International Institute of Information Technology, Hyderabad

(Deemed to be University)

Intro to Cognitive Science (CS9.426) Spring-2022

Question cum Answer Booklet

Quiz 1

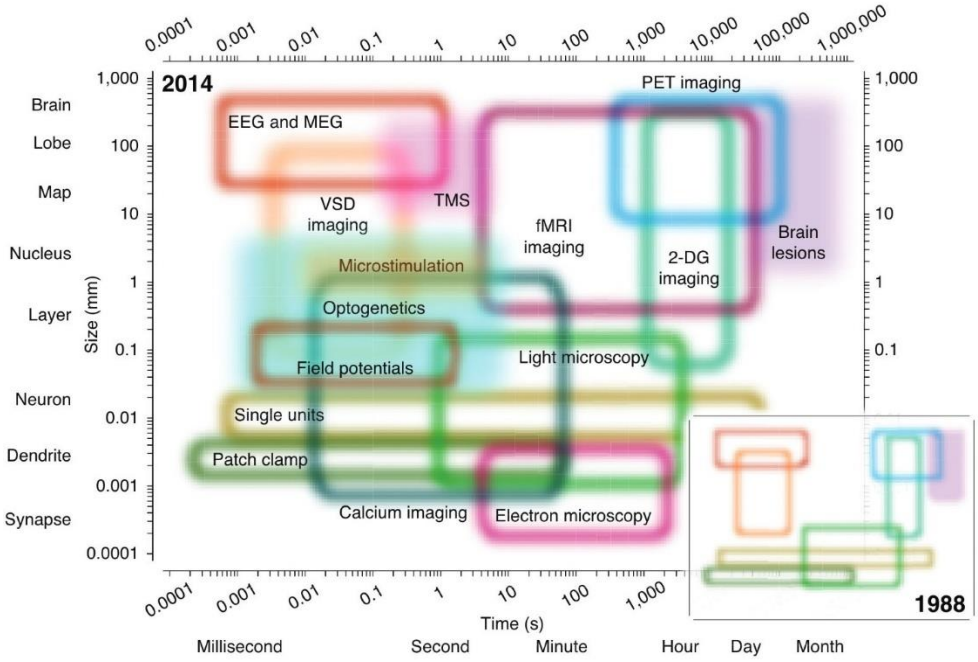
1. 

   In this example, symbol in the middle can be interpreted in 2 ways based on the surrounding symbols. Which factor is responsible for that? **(0.5)**
   a) Top-down processing
   b) Bottom-up processing
2. Behaviourism completely ignored internal processes and only focused on what was observable. **(0.5)**
   a) True
   b) False
3. People are more likely to notice a 100g increase in weight of a 1kg sweet box as compared to the same increase in a 10kg one. This can be explained by **(0.5)**
   a) The absolute threshold
   b) Signal detection
   c) Opponent processes
   d) Weber's law
4. A rat can be taught to navigate a spatial maze by reinforcing the correct path through the maze using juice rewards. Other rats that passively observe this training but don't get the juice rewards themselves can also learn the navigation task. The following explanation for how the rat navigates through the maze would be favoured by cognitivists: **(0.5)**
   a) The trained rats navigate through the maze in order to maximize the probability of a juice reward whereas the observer rats mimic the behavior that they observe because of social contagion effects.
   b) The rat changes its behaviour solely in response to the reward. The observer rats experience the same change in behaviour in response to the reward they can see being administered to the other rats even though they don't get the rewards themselves.
   c) Rats have enhanced spatial cognition compared to humans and therefore can learn merely by observation.
   d) The rat forms an internal representation of the maze and therefore can use such an internal map for navigation.
5. Alice and Bob are given a number N and there are trying to find all prime numbers less than N. They are using Sieve of Eratosthenes algorithm. Bob is using Python while Alice is doing it on pen and paper. At which level of Marr's analysis do they differ? Select the highest applicable level. **(0.5)**
   a) Algorithmic

Good Luck

b) Implementational

c) Computational



6. Alice is performing an experiment to measure temporally precise cortical responses to brief (300 ms) presentations of visual gratings. Which imaging technique would be most suitable for it? **(0.5)**

a) EEG

b) fMRI

c) Electron microscopy

d) PET imaging

7. Match the function with the part of the neuron. **(1.5)**

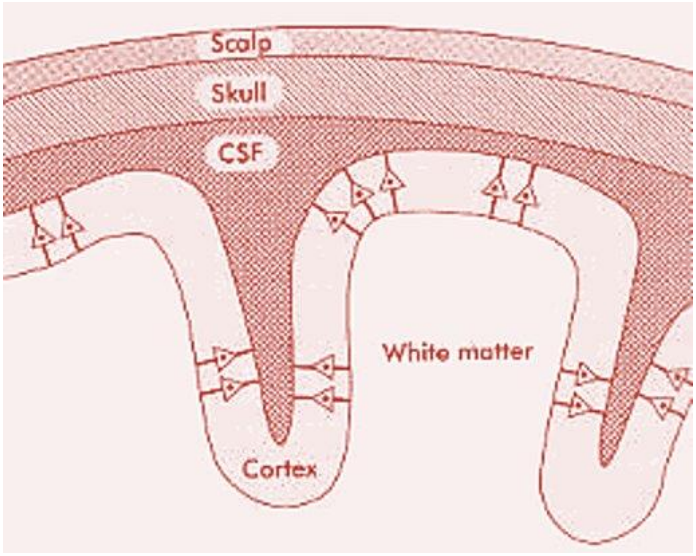
Function	**Part of Neuron**
A. Renewal of cell components - 2	1. Axon
B. Site of input - 4	2. Cell Body
C. Action potential travels through it - 1	3. Synapse
D. Provides entry to neurotransmitters- 3	4. Dendrite

8. In a signal detection model, holding the noise and signal+noise distributions the same, what happens if you decrease the criterion? **(0.5)**

a. Increases both hit rate and false alarm rate

b. Decreases hit rate but increases false alarm rate
c. Increases hit rate but decreases false alarm rate
d. Decreases both hit rate and false alarm rate

9. The Magnetoencephalography (MEG) coil is not sensitive to _____ but is sensitive to _____ dipoles. **(0.5)**

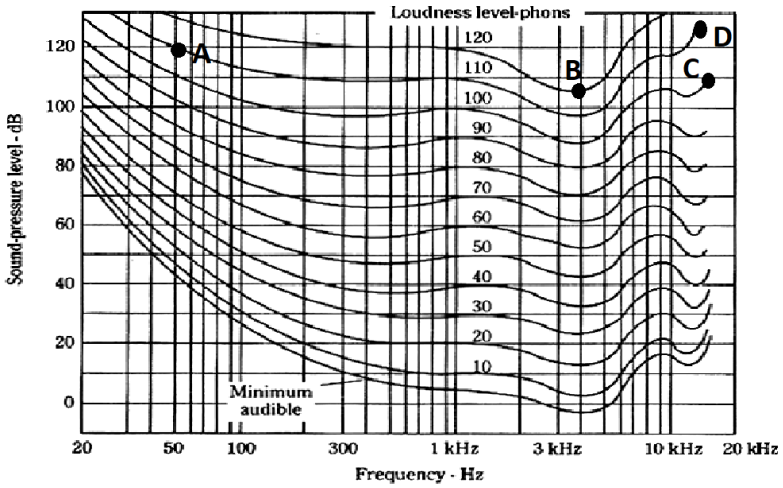


a. tangential; radial
b. radial; tangential
c. deep dipoles; surface-level
d. surface-level dipoles; deep

10. While trying to solve the color constancy problem, which of the following activities of a cognitive scientist is described by Marr's computational level? **(0.5)**
    a. analyze the constraints acting on illuminants and reflectances, and make assumptions about information that is required to solve the problem.
    b. propose the dimensionality of the visual representations in the occipital cortex when viewing the image and specify operations on these representations that may lead to the perception of color constancy.
    c. use EEG recordings to understand how the visual cortex responds to different squares of the image and therefore try to understand how two squares of different colors come to elicit the same percept.
    d. propose two alternative neural mechanisms in terms of elaborate mathematical models that can potentially explain color constancy.
11. Which of the following are true about mental representations? Choose all that apply (**1 mark** – zero credit if all correct options are not indicated or if a wrong option is chosen).
    a. Mental representations are analogous to computer programs.
    b. Mental representations are analogous to symbols in computers that are operated upon by algorithms.
    c. Mental representations are key ingredients of dynamical systems theory in cognitive science.

d. According to the information-processing view of the mind/brain, neural computations are thought to occur by neural mechanisms that operate on mental representations in the brain.

12. Which sensory system bypasses the thalamus while transmitting information to its respective primary cortex? **(0.5)**
    a. Visual
    b. Auditory
    c. Olfactory
    d. Tactile
13. Mirror therapy treatment is commonly used to treat **(0.5)**
    a. Colour blindness
    b. Tactile Acuity
    c. Hemispatial Neglect
    d. Phantom Limb pain
14. Select the correct physical perceptual correlate pairs. **(0.5)**
    a. Pitch : Timbre and Loudness : Amplitude
    b. Pitch : Frequency and Loudness : Timbre
    c. Pitch : Frequency and Loudness : Amplitude
    d. Pitch : Amplitude and Loudness : Frequency



15. In the given graph, which point sounds the loudest? **(0.5)**
    a. A
    b. B
    c. C
    d. D
16. Timbre is a physical attribute of sound. **(0.5)**
    a. True
    b. False
17. Which statement is incorrect about across fibre model of gustatory perception? **(0.5)**
    a. Each taste quality is specified by activity of non-overlapping cells and fibres.
    b. Specification of one taste quality is embedded in a complex pattern of activity across various lines

c. Individual taste receptors cells are tuned to multiple taste qualities.
d. The same efferent fibre carries information for more than one taste modality