

NEUR0010

Topics: Memory 1&2

NOTE before proceeding: This last third of the class varies greatly from year to year than the previous two thirds. I don't have time to rearrange all the questions to match the ever-changing order of material, so please check the heading above for the topics covered.

2009-3

79. Memories of familiar faces are

- a) declarative information stored in cerebral cortex
- b) declarative information stored in the striatum and cerebellum
- c) non-declarative information stored in the cerebral cortex
- d) non-declarative information stored in the striatum and cerebellum

80. Consolidation is the conversion from

- a) short term to long term memory
- b) working memory to short term memory
- c) working memory to long term memory
- d) short term memory to working memory

81. All the following are traits of short term memory EXCEPT:

- a) large capacity
- b) used to actively hold information "in mind"
- c) subject to disruption by brain injury
- d) lifetime of hours to days

82. A lesion of inferotemporal cortex (area IT) produces which deficit

- a) inability to recognize faces
- b) hyperreflexia
- c) difficulty telling whether successive visual stimuli appear at the same location on a computer display
- d) inability to adjust to new rules in the Wisconsin Card Sorting Task

83. Memory storage in inferotemporal cortex involves all of the following EXCEPT:

- a) increases in synaptic strength
- b) decreases in synaptic strength
- c) changes in synaptic strength distributed across many neurons
- d) many thousands of individual neurons that each store an individual memory

84. Long term potentiation in the hippocampus requires
- a) hyperpolarization of the postsynaptic membrane and Ca^{++} entry through NMDA receptors
 - b) depolarization of the postsynaptic membrane and Ca^{++} entry through NMDA receptors
 - c) hyperpolarization of the postsynaptic membrane and Ca^{++} entry through AMPA receptors
 - d) depolarization of the postsynaptic membrane and Ca^{++} entry through AMPA receptors
85. Long term depression in the hippocampus involves all of the following EXCEPT
- a) NMDA receptors
 - b) high frequency stimulation of afferents
 - c) weak postsynaptic activation
 - d) activation of protein phosphatases
86. Working memory in brain area LIP is seen as
- a) a response that precedes the presentation of a visual stimulus
 - b) an enhanced response to stimuli that had been seen before
 - c) a sustained response after a stimulus is turned off
 - d) a response during an eye movement that signals a perceptual decision
87. Human working memory is commonly assessed by
- a) conditioned place preference
 - b) retention of declarative information from day to day
 - c) recollection of childhood events
 - d) Wisconsin card sorting task
88. In retrieving food from a radial arm maze, rats with hippocampal lesions are different from rats without lesions in what way
- a) rats with lesions no longer seek food rewards
 - b) rats with lesions retrieve food from the arms of the maze but they are inefficient in retrieving all the food
 - c) rats with lesions can no longer use visual cues to locate food
 - d) with the loss of place cells, the rats with lesions are no longer able to navigate the maze
89. The human hippocampus is found to be most active when a person navigates a virtual city in a video game
- a) by referring to a map of the virtual city
 - b) from memory after practicing the game
 - c) from visual or verbal directional cues from an experimenter
 - d) by watching a recording of another person navigating the city

90. One day as you left a neuro 1 lecture, you walked to the Blue Room and were hit on the head by a brick dropped by a construction worker. You consequently had absolute anterograde amnesia but no other deficit, meaning you most likely forgot

- a) the name of your roommate
- b) how to reach your dorm room
- c) the spellbinding lecture you had just seen titled “memory, bricks, and you”
- d) the name of the cute EMT who bandaged your head

91. The cause of amnesia in the famous case of H.M. was surgical removal of

- a) medial temporal lobes
- b) prefrontal cortex
- c) the pole of the occipital lobes
- d) posterior parietal cortex

92. Long term memories are stored in

- a) thalamus
- b) hippocampus
- c) primary sensory cortex
- d) cortical association areas

2010-3

79. Walking down Thayer St you see a new restaurant that offers everything “in a cone!”. Imagining a pepperoni pizza squashed into a cone you make a mental note of the phone number so you can ask the restaurant owner later. As you repeat the number to yourself you are using:

- a) long term memory
- b) short term memory
- c) working memory
- d) way more memory than the restaurant deserves

80. A neuron in prefrontal cortex responds to a stimulus and continues responding during a delay period with no stimulus prior to the animal making a decision. The continued response of the neuron is an example of:

- a) long term memory
- b) short term memory
- c) working memory

81. In rats trained to run a radial arm maze to retrieve food treats, the biggest difference between a normal rat and a rat with a hippocampal lesion is that the lesioned rat:

- a) retrieves more food
- b) has less interest in food
- c) takes longer to retrieve food because it revisits arms
- d) does not remember how to run the maze

82. Walking to the final exam you pass by the Rockettes who are practicing on the Green. A shoe flies off a dancer's foot and hits you in the head. You realize you can no longer remember if you had 6 or 7 donuts for breakfast. This memory loss is an example of what kind of amnesia:

- a) anterograde
- b) retrograde
- c) projective
- d) episodic

83. The severe amnesia experienced by patient H.M. was associated with the surgical removal of which two structures:

- a) prefrontal cortex and amygdale
- b) amygdale and hippocampus
- c) lateral intraparietal cortex and hippocampus
- d) prefrontal and lateral intraparietal cortex

84. The famous neurosurgeon Wilder Penfield found that some patients described memory-like experiences when which lobe of their brain was electrically stimulated:

- a) frontal
- b) occipital
- c) parietal
- d) temporal

85. In a human brain imaging study, people navigate a virtual world in a computer game either by following arrows on the screen or by recall of the route. The difference in brain activity is that when people use their memory to recall the route, one area is much more active than when there are explicit cues. The more active area is:

- a) hippocampus
- b) prefrontal cortex
- c) association sensory cortex
- d) amygdale

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90. Long term depression in the hippocampus involves all of the following EXCEPT
a) NMDA receptors
b) high frequency stimulation of afferents
c) weak postsynaptic activation
d) activation of protein phosphatases

91. Unlike working and short term memory, the formation of long term memory requires:
a) activation of both protein kinases and protein phosphatases
b) very high levels of input activity
c) correlated presynaptic and postsynaptic activity
d) protein synthesis

92. Remembering how to ride a bike is an example of
a) declarative memory
b) non-declarative memory
c) associative memory
d) dissociative memory

2011-3

72. The following statements about memory storage are all correct EXCEPT:
a) memory storage is influenced by emotional content of events
b) short term memory storage involves changes in the number of AMPA receptors
c) memory storage is distributed across neurons and synapses
d) memory storage is based on synaptic strengthening and forgetting is based on synaptic weakening

73. The hippocampus is located in the:

- a) frontal lobe
- b) occipital lobe
- c) parietal lobe
- d) temporal lobe

74. NMDA receptors are called coincidence detectors because ion movement through the channel requires:

- a) binding of magnesium to the NMDA receptor AND entry of calcium into the postsynaptic neuron
- b) binding of glutamate to NMDA receptors AND no glutamate binding to AMPA receptors
- c) binding of glutamate to the NMDA receptor AND depolarization of the postsynaptic membrane
- d) flow of Ca^{++} through the NMDA receptor channel AND long term potentiation at the synapse

75. The following statements about long term depression are all correct EXCEPT:

- a) NMDA receptors are activated
- b) AMPA receptors are blocked by magnesium
- c) lower frequency stimulation is required than that needed for LTP
- d) Ca^{++} must enter through the NMDA receptor channel

76. Synthesis of new proteins is required for:

- a) long term potentiation
- b) working memory
- c) short term memory
- d) consolidation

77. In the hippocampus, CA1 neurons receive input from:

- a) perforant path axons
- b) Schaffer collateral axons
- c) dentate gyrus mossy fibers
- d) entorhinal cortex pyramidal cells

78. "Graceful degradation" of long term memory means that:

- a) each year of our life we completely lose memories for only a small percentage of all the things we know
- b) we acquire new memories at approximately the same rate that we lose old ones
- c) memories gradually weaken and become more similar to each other
- d) we are not aware that we are losing memories

79. In your latest brilliant idea to get rich quick, you train your pet monkey to remember which of three containers holds a 10 dollar bill. You go to Caesars' Palace in Las Vegas and the dealer puts money in one of three boxes and then puts lids on the boxes. The monkey must remember which box holds the money for 30 seconds and then he chooses by tapping on the box. The correct answer is different each time. During the delay period in which the monkey must remember which box holds the money, the information is best described as being stored in:

- a) short term memory
- b) working memory
- c) long term memory
- d) monkey memory

80. To make things more interesting, Caesar's Palace has installed an fMRI machine that allows you to see the brain activity of the players at the games. When your monkey is playing the 3-box game, brain activity that peaks during the delay period is most likely to be seen in which part of the brain:

- a) primary visual cortex
- b) prefrontal cortex
- c) substantia nigra
- d) cerebellum

81. A rat with bilateral hippocampal lesions will have what deficit retrieving food from a radial arm maze:

- a) the rat will have difficulty remembering how to navigate the maze
- b) the rat will perform in all respects the same as a normal animal but it will move slower
- c) the rat will be able to retrieve food only if the cheese bits are in exactly the same locations each time it runs the maze
- d) the rat will retrieve all the food but it will enter some arms more than once before retrieving the food from other arms

82. The following statements about place cells in the rat hippocampus are all correct EXCEPT:

- a) a cell is more active when the rat is in one location compared to other locations
- b) different cells have place fields in different locations
- c) the cells require visual input to be active
- d) the location that gives the greatest response may change in time

83. You are riding your bicycle past the V-Dub and someone throws a dinner roll out the window that hits your head like a brick. The EMTs, who suspiciously happened to be eating rolls at the time, diagnose you with mild retrograde amnesia. What memory is most likely impaired:

- a) the name of the fuzzy dog stuffed animal you had when you were 3 years old
- b) the short cut path you take every week to excitedly rush from your dorm to neuro 1
- c) the flavor of ice cream you ate a few minutes before the accident
- d) the color of the ambulance that came 15 minutes after the accident

84. Speaking of “Puggy” the stuffed dog, where is the most likely location in your brain where your memory of that critter has been stored for over a decade?

- a) primary sensory cortex
- b) thalamus
- c) hippocampus
- d) temporal lobe cortex

85. The amnesia of H.M. is characterized by:

- a) difficulty remembering his childhood
- b) inability to consolidate new declarative memories
- c) difficulty performing routine daily tasks
- d) inability to learn new procedural tasks