

Chapter One: Introduction to Neuropsychology

Objectives

At the end of Module 1.1, Introduction to Neuropsychology, your class should be able to describe:

1. the domain and goals of neuropsychology
2. popular and historical perspectives of neuropsychology
 - a. including the dualistic views of brain function proposed by Descartes
 - b. prehistoric views of brain function
 - c. Greek, Roman and 17th century European views of brain function

At the end of Module 1.2, The Recent History of Neuropsychology, your class should be able to describe:

1. the key findings of Broca, Wernicke, and Hughlings Jackson. As well your class should be able to describe some of the key case-studies that have been used to understand brain function
2. the research that tried to understand the cellular components of the brain
3. the brain hypothesis
4. the series of events that led up to the use of neurosurgery as a treatment for a variety of diseases

Key Terms

Aphemia

Aura(s)

Cardiocentric hypothesis

Cephalocentric hypothesis

Cerebrospinal fluid

Clinical neuropsychology

First Law of mass action

Lesioning

Leucotomy

Monism

Neuron doctrine

Neuropsychology

Cytoarchitecture	Nissl stain
Dualism	Phrenology
Engram	Postcentral gyrus of the parietal lobe
Equipotentiality	Prefrontal lobotomy
Experimental neuropsychology	Prosody
Functional neuroimaging	Psychology
Golgi stain	Somatosensory homunculus
Histology	Synapse
	Trephination
	Wernicke's Aphasia

Lecture launchers (and possible essay questions)

The following are a few suggestions about how to approach lectures on Module 1.1

1. How have older beliefs about the importance of structures other than the brain lingered? What is the evidence from language?

The following are a few suggestions about how to approach lectures on Module 1.2

1. What are the limitations of case studies? Of lesions?
2. What evidence is there that individuals recognized the brain as important in both 'normal' behavior and in 'abnormal' behavior?
3. What were the reasons that psychosurgery became a popular treatment of individuals suffering from a variety of mental illnesses?

Multiple-Choice Questions

1. Consider the statement "humans only use 10% of their brain". Which of the following statements is *true*?

- a) This is a fact that Albert Einstein discovered
- b) This is not true for humans, but it is true for rats and other rodents

- c) The statement is a myth that is well-known and often repeated
- d) This is true only for infants, but humans gradually use more as they age
- e) This is true only for adults, because infants are less developed than adults and need to use more of their brains for basic functioning

Answer: C

2. *Trephination* was an ancient procedure that...

- a) was performed in order to 'cure' an individual of some ailment
- b) removed the heart of an individual, because all thoughts and emotions were thought to originate there
- c) involved the surgical opening of the skull
- d) a and c
- e) b and c

Answer: D

3. Descartes believed that voluntary behaviours or the 'rational soul' was located at the pineal gland because...

- a) surgical removal of this gland in animals left them in a vegetative state
- b) writings left by the ancient Greeks documented the importance of this gland in their studies
- c) of its anatomical position in the brain (its unitary nature)
- d) the pineal glands of criminals tended to be smaller than that of law abiding people
- e) the pineal gland is a bilateral structure, which relates to mind (right pineal) and soul (left pineal)

Answer: C

4. Dualism is a view about mind-body interaction that believes...

- a) that the mind and body are separate but interacting identities
- b) there is a causal interaction between mind and body that cannot yet be explained

- c) the mind can affect the body, but the body cannot affect the mind
- d) the body can affect the mind, but the mind cannot affect the body
- e) These are all possible dualistic beliefs

Answer: D

5. What was the first widely accepted function to be localized in the brain?

- a) The respiratory center, discovered by Jean-Cesar Legallois
- b) Eye sight, discovered by Johann Spurzheim
- c) Hand coordination, discovered by Gustave Dax by researching primates
- d) Sexual impulses, discovered by Hugh Heffner
- e) language, discovered by Johns Hughlings Jackson

Answer: A

6. Which of the following statements about Wernicke's aphasia is true?

- a) An individual with this condition cannot produce speech but is still capable of using words correctly.
- b) An individual with this condition is unable to produce speech but is able to understand speech.
- c) This condition is caused by a lesion in the left frontal lobe.
- d) An individual with this condition can produce speech and understand verbal language, but only produces random words when writing (word salad).
- e) An individual with this condition can still produce speech, but is incapable of using words correctly and is unable to understand the speech of others.

Answer: E

7. What does the *neuron doctrine* propose about neuronal systems?

- a) That neurons are not continuous and that they must communicate by contact
- b) That neurons form continuous circuits
- c) That the neuron contains three distinct parts: the cell body, the axon, and the dendrites
- d) That neurons can become visible under a microscope because of histology

e) That neurons are the most important cell in the body

Answer: A

8. The German neuroanatomist, Korbinian Brodmann, is most notable for his work involving...

- a) phrenology, in which he proposed that an increased size of an area of the brain was associated with increased function.
- b) cytoarchitecture, in which he divided the cortex into similar regions, forming a map of the brain.
- c) histology, in which he developed new stains and staining techniques.
- d) the neuron doctrine.
- e) histology, for which he won the Nobel prize

Answer: B

9. Which of the statements about the engram is *false*?

- a) The engram is a location in the brain that is responsible for storing memories.
- b) Lesioning rat brains was done by Lashley in an attempt to find the engram.
- c) Research involving the engram led to the formulation of the laws of mass action and equipotentiality.
- d) The engram is a hypothetical word to describe the location of stored memories.
- e) Lashley did not find a single area responsible for producing behavior

Answer: A

10. Wilder Penfield devised a technique for stimulating the cortex of his patients while they were awake. Because his patients were able to communicate the sensations they could feel during the procedure, it led to the development of a sensory and motor map called...

- a) the somatotopic map.
- b) the sensory homunculus.
- c) the postcentral map.

- d) the somatosensory homunculus.
- e) the sensory funiculus

Answer: D

11. The gap between neurons is known as

- a) the axon
- b) the synapse
- c) the myelin
- d) the engram
- e) the gapatron

Answer: B

12. The Law of Mass Action proposes that...

- a) the cortex functions as a whole, with no functional specialization within the cortex.
- b) an increase in neurotransmitters in the brain increases overall brain activity.
- c) large portions of the brain must be activated in order for functional neuroimaging techniques to work
- d) the degree of deficit is directly related to the proportion of the brain that has been lesioned.
- e) there is no part of the brain that is special for language

Answer: D

13. Clinical neuropsychology is mostly concerned with...

- a) psychological assessment management and rehabilitation or neurological disease and injury.
- b) explaining how patterns of behavioural impairments can be explained in terms of disruptions to the damaged neural components.
- c) brain surgery on afflicted individuals to improve their cognition.

- d) researching the effects of medications on persons who are affected with neurological damage.
- e) helping people understand and/or change the behavior of their children and spouses

Answer: A

14. What does the term monism mean?

- a) The idea that there is only one dominating truth for all brain functions.
- b) The idea that cognition and brain mechanisms are the same thing.
- c) The idea that the mind and body are the same thing.
- d) The idea that behaviour is a function of the brain.
- e) It is the theory that each human has only one thought process.

Answer: C

15. Which of the following is *true* about Nissl staining?

- a) This technique led to the theory of the neuron doctrine by Franz Nissl.
- b) It is a staining technique done in order to distinguish neurons from other cells in the brain by staining the cell body.
- c) This is a staining technique done by soaking tissue in silver chromate in order to make neurons appear in a dark colour.
- d) The discovery of this technique 20 years ago has made more advances in knowledge of neuroanatomy than the previous 100 years combined.
- e) All of the above are true.

Answer: B

16. Which of the following is the correct definition of histology?

- a) The history of neurology.
- b) The study of past neurologists.
- c) The study of past neurological techniques.
- d) The study of thinly sliced, fixed and stained tissues.
- e) The study of neurological disorders.

Answer: D

17. Which of the following is the term for the deficit suffered by individuals who, as a result of a left hemisphere frontal lobe lesion, are incapable of productive speech?

- a) Disfunctional Speech Disorder (DSD)
- b) Articulatory aphasia
- c) Wernicke's aphasia
- d) Broca's aphasia
- e) transcortical aphasia

Answer: D

18. What is the cardiocentric hypothesis?

- a) The hypothesis that the heart is the center for cognitive and emotional function.
- b) The hypothesis that the soul is located in the heart.
- c) The hypothesis that the heart is fully developed in the fetus before the brain.
- d) The theory that there is a communicative line between the heart and brain that determines behaviour.
- e) The theory that the heart is located directly in the center of the body

Answer: A

19. Which of the following is an accurate description of the patient known as Tan?

- a) A man who lost the ability to speak but could still comprehend language.
- b) A case study that led to Carl Wernicke's discovery of Wernicke's aphasia.
- c) A man who suffered a severe lesion of the posterior right hemisphere.
- d) A man whose skin turned darker following exposure to UV light
- e) A man who suffered a severe lesion of the right parietal lobe.

Answer: A

20. The study of the skull as a mean of understanding an individual's cognitive strengths and weaknesses, and personality traits is known as...

- a) neuropsychology
- b) physiology
- c) the Gall technique
- d) phrenology
- e)

Answer: D

21. Which of the following best defines clinical neuropsychology?

- a) The branch of psychology in which the biology of the person is the most important aspect of diagnosis.
- b) The branch of neuropsychology concerned with studying the physiology of cognitively impaired persons.
- c) The branch of neuropsychology concerned with psychological assessment, management, and rehabilitation of neurological disease and injury.
- d) The branch of neuropsychology concerned with psychological assessment, management, and rehabilitation of persons with motor and spatial confusion.

Answer: C

23. Which of the following statements is *false* regarding studying the history of neuropsychology?

- a) It is important to study because it provides insights into the development of science.
- b) It is important to study because it gives us information about what is left to discover.
- c) It is important to study because it illustrates the instances within the discipline in which researchers were wrong about the nature of brain-behaviour relations.
- d) It is best to study what is known to be true now rather than what is now known to be false in order to avoid confusion.

e) Many of the most firmly held views in neuropsychological history are now known to be false.

Answer: D

24. Which of the following correctly defines the cephalocentric hypothesis?

a) The hypothesis that the brain and heart interact to form behaviour and emotion.

b) The hypothesis that the brain is the center for behaviour.

c) The hypothesis that the brain is the center for emotion.

d) The hypothesis that the heart is the center for emotion.

e) The hypothesis that the heart is the center for behaviour.

Answer: B

25. Which of the following is *not* a remnant of cardiac hypothesis in popular culture?

a) "Action is eloquence," said by William Shakespeare.

b) The expression "It makes my blood boil."

c) The hearts found on Valentines Day cards.

d) The song title, "Billy Broke My Heart at Walgreens and I Cried All the Way to Sears."

e) The poem "Proud of My Broken Heart" by Emily Dickinson.

Answer: A

26. Descartes theory described as the flow of "animal spirits" through "valvules" within nervous tissue filaments is known as the _____ theory.

a) valvule

b) soul

c) autonomic

d) mind-body

e) reflexive

Answer: E

27. Which of the following is the function of cerebrospinal fluid in the brain?

- a) The function is not entirely clear and needs further research.
- b) To support, nourish and clean the brain.
- c) To lower the temperature of the brain.
- d) To make a reservoir allowing for voluntary action.
- e) To connect veins and arteries to the correct location in the brain.

Answer: B

28. Current analogies of brain function resemble current technologies. For example, describing the brain as a supercomputer. What is one problem with these mechanical accounts of mental life?

- a) The human brain does not match the complexity of a supercomputer.
- b) Their relative inability to account for variability in behaviour.
- c) The human brain while asleep is not comparable to a computer that is shut off.
- d) We are unable to draw comparisons because of computers limited sensory modalities.
- e) None of the above are acceptable criticisms.

Answer: B

29. Physiologists Bell and Magendie studied the nerves that exited the spinal cord. Their discovery that the spinal cord was _____ led to the view that the brain was _____.

- a) functionally segregated; functionally segregated
- b) structurally segregated; structurally segregated
- c) a distinct entity; a distinct entity
- d) easily accessible for research; easily accessible for research
- e) measurable; measurable

Answer: A

30. A perceptual experience that many epileptics experience, which occurs without sensory stimulation before the onset of seizures, is known as _____.

- a) halos
- b) seizure atmospheres
- c) the “burnt toast” phenomena
- d) auras
- e) sensory epilepticus

Answer: D

31. Which of the following correctly defines psychology?

- a) The study of the attempt to describe, explain, predict and in some cases, change behaviour
- b) A collection of theories to explain mental behaviour.
- c) The scientific approach of assessing personality.
- d) The study of the relationship between behaviour and activity of the brain.
- e) They study of people as individuals.

Answer: A

32. What is the term for the procedure where the thalamus is disconnected from the frontal lobe with a special knife?

- a) frontalectomy
- b) thalami lesion
- c) leucotomy
- d) trephination
- e) hysterectomy

Answer: C

33. What is the stain that stains the entire neuron, revealing parts other than the cell body?

- a) Gall stain
- b) Synapse stain

- c) Cyto stain
- d) Nissl stain
- e) Golgi stain

Answer: E

34. Golgi staining is done through soaking tissue in _____, making stained neurons appear a dark colour.

- a) lithium hydroxide
- b) silver chromate
- c) radium hydroxide
- d) potassium alkalis
- e) magnesian acid

Answer: B

35. What is the name for techniques that provide three-dimensional representation of brain metabolism while the person is performing various mental tasks?

- a) histology techniques
- b) MRIs
- c) functional neuroimaging
- d) radiology techniques
- e) experimental neuropsychology

Answer: C