

They said we should guess 2-3 other questions for each video, in the sense of the mock exam, and with a high probability have the questions they will ask in the exam. So here we go:

Complementary questions to mock exam (made up by myself - i will use the same numbering as in the mock exam to show the relation to the specific slides)

1. Explain the multidisciplinary perspective.

Cog neuroscience is the interdisciplinary study of the mind

It is the intersection of philosophy, biology, neuroscience, psychology, linguistics, Ai, robotics, physics

2. Name the four types of representations. - Explain the tri-level hypothesis.

Representations: mind performs computations on representations - representation is something that stands for something else

Concepts: stands for a single entity or group of entities „apple“, “fruit”

Propositions: statements about the world and can be illustrated with sentences: „Mary has black hair.“ Mary is concept, black is concept, hair is concept,

Rules „If it is raining, I will bring my umbrella.“, can specify the relationships between propositions, the second proposition does not happen unless the first one happens, we do this kind of inference everyday, Unconsciously.

Analogies „Life is a roller coaster.“ What is the similarity between roller coasters and life?
We know that ;)

Tri-level hypothesis: levels for mental or artificial information processing

Computational level: Whats is the underlying problem the system is trying to solve (example: sort a set of rules)

Algorithmical level: which alg solves this problem (example: bubble sort)

Implementational level: how the alg is implemented(example: python code)

3. What is dualism?

Mental and physical substances are possible

One believes that both mental and physical substances are possible

Plato: mind and body exist in two separate worlds

Mind: ideal world - immaterial, non extended, eternal

Body: material world - extended, perishable(mortal)

Example: Circles are theoretically always perfectly round. But in the real world, not always.

4. What is Structuralism - Functionalism - Gestalt Theory - Behaviourism?

All resolve relations between body and mind

Voluntarism: mind consists of elements assembled into higher cognitive components through the power of will (voluntary effort of the mind)

Describes consciousness with elements assembled into sth complex

Structuralism: in contrast to voluntarism - mind not a voluntary act. Mind as passive reagent

Total of 44000 sensation elements described (all fundamental)

Also mind described with basic elements

Functionalism: implies that mental states might not be reduced to any particular physical state (many possible physical states for same thought)

Describes rather what mind does instead of its elements

Mind as a stream of consciousness

Darwin

Gestalt Theory: counter reaction to structuralism

“the whole is greater than the sum of its parts”

Gestalt: integrated whole; conscious whole cannot be reduced to parts

Main method: phenomenology (subjective experience)

Behaviourism: the mind as a black box

Skinner as example: learning through punishment and reinforcement

behaviours are indicators of mental states

They believe the environment controls a person's actions, not mind.

mental states are tendencies to behave in certain ways under certain circumstances,

For example Happiness can be thought of as the tendency to smile or laugh.

Is that always true? No

5. What is the role of the neurons?

Information processing; use electrical impulses and chemical signals to transport information between different brain regions/nervous system

Are connected through synapses

Eventually myelinated - the thicker the myelin sheath and the thicker the neuron diameter the faster the velocity of transport

Neuron consists of dendrites(if multiple dendrites = multiple inputs) a cell body and an axon(wrapped with myelin for noise reduction)

Neurons have activation thresholds, if summation of input signals(through dendrites) be large enough to exceed this threshold, Depolarization happens (activation potential)

6. Describe the major neural activity generation models? (same as mock, i didn't get this) - maybe Nernst Equation or Hodgkin-Huxley model?

Describing how action potentials in neurons work

Nernst Equation: describes how to reach equilibrium through the neural membrane

Electrical potential difference drives ions through the cell until extracellular and cytoplasmic site of the cell are in equilibrium

Ions can pass through cell membrane using ion channels (Na⁺, Cl⁻, K⁺)

For K it is -75mv, near resting potential

Hodgkin-Huxley: mathematical way of describing the ion mechanism

12. Describe how voltage signals can be used to measure neural activity.

Neural activity is based on electric signals passing through them. we measure the voltage across a neuron with a voltage, eternal to determine when it is firing, as the voltage will change.

13. What are CT / PET used for?

Positron Emission Tomography/Computed Tomography)

Used to measure the pet signal. - detect diseases before imaging can detect

Used to analyse brain activity - detect tumours

14. Couldn't think of another question

15. Who was Broca - Wernicke - Molaison ?

Broca: damage to broca's area/frontal gyrus - unable to speak

Wernicke: injury to temporal gyrus. Bad comprehension between written-spoken language

Molaison: brain surgery cured his epilepsy. But was unable to form new memories. But could learn new motor tasks like violin (no long term knowledge what he experienced)

16. Couldn't think of another question

17. What is the auditory system?

18. Explain dorsal + ventral stream.

Two auditory systems

Dorsal stream: Where the sound comes from, where is the object , speech production

Ventral stream: What comes - phonological processing, speech comprehension

19. List all 5 tastes and state which can be perceived through ion channels.

Sensed with tongue. Receptors on top of taste buds

Sour, salty (ion channels)

Sweet, bitter, umami (bound tastants on receptors)

20. Explain Somatosensation and the 3 ceptions.

Somatosensation: Touch, pressure, pain, temperature

Proprioception: pro prio - by myself. Sensing oneself (muscles, ..)

Exteroception: extero - outside. Sensing outside of the world (touch, pressure on hand)

Interoception: inter - inside. Sensing the inside world

21. Explain Thunberg's illusion and its correspondence to pain sensation.

Burning heat as a result of cold and warm. Bruning heat felt after placing the hand on a plate with alternating cold and warm bars.

(Copy form above - was well described)

22. Name the 3 levels of how a visual scene is analysed.

LLP lower level processing: orientation, colour, contrast

ILP intermediate lp: contour, surface, shape

HLP higher lp: identify whole object

23. Couldn't think of another question

24. Which brain structure is important in reusing learned patterns?

Basal ganglia: active when reusing learned patterns and adapting them

25. What is explicit memory?

Two types of memory short-term/working memory and long-term memory

Two types of Long-term memory: declarative/explicit and non-declarative/unexplicit memory

Declarative/ Explicit Memory : is the conscious storage and recall of information

- requires conscious recall where some consc. process must call back the information
- explicit memory since it consists of information that is explicitly stored and retrieved
- usually the primary process one thinks of when referencing to memory

26. What is the P600 wave?

The P600 wave is a brainwave, emitted 600ms post stimulus as a reaction to syntactic violations. Can be measured as positive peak after grammatical error

27. Describe the Turing Test - Damasio's Theory of Consciousness - Chinese Room.

Turing Test: imitation game: test of machines ability to act as a human/think

Damasio: consc. Relies on emotions and feelings

Emotions: unconscious Response to external input/stimuli

Feelings: arise after awareness of change in emotion

Chinese Room: answer to (turing test) the belief that a computer can be intelligent

computer can not have a mind/understanding or consciousness

Mind as a chinese room: intelligence comes from computing right input to right output