

# **CNAD - Questions Übung 2023/24**

**Source: Exercise Material**

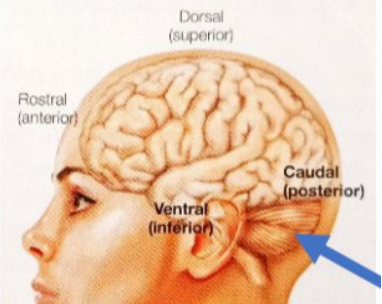
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| <p>Which statement on cognitive science is not correct?</p> <ul style="list-style-type: none"> <li>a. The scientific method is an iterative process where hypotheses are tested in experiments and the results are used to update the hypotheses</li> <li>b. Cognitive science is an interdisciplinary approach with the common goal to understand the mind</li> <li>c. Especially philosophy uses the scientific method to generate knowledge</li> <li>d. "The blind men and the elephant" is a metaphor for the problems of the interdisciplinary study of the mind</li> <li>e. Cognitive Neuroscience is located at the intersection of psychology and neuroscience true</li> </ul> | C |
| <p>Which statement on the brain and the mind is not correct?</p> <ul style="list-style-type: none"> <li>a. The brain consists of approximately 100 Million neurons</li> <li>b. The central idea of cognitive science is that the brain is an information processor</li> <li>c. Cognitive science was influenced by the development of the digital computer</li> <li>d. There are more possible connectomes than protons in the universe Information processor represent and transform information</li> </ul>   | a |
| <p>Which statement about representations and computations is true?</p> <ul style="list-style-type: none"> <li>a. There are 2 different forms of representations. o Concepts are statements about the world. (e.g. "It is raining outside!")</li> <li>b. Newell and Simons proposed that physical symbol systems (formal logical systems) allow for general intelligence</li> <li>c. David Marr proposed that computations can be understood on four different levels</li> <li>d. In David Marrs "Tri-level Hypothesis" the implementational level refers to an exact formulation of the problem a system is trying to solve</li> </ul>   | c |
| <p>Which statement of the philosophical approach in cognitive science is not correct?</p> <ul style="list-style-type: none"> <li>a. Philosophy is the oldest discipline in cognitive science.</li> <li>b. The primary method of philosophy is reasoning. X Deductive reasoning refers to drawing conclusion from several observations of specific instances of the world. (Whiskers the cat has four legs. Scruffy the cat has four legs. All cats have four legs.)</li> <li>c. branches of philosophy are Metaphysics and Epistemology</li> <li>d. Dualism and Monism are two theories trying to solve the mind-body problem</li> </ul>   | c |
| <p>Which statement on Monism and Dualism is true?</p> <ul style="list-style-type: none"> <li>a. Idealism is one sub-theory of Monism. o Materialism considers a "world consciousness".</li> <li>b. Functionalists believe that biological neurons are needed to generate mind and intelligence.</li> <li>c. Rene Descartes believed in monism.</li> <li>d. The fact that brain damage changes mental states proves Dualism.</li> </ul>   | a |
| <p>Which statement on psychology is correct?</p> <ul style="list-style-type: none"> <li>a. Psychology exclusively studies internal events (e.g. perception) but does not investigate external events (behavior)</li> <li>b. Since the late 19th century there was an overarching theory and framework in psychology</li> <li>c. In modern psychology the scientific method is applied</li> <li>d. Psychology is a young discipline compared to robotics</li> <li>e. Since the late 19th century psychologists stopped to apply introspection as method to gain scientific insight</li> </ul>   | c |

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| <p>Which statement on the scientific method is not true?</p> <ul style="list-style-type: none"> <li>a. From a general theory a specific hypothesis is derived, which is then tested in an experiment</li> <li>b. The independent variable is the parameter that is measured in the experiment</li> <li>c. Systematic errors have to be prevented by randomization and counterbalancing</li> <li>d. Systematic errors are not regarded in inferential statistics (e.g. t-tests)</li> <li>e. In experiments at least two groups have to be compared (experimental group and control group)</li> </ul>   | b |
| <p>Which statement on IQ-tests is not true?</p> <ul style="list-style-type: none"> <li>a. In the early 20th century the IQ-test was developed under the assumption that intelligence is innately endowed and does not change over time</li> <li>b. Historic IQ-tests had a strong cultural bias</li> <li>c. IQ-tests are well suited to measure all forms of intelligence (linguistic intelligence, musical intelligence, social intelligence etc.)</li> <li>d. Some portion of general intelligence is not innate and can be improved</li> <li>e. A major criticism of IQ tests is that intelligence cannot be represented in a single number</li> </ul> | c |
| <p>Which statement on psychological Voluntarism, Structuralism and Functionalism is not true?</p> <ul style="list-style-type: none"> <li>a. In analogy to chemical elements the Voluntarists wanted to create a periodic table of mental elements</li> <li>b. The main method of Voluntarists and Structuralists was introspection</li> <li>c. In contrast to Voluntarism in Structuralism subjects were trained on performing introspection to improve the scientific rigor</li> <li>d. Functionalism is the precursor of evolutionary psychology</li> <li>e. Structuralism describes the mind as a stream of consciousness</li> </ul>                   | e |
| <p>Which statement on Gestalt psychology and psychoanalytic psychology is not true?</p> <ul style="list-style-type: none"> <li>a. Gestalt psychology is a counterreaction to Voluntarism and Structuralism</li> <li>b. Main method of Gestalt psychology is phenomenology</li> <li>c. Max Wertheimer defined the principles of visual perceptual organization</li> <li>d. Sigmund Freud proposed the three-tiered system of consciousness (unconscious, preconscious, conscious)</li> <li>e. The superego is the mental structure, which always tries to maximize pleasure</li> </ul>   | e |
| <p>Which statement on Behaviorism is not true?</p> <ul style="list-style-type: none"> <li>a. Behaviorism was highly influenced by animal research (animal experiments were performed)</li> <li>b. Behaviorism rejected introspection</li> <li>c. The Skinner box is a tool to investigate operant conditioning</li> <li>d. Behaviorists assume the mind as a black box and investigate the behavioral responses of subjects after presenting a stimulus</li> <li>e. Pavlov's dog is an example for operant conditioning</li> </ul>  | e |
| <p>At which magnitude is the resting membrane potential of neurons?</p> <ul style="list-style-type: none"> <li>a. V</li> <li>b. mV</li> <li>c. <math>\mu</math>V</li> <li>d. nV</li> <li>e. pV</li> </ul>   | b |

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| <p>Which of the following ions is barely involved in membrane potential generation?</p> <ul style="list-style-type: none"> <li>a. K<sup>+</sup> (Potassium)</li> <li>b. Na<sup>+</sup> (Sodium)</li> <li>c. Cl<sup>-</sup> (Chloride)</li> <li>d. A<sup>-</sup> (Anions)</li> <li>e. Fe<sup>2+</sup> (Iron)</li> </ul>   | e and somewhat<br>d |
| <p>Which statement is true with respect to neuron-neuron communication?</p> <ul style="list-style-type: none"> <li>a. Neurons are mainly connected electrically</li> <li>b. Neurotransmitters are released from the post to the presynapse</li> <li>c. Chemical connections allow signal adjustments</li> <li>d. Unmyelinated axons allow faster transmission</li> <li>e. Vesicles fuse with the presynapse upon sodium influx</li> </ul>          | c                   |
| <p>Single perceptrons cannot compute</p> <ul style="list-style-type: none"> <li>a. Logical AND</li> <li>b. Logical OR</li> <li>c. Logical NOT AND</li> <li>d. Logical XOR</li> <li>e. Logical NOT</li> </ul>   | d                   |
| <p>What statement is true w.r.t. neural anatomy?</p> <ul style="list-style-type: none"> <li>a. Neurons could have two or more axons</li> <li>b. Neurons always have only one dendrite</li> <li>c. Some neurons in the retina are bipolar</li> <li>d. Purkinje cells have no dendrites</li> <li>e. Oligodendrocytes are involved in the tripartite synapse</li> </ul>   | c                   |
| <p>Neural plasticity does not include</p> <ul style="list-style-type: none"> <li>a. Synaptic plasticity</li> <li>b. Brain growth</li> <li>c. Reorganization</li> <li>d. Structural plasticity</li> <li>e. Apoptosis</li> </ul>   | e                   |
| <p>Which of the following statements applies to Hebb's rule?</p> <ul style="list-style-type: none"> <li>a. It is a simplified form of the Delta rule</li> <li>b. It is a supervised learning paradigm</li> <li>c. Hebb's rule only allows LTP</li> <li>d. Neurons that fire together, inspire together</li> <li>e. Hebb expanded the BCM rule</li> </ul>   | c                   |
| <p>What algorithm optimizes artificial neural network architectures?</p> <ul style="list-style-type: none"> <li>a. Canny Edge Detector</li> <li>b. Neuroevolution of Augmented Topologies</li> <li>c. Oja's rule</li> <li>d. Spike-timing-dependent plasticity</li> <li>e. PCA</li> </ul>  | b                   |
| <p>What statement w.r.t. Pruning is correct?</p> <ul style="list-style-type: none"> <li>a. We prune first, and then perform neurite branching</li> <li>b. Pruning is always on the level of synapses</li> <li>c. Pruning is performed to compress neural networks</li> <li>d. Convolutional layers are preferred pruning layers, in contrast to Dense layers</li> <li>e. Pruning is an artificial concept only applied to Deep Learning</li> </ul> | c                   |

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| <p>Electrophysiological single-cell assessment does not include</p> <ul style="list-style-type: none"> <li>a. Ion Channels</li> <li>b. Recording pipettes</li> <li>c. Voltage sensors</li> <li>d. Intact skull</li> <li>e. Mild suction for cell access</li> </ul>  | d |
| <p>Which statement is true w.r.t. Electrophysiological methods?</p> <ul style="list-style-type: none"> <li>a. ECoG is not as invasive as iEEG</li> <li>b. Typically, with increased invasiveness the signal localization improves</li> <li>c. Intracellular recordings have the worst signal-to-noise-ratio</li> <li>d. Field potentials require access to the cell interior</li> <li>e. EEG is a low-noise technique</li> </ul>  | b |
| <p>Noise is a problematic factor in experimental conditions. Which statement is false?</p> <ul style="list-style-type: none"> <li>a. EEG signals are very noisy</li> <li>b. EEG noise is a serially uncorrelated random variable</li> <li>c. Noise has zero mean and finite variance</li> <li>d. No prior distribution is assumed</li> <li>e. Important events, such as N170, are easily seen in single traces</li> </ul>   | e |
| <p>What statement regarding GFP is true?</p> <ul style="list-style-type: none"> <li>a. GFP is short for green flourishing protein</li> <li>b. GFP is typically excited with greenish light</li> <li>c. GFP emits typically blueish light</li> <li>d. GFP can be only used for fixed, non-alive tissue</li> <li>e. GFP in combination with M13-Calmodulin domains visualizes neural signals</li> </ul>   | e |
| <p>Which statement on lesion studies is true?</p> <ul style="list-style-type: none"> <li>a. For transcranial direct current stimulations (TDCS) a coil is used to create a transient magnetic field to induce a transient brain lesion</li> <li>b. Brain lesions in lesion studies are always generated by a physician</li> <li>c. The Huntington disease has no genetic component</li> <li>d. Stroke is a vascular disorder</li> <li>e. To treat epilepsy the brainstem (including medulla) is removed</li> </ul>  | d |
| <p>Which statement on lesion studies is not true?</p> <ul style="list-style-type: none"> <li>a. Phineas Gage is a famous example for a person with an unwanted brain lesion, which caused changes of the personality</li> <li>b. Broca's area is important for word understanding and has nothing to do with speech production</li> <li>c. Wernicke's area is important for language understanding and is placed posterior to the Broca's area (temporal)</li> <li>d. In former times in some cases epilepsy was treated by applying a lobectomy</li> <li>e. Epilepsy is a pathological hyperactivity in the brain and is characterized by a highly synchronous brain activity</li> </ul> | b |

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| <p>Which statement on neuro-imaging techniques is correct?</p> <ul style="list-style-type: none"> <li>a. Functional magnetic resonance imaging fMRI has a temporal resolution of approximately 100 Hz</li> <li>b. EEG has a better spatial resolution than fMRI</li> <li>c. fMRI measures directly the neural activity and is well suited to measure gamma-waves</li> <li>d. In fMRI studies the blood oxygenation level is measured in order to draw conclusions on the underlying neural activity</li> <li>e. Neuro-imaging techniques can be divided in techniques used for analyzing brain structure such as fMRI and fNIRS, and methods used to analyze brain function such as MRI and CT</li> </ul>                            | d |
| <p>Which statement on neuro-imaging techniques is not correct?</p> <ul style="list-style-type: none"> <li>a. CT (computed tomography) and MRI are used to measure the structure of the brain and take advantage of the different physical properties of the brain tissue</li> <li>b. fMRI in contrast to standard MRI is used to draw conclusions on neural processing</li> <li>c. In CT, a 3D volume is reconstructed from 2D x-ray images</li> <li>d. MRI exploits the effect that hydrogen nuclei (protons) have a spin that creates a tiny magnetic dipole</li> <li>e. The magnetic field strength in MRI scanners is approximately 10 ft</li> </ul>   | e |
| <p>Which statement on PET is not correct?</p> <ul style="list-style-type: none"> <li>a. PET like MRI relies on the spin of hydrogen nuclei</li> <li>b. For PET measurements a radioactive tracer is injected</li> <li>c. The tracer decays and emits positrons that annihilate with the electrons of the tissue to be measured</li> <li>d. The annihilation of an electron and a positron emits two photons that move in opposite directions</li> <li>e. PET can be used to draw conclusion on neural activity as it measures local variations in cerebral blood flow which are correlated to mental activity</li> </ul>   | a |
| <p>Which statement on neuro-imaging techniques is not correct?</p> <ul style="list-style-type: none"> <li>a. Functional near infrared spectroscopy (fNIRS) is as fMRI used to measure blood oxygenation level but through a different mechanism</li> <li>b. Oxygenated hemoglobin (HbO<sub>2</sub>) has a different absorption spectrum for electro-magnetic radiation than de-oxygenated hemoglobin (Hb)</li> <li>c. The fNIRS method is based on the fact that protons have a spin and behave as small magnets</li> <li>d. Diffusion Tensor Imaging (DTI) is used to measure the white matter tracts in the brain, but not the neural activity</li> <li>e. cFor DTI the gradient coils of the MRI scanner are important</li> </ul> | c |
| <p>Which statement on fMRI is correct?</p> <ul style="list-style-type: none"> <li>a. BOLD stands for blood overcompensation duration</li> <li>b. fMRI exploits the magnetic properties of acetylcholine</li> <li>c. fMRI has a very high temporal resolution comparable to MEG</li> <li>d. The Larmor frequency depends on the magnetic field strength (B<sub>0</sub>) and is varied using gradient coils</li> <li>e. fMRI measurements are highly suited for auditory neuroscience as it easy to present auditory stimuli in an MRI scanner</li> </ul>  | d |

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| <p>Which statement on the human nervous system is not correct?</p> <ul style="list-style-type: none"> <li>a. The autonomous nervous system mainly controls smooth muscles of the intestines, e.g. the heart and glands</li> <li>b. The autonomous system can be divided is sympathetic and parasympathicus</li> <li>c. The sympathicus is responsible for stress related responses of the body and accelerates the heart rate</li> <li>d. The parasympathicus increases its activity when a threat is perceived</li> <li>e. The central nervous system consists of spinal cord and the brain (including brainstem)</li> </ul> | d   |
| <p>Which statement on the brainstem and the cerebellum is not correct</p> <ul style="list-style-type: none"> <li>a. The brainstem is evolutionary older than the cortex?</li> <li>b. Damage to the brainstem is life threatening in most cases</li> <li>c. The cerebellum is the brain structure that contains approximately two thirds of all brain neurons</li> <li>d. The pons is a substructure of the cerebellum</li> <li>e. The brainstem consists of medulla, pons, midbrain (mesencephalon)</li> </ul>  | d   |
| <p>Which statement on the thalamus is not correct?</p> <ul style="list-style-type: none"> <li>a. The thalamus is the 'gate to consciousness'</li> <li>b. The thalamus filters out 'irrelevant' information</li> <li>c. The hypothalamus has very similar functions as the thalamus</li> <li>d. All sensory input (except olfactory input) has to pass through the thalamus</li> <li>e. The thalamus consists of several nuclei (e.g., lateral geniculate body, medial geniculate body)</li> </ul>   | c   |
| <p>Which statement on the cerebral cortex is true?</p> <ul style="list-style-type: none"> <li>a. The cerebral cortex consists of approx. 100 Million neurons</li> <li>b. Gyri are indentations (valleys) and sulci are the elevations (mountains) of the cortex</li> <li>c. The cortex contains the highest number of neurons of all brain parts</li> <li>d. The cortex can be structured and classified based on function, anatomy and cytoarchitecture</li> <li>e. The cortex consists exclusively of neuronal axons (white matter)</li> </ul>  | d   |
| <p>The arrow points to which brain structure in the image below?</p> <ul style="list-style-type: none"> <li>a. Medulla oblongata</li> <li>b. Cerebral cortex</li> <li>c. Hippocampus</li> <li>d. Cerebellum</li> <li>e. Basal Ganglia</li> </ul>  | <div style="text-align: center;">  <p>Figure 1: Source Exercise Material</p> </div> |

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| <p>Which statement on lateralization of brain function is true?</p> <ul style="list-style-type: none"> <li>a. Both brain hemispheres are anatomically exactly identical</li> <li>b. Both brain hemispheres are functionally exactly identical</li> <li>c. Wernicke's area is on the right side of the brain</li> <li>d. The right brain hemisphere (cortex) is optimized to process small details and is specialized for maths, programming, and language processing</li> <li>e. The right cortex hemisphere is important to process the prosody (rhythm) of speech</li> </ul>  | e |
| <p>Which statement on the auditory system is true?</p> <ul style="list-style-type: none"> <li>a. The middle ear contains the sensory cells (hair cells) that transduce the sound (air pressure fluctuations) to a chemical signal</li> <li>b. The 7 ossicles in the middle ear are responsible for an impedance adaptation, in order to prevent the sound to be reflected on the border between air and fluid</li> <li>c. The pinna of the outer ear has no effect on directional hearing and is therefore just a symmetrical funnel collecting sound waves</li> <li>d. The cochlea contains the inner hair cells, which transduce the mechanical signal to a chemical signal (inner hair cells = sensory cells)</li> <li>e. The cochlea contains the outer hair cells, which are more efficient sensory cells than the inner hair cells.</li> </ul>                                | d |
| <p>Which statement on the mechanisms within the auditory system is not true?</p> <ul style="list-style-type: none"> <li>a. The outer hair cells enhance the amplitude of and sharpen the travelling wave in the inner ear.</li> <li>b. Lateral inhibition is an important mechanism in the auditory system (lateral inhibition: active neurons inhibits neighboring neurons)</li> <li>c. The brainstem is important for sound localization and receives input from both ears.</li> <li>d. Subjective tinnitus is an illness which is always characterized by a hypersensitivity against mild sounds (hyperacusis), chronic pain, and impairments of the visual system.</li> <li>e. Potentially tinnitus could be explained by the so-called stochastic resonance model or central noise model (intrinsically generated neural noise is the neural correlate of tinnitus)</li> </ul> | d |
| <p>Which statement on the olfactory and gustatory system is true?</p> <ul style="list-style-type: none"> <li>a. The sense of smell is a mechanical sense like hearing</li> <li>b. The thalamus plays an important role for processing odor information</li> <li>c. The olfactory bulb is a very new cortex area (part of neocortex)</li> <li>d. Each glomerulus receives only input from one olfactory receptor type</li> <li>e. Sour receptors on the tongue respond to OH<sup>-</sup> ions</li> </ul>   | d |



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| <p>Which statement on the fruitfly algorithm developed by Dasgupta and co-workers is not true?</p> <ul style="list-style-type: none"> <li>a. The fruitfly algorithm is computationally less accurate and efficient as standard locality sensitive hashing algorithm</li> <li>b. The fruitfly algorithm is used to create representations of input data which are useful for nearest neighbor search (similarity search)</li> <li>c. The fruitfly algorithm consist of three major steps: 1) Feed forward step: normalization (become independent from odor concentration, dimensionality not changed), 2) Dimensionality expansion via sparse, binary random connection matrix, 3) Winner takes all step</li> <li>d. Locally sensitive hashing through based on an adapted fruitfly algorithm might be implemented in different brain areas (e.g. in rat cerebellum)</li> <li>e. The fruitfly algorithm demonstrates that ideas from neuroscience can lead to the development of efficient computer algorithms</li> </ul> | a |
| <p>Which of the following statements is TRUE regarding vision?</p> <ul style="list-style-type: none"> <li>a. Rods are most abundant at the fovea</li> <li>b. Rods and cones mediate color vision</li> <li>c. Only rods mediate color vision</li> <li>d. Cones release most neurotransmitters in light conditions</li> <li>e. Rods enter the cone pathway with Amacrin II cells</li> </ul>   | E |
| <p>Which of the following statement is TRUE w.r.t. Receptive fields?</p> <ul style="list-style-type: none"> <li>A. The closer to the fovea, the smaller the receptive field</li> <li>B. If the surrounding of the centre photoreceptor experiences dark, it has the same effect as the center photoreceptor experiences dark</li> <li>B. Each ganglion cell in the retina is connected to roughly the same number of photoreceptors</li> <li>C. Receptive fields are either ON or OFF center</li> <li>D. A receptive field is built up using only ganglion cells and photoreceptors</li> </ul>  | A |
| <p>Which connection between areas in the visual pathway is correct?</p> <ul style="list-style-type: none"> <li>A. Bipolar cell -&gt; Photoreceptor</li> <li>B. Lateral geniculate nucleus -&gt; Ganglion cell</li> <li>C. Secondary visual cortex -&gt; Photoreceptor</li> <li>D. Ganglion cell -&gt; Photoreceptor</li> <li>E. Bipolar cell -&gt; Ganglion cell</li> </ul>   | E |

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| <p>Which statement in the retinal “analog-digital converter” is wrong?</p> <ul style="list-style-type: none"> <li>A. Light decreases the membrane potential in the photoreceptor</li> <li>B. In light condition, no current (Na<sup>+</sup> and Ca<sup>2+</sup> ions) can enter the photoreceptor</li> <li>C. All cells (photoreceptors, bipolar cells, Ganglion cells) are spiking</li> <li>D. OFF bipolar cell mirrors photoreceptor activity</li> <li>E. Rods and cones are tuned to a specific wavelength</li> </ul>   | C |
| <p>Which of the following statements is TRUE for edge detection in the retina?</p> <ul style="list-style-type: none"> <li>A. Horizontal cells are not involved</li> <li>B. Lateral inhibition is mediated by ganglion cells</li> <li>C. The direct effect on a bipolar cells on a light edge is decrease in membrane potential</li> <li>D. The indirect effect (e.g. bipolar cell in the center) is an increase in the membrane potential</li> <li>E. The aim of lateral inhibition is to maximize the difference in the membrane potential across bipolar cells (enhancing contrast)</li> </ul> | E |
| <p>Direction selectivity is...</p> <ul style="list-style-type: none"> <li>A. Already available at the photoreceptor</li> <li>B. Irrelevant for downstream visual processing</li> <li>C. Achieved through a convergence of receptive fields in the LGN</li> <li>D. Not seen in V1</li> <li>E. Only available in V2 and V4</li> </ul>  | C |
| <p>Linear filters are...</p> <ul style="list-style-type: none"> <li>A. Always positive</li> <li>B. Increase their receptive field with increased kernel size</li> <li>C. Not related to convolution operations</li> <li>D. Always 3x3 large</li> <li>A. Only used for edge detection</li> </ul>  | B |
| <p>Which statement about object recognition is correct?</p> <ul style="list-style-type: none"> <li>A. We detect where and what simultaneously in the same brain area</li> <li>B. The ventral stream and the dorsal stream are both responsible for the “what” information</li> <li>C. We can only derive object shapes from luminance, but not from motion</li> <li>D. The inferior temporal cortex (IT) is crucial for face detection</li> <li>E. Jennifer Aniston neurons are thought to be found in the hypothalamus</li> </ul>   | D |

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| <p>Which statement on linguistics is correct?</p> <ul style="list-style-type: none"> <li>A. Linguistics is a special method that is used by no other scientific discipline.</li> <li>B. Noam Chomsky is a famous behaviorist.</li> <li>C. Many animal species have a sophisticated language similar to humans.</li> <li>D. Language is: communicative, arbitrary, structured, generative, and dynamic.</li> <li>E. Pragmatics is a synonym for syntax.</li> </ul>   | D |
| <p>Which statement on language and the brain is not correct?</p> <ul style="list-style-type: none"> <li>A. Important brain areas for language processing are among others: Wernicke's area, Broca's area, left inferior parietal lobe, and left insular cortex.</li> <li>B. Right hemisphere processes speech prosody (speech rhythm).</li> <li>C. Aphasia is a term summarizing deficits in language understanding and production.</li> <li>D. Broca's aphasia is related to problems in speech/language production and comprehension deficits related to syntax (agrammatic aphasia) and Wernicke's aphasia is related to problems with language understanding.</li> <li>E. Language is mainly processed in the right hemisphere</li> </ul> | E |
| <p>Which statement on the mental lexicon is not correct?</p> <ul style="list-style-type: none"> <li>A. The brain stores syntactic and semantic information of words in a so-called mental lexicon.</li> <li>B. The mental lexicon is ordered like a conventional dictionary (book).</li> <li>C. There are three general functions of a mental lexicon: lexical access, lexical selection, lexical integration</li> <li>D. In a mental lexicon semantic relationships between words are stored.</li> <li>E. The idea that in a mental lexicon semantic relationships between words are covered is supported by so called priming studies.</li> </ul>   | B |
| <p>Which statement on language comprehension in the brain and in artificial neural networks is correct?</p> <ul style="list-style-type: none"> <li>A. Language comprehension is a pure bottom-up process, which means top-down information or context have absolutely no effect on e.g. lexical selection.</li> <li>B. Syntactic violations lead to a higher P600 wave (positivity in EEG 600 ms after violation).</li> <li>C. Transformer networks are very efficient as they are a detailed replica of the human brain.</li> <li>D. Transformer networks are so efficient, because they have a lot of recurrences.</li> <li>E. "Positional encoding" is a synonym for "self-attention"</li> </ul>   | b |
| <p>What statement on attention mechanisms in the human brain is not true?</p> <ul style="list-style-type: none"> <li>A. Selective attention is our ability to prioritize things while ignoring others.</li> <li>B. Different brain areas (cortical and subcortical) are involved in selective attention mechanisms.</li> <li>C. Our ability to focus on a certain speaker in a loud environment is called cocktail party effect</li> <li>D. The cocktail party effect only works as the unattended speech stream is completely filtered out in the inner hair cells of the cochlea.</li> <li>E. Neglect means an attention bias due to a damaged brain.</li> </ul>  | d |

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| <p>Which statement on the human memory is not correct?</p> <ul style="list-style-type: none"> <li>A. Human memory can be divided into long term memory and memory parts which are short term as short-term memory, sensory memory, and working memory.</li> <li>B. Long term memory can be divided into a conscious part (declarative memory) and an unconscious part (nondeclarative memory).</li> <li>C. Learning (forming memories) is achieved by changing the strengths of synapses (change of synaptic connections).</li> <li>D. Anterograde amnesia means that all memories and especially memories formed before the brain damage, which has led to the amnesia are lost.</li> <li>E. Working memory is an extended concept which adds the component of data manipulation (operations on stored information) to the short-term memory.</li> </ul>  | d |
| <p>Which statement on human long-term memory is correct?</p> <ul style="list-style-type: none"> <li>A. Semantic and episodic memory are parts of the non-declarative (implicit, unconscious) memory.</li> <li>B. The hippocampus and surrounding areas are important to form long term memories as it encodes, and organizes information and distributes this information over the cortex and furthermore consolidates these memories.</li> <li>C. With semantic memory the storage of personal experiences is meant, whereas episodic memory refers to the storage of facts, concepts, and rules.</li> <li>D. Classical conditioning (cerebellum is involved) and procedural memory (basal ganglia are involved) are part of the explicit and thus conscious long-term memory.</li> <li>E. The hippocampus is part of the brainstem and is located next to the spinal cord.</li> </ul>  | b |
| <p>Which statement on the "Free Will" is not correct?</p> <ul style="list-style-type: none"> <li>A. "Free Will" is defined as right to act outside of external influences and the capacity to make choices undetermined by past events</li> <li>B. Determinism means that only one course of events is possible and therefore is predictable.</li> <li>C. Incompatibilism says that if determinism is true "Free Will" is impossible.</li> <li>D. Compatibilism says that "Free Will" is compatible with determinism (deterministic chaos, quantum mechanics).</li> <li>E. In his groundbreaking experiment Benjamin Libet found out that a so-called readiness potential (RP) in the brain occurs 10 s after the conscious decision of the participants to press a button and thus these experiments challenged the concept of "Free Will".</li> </ul>  | e |
| <p>Which statement on theories of consciousness is not correct?</p> <ul style="list-style-type: none"> <li>A. The Integrated information theory of consciousness uses the measure phi (synergy) to quantify the degree of consciousness.</li> <li>B. Antonio Damasio defines three hierarchical stages of consciousness: protoself, core consciousness, and extended consciousness.</li> <li>C. Bernhard Baars defined the global workspace as consciousness; The global workspace is a bright spot on the working memory that receives information from sensory system and broadcasts the information to many further functional systems.</li> <li>D. The Chinese Room is a thought experiment to demonstrate that communication via language does not need language comprehension.</li> <li>E. Behaviorists were famous for analyzing biological processes in the brain and therefore made huge progress in unraveling the neural correlate of consciousness.</li> </ul> | e |