

PSYCH/CS L 271 – PRACTICE MIDTERM SOLUTIONS

This practice exam is about half as long as the actual exam. Since the actual exam will be 75 minutes long, you should be able to answer all of these questions in less than 40 minutes.

For each of the Questions 1 to 7, exactly one of the four given answers (a) to (d) is correct. Please circle the letter of that answer. You will get one point for every correct answer.

Question 1: What are the types of photoreceptors in the human retina?

- (a) Ganglion cells and bipolar cells
- (b) Rods and cones
- (c) Iris and pupil
- (d) Pyramidal neurons

Question 2: What types of eye movements do people predominantly make when inspecting a static (motionless) picture?

- (a) Fixations and saccades
- (b) Smooth pursuit and saccades
- (c) Fixations and torsional eye movements
- (d) Saccades and vergence eye movements

Question 3: What type of memory has the fastest decay?

- (a) Episodic memory
- (b) Iconic memory
- (c) Working memory
- (d) Echoic memory

Question 4: What is the corpus callosum?

- (a) A brain area mainly responsible for speech production
- (b) A brain area mainly responsible for speech understanding
- (c) The main connection between the two hemispheres of the brain
- (d) The connection between the brain and the peripheral nervous system

Question 5: What is a morpheme?

- (a) The smallest unit of sound in a language
- (b) A sound modifier
- (c) A rule that governs word structure
- (d) The smallest unit of spoken language that has meaning

Question 6: What is solipsism? A theory assuming that...

- (a) There is no physical universe but only a mental one that exists in each person's mind
- (b) There is no mental universe but only a physical one
- (c) There is no physical universe but only a mental one that exists in God's mind
- (d) Both mental and physical substances exist

Question 7: What is the most effective way to inform the scientific community about one's work?

- (a) Journal publications
- (b) Conference talks
- (c) Book chapters
- (d) Conference proceedings publications

For each of the Questions 8 to 10, write down your answer in a few sentences. You will get a maximum of two points for every answer.

Question 8: What is a neurotransmitter?

A neurotransmitter is a chemical that is released by a presynaptic area at axon termini upon stimulation and activates post-synaptic dendrites. This activation could be excitatory or inhibitory and is achieved by the neurotransmitter attaching to receptors in the dendrite.

Question 9: Explain the distinction between procedural and declarative memory.

Procedural memory (also called implicit memory) is memory for skill, can be demonstrated only by doing, and arises without conscious recall. Examples include riding a bike, playing tennis, or playing the piano.

Declarative memory (also called explicit memory), on the other hand, is memory for facts and events, is demonstrated verbally, and arises with conscious recall. Examples are the memorization of scientific facts (semantic memory) or what you did on your birthday last year (episodic memory).

Question 10: What is visual attention, and why do we need it?

Visual attention is the selective allocation of visual processing resources. Typically, at any given time, we focus our attention on a particular object of interest in the visual field. Visual processing of that object is enhanced while being rather shallow for other objects. For example, we can respond more quickly and accurately to changes in an attended region. Such prioritization is necessary due to our visual system's limited processing resources. These resources have to be directed to objects or areas of greatest potential threat or reward in order for us to act most fittingly in terms of our evolutionary goals.

Question 11 (5 points): Describe in detail (multiple paragraphs) how, with the help of split-brain patients, you can study experimentally if the right brain hemisphere has at least some rudimentary ability to understand and produce written language.

In split-brain patients, the corpus callosum was cut in order to prevent epileptic activity to spread between the hemispheres of their brain. Therefore, the two hemispheres are working almost independently in these patients, which provides a unique opportunity for scientists to study the lateralization of cognitive function in the brain.

We could conduct an experiment in which split-brain patients and healthy control subjects sit in front of a computer monitor and are instructed to keep their gaze fixated on a central marker shown on the screen. In each trial, we briefly (200 ms) present a word a few degrees to the left of the marker. The subjects' task is to write down with their left hand the word they saw and also draw the object described by that word. Several subjects of each group participate, and each of them performs fifty trials. The correctness of the responses and typical patterns of mistakes will be evaluated by an assistant who does not know the group membership of any subject.

Since visual information presented to the left of the fovea only enters the right hemisphere of the brain, which in turn controls the left hand, the results of this experiment will inform us about the ability of that hemisphere to process written language. Greater errors at drawing the corresponding objects in patients than in controls would reflect problems of language understanding (and possibly problems at drawing of objects – this ability should be tested prior to the experiment). Furthermore, greater errors at reproducing the words in patients than in controls, in addition to the drawing errors, would indicate problems in language production.