

Exam SS 2021

1. What is Cognitive Science?

See above

2. Name examples for computations performed by the mind.

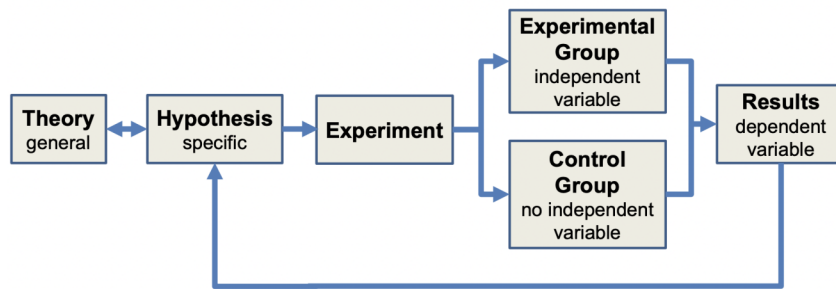
See above

3. What is dualism?

See above

4. What is the scientific method?

Psychology and the scientific method



5

Eg: Studying the effect of memory while listening to music

5. What is the role of neurons?

See above

6. What is an action potential?

See above

7. Explain what the term plasticity means

The brain is dynamic. It can adapt (regrow, reorganise). Given an injured part in the brain or malfunction it can regrow and reorganise

In the same way learning works - reorganisation - routing new paths through the brain

8. What is the central nervous system?

See above

9. What are gyri and sulci?

Gyrus is a ridge on the cerebral cortex

Sulcus is a groove on the cerebral cortex

Both give the specific shape of the brain - they increase the surface

10. After birth, neurons grow to a specific shape and form spines. Describe the event after the outgrowth phase.

-> Initiation > Outgrowth > Branching > Spine formation > Stopping/pruning (growth is stopped and unnecessary connections are removed, important ones are strengthened)

11. We talked about various electrophysiological methods. Name three and order these with increasing invasiveness.

See above

12. GFP is used to track proteins in vivo. What is GFP and what makes it so special?

See above

13. What is CT (in contrast to MRI)?

Computer Tomography: x rays

MRI magnetic resonance imaging: uses magnetic field

Both are used to capture disease as cancer

CT can scan whole body

MRI can show some disease which are nearly unable to trace with CT

14. Understanding neural connectivity (“connectomics”) is very important. Explain briefly why. Maybe use an adequate example where the connection matters.

Knowing the circuitry helps in identifying the purpose.

15. What are split-brain patients?

The hemispheres are no longer connected to each other

Patient WJ: WorldWar attendant injured, “one hand tried to open the door and the other one tried to block”

16. What is lateralization of brain function?

That specific functions performed by the brain are located in one of the hemispheres

17. What is the organ of corti?

Organ of corti converts sound signal to electric signals in the inner ear. **Basilar membrane** decomposes the signal into something similar to a Fourier transformation.

18. Roughly describe the organization of the olfactory system.

The smell bind to the olfactory receptor cells in the nasal epithelium. The glomeruli aggregate the signals from the receptors and pass them to the Mitral cells in the olfactory bulb. Then it is passed to the corresponding position in the brain directly bypassing the thalamus.

19. Which taste is strongly pH-dependent? Sketch why.

Sour (acidic) - because of the amount of protons

The olfactory bulb contains receptors in the nose where protons can directly bind to

20. Conductances from fibres is depending on the myelination. Describe what myelination is and how it affects conduction velocity.

See above

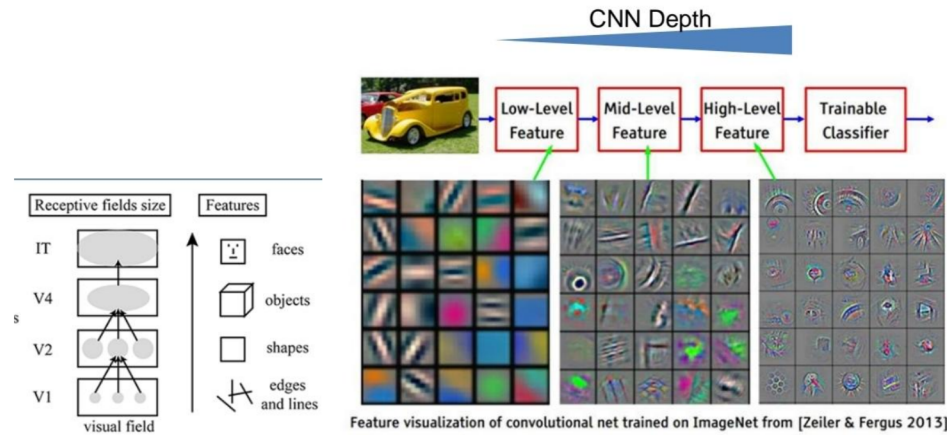
21. Pain is not a single wave. Describe the waves of pain and which kind of fibres are important in pain sensation.

See above

22. There are multiple kinds of cones in our retina.] their role and how they are distinct to each other.

See above

23. How does the brain and convolutional neural networks relate? Explain.



24. The basal ganglia are important in action generation. Name at least one common disease and describe how the basal ganglia are affected.

25. What is procedural memory?

Procedural memory is a type of implicit memory which aids the performance of particular types of tasks without conscious awareness of these previous experiences. Procedural memory guides the processes we perform, and most frequently resides below the level of conscious awareness.

26. What is Wernicke's area and what happens if it is dysfunctional?

a German physician, anatomist and anthropologist, who was working on receptive aphasia. He introduced patients who had impaired comprehension of written and spoken language. He recognized that this phenomenon occurred after injury to the **left superior temporal gyrus**, a part of the **neocortex** that is now known as **Wernicke's area**

27. What is the Global Workspace theory?

explained in terms of a "theater metaphor". In the "theater of consciousness" a "spotlight of selective attention" shines a bright spot on stage. The bright spot reveals the contents of consciousness, The audience is not lit up—it is in the dark (i.e., unconscious) watching the play. Behind the scenes, also in the dark, are the director (executive processes), stage hands, script writers, scene designers and the like. They shape the visible activities in the bright spot, but are themselves invisible.