

Olympiad for students and graduates – 2017

Demonstrative version and guidelines for the area «Psychology»

Profile:

«Cognitive sciences and technologies: from neuron to cognition»

DEMONSTRATIVE VERSION

You have 180 min to complete this task.

Methods of assessment

Article abstract - 40 points;

1 task on cognitive psychology - 30 points;

1 task on cognitive psychophysiology - 30 points (100 points overall).

Task 1: content analysis and writing the abstract of scientific article.

You are offered a short article on cognitive psychophysiology (Pollman, S. & Maertens, M. (2005). Shift of activity from attention to motor-related brain areas during visual learning. *Nature Neuroscience*, 8, 1494-1496).

On this article, authors abstract and conclusion is hidden from you.

Carefully read the article. After that you have to write a short abstract on 100-250 words. In this abstract, you have to show the main problem of the study, the key experimental manipulations, the main results and the explanation proposed by authors.

Task 2: Theoretical interpretation of experimental results.

Please, suggest your own interpretation of the results described below. **Your answer should be in English.**

In J.R. Stroop's experiments, volunteers had to perform a very simple task: to name colors of the printed words. The volunteers were presented with many words, printed in different colors; each of them could be classified into one of three groups: 1) non-sense word (just a random mix of letters), 2) a name of the color printed in the same color (e.g. the word "blue" printed in blue), 3) a name of the color printed in different color (e.g. the word "blue" printed in red). The researcher measured how much time it took for the volunteers to respond, i.e. to name the ink color. It occurred that the reaction time was faster when color of the ink was congruent with the word itself, and the reaction time was slower when the ink color was incongruent with the word.

Task 3: Research design to test the offered hypothesis.

You need to test the hypothesis about the following idea: if human's attention is distracted from the memorized material, the results of memorization are deteriorated. Suggest the experiment to test this hypothesis. Describe in steps what you have to do during the preparation and at the time of conduction for this experiment.

GUIDELINES

- **Preliminary assessment criteria**

Task 1 (criteria above should be summed together for the final assessment)

Max - 40 points

1. Formulation of the research problem
2. Description of the key experimental procedures
3. Description of the main results
4. Theoretical interpretation of the results
5. The scientific style, the adequacy of the use of terminology, conciseness of presentation

Task 2 (criteria above should be summed together for the final assessment)

Max - 30 points

1. The lack of a scientific explanation of the experimental effect - 0 points (in this case, the evaluation of other criteria will automatically equal to 0 points, because each criterion assesses one aspect of scientific explanation)
2. Presence of the correct hypothesis corresponding to the explanation offered by the theory of the conflict - max. 12 points
3. Presence of the so-called "cognitive" hypothesis, ie, associated with the decision-making process or the structure of tasks, not fatigue or lack of the motivation - max. 5 points
4. The number of "cognitive" hypothesis (more than 2) - max. 3 points
5. The presence of statistical considerations, explaining the results of the experiment - max. 10 points
6. The contradictions between the proposed explanations - 5 penalty points which are deducted from the total
7. Incorrect use of the English language to solve the task – up to 10 penalty points which are deducted from the total amount

Task 3 (criteria above should be summed together for the final assessment)

Max - 30 points

1. The presence of the correct solution - max. 12 points
2. Understanding the key points of research - max. 2 points
3. Good knowledge of terminology - max. 3 points
4. Good knowledge of the possibilities and limitations of the proposed methods - max. 4 points
5. Proper assignment of independent and dependent variables - max. 6 points
6. An effective experiment design - max. 3 points

- **The list and content of the Olympiad competitions**

You may need knowledge in the following areas for the most complete and reasonable response to the Olympiad tasks:

1. Psychology of perception and attention.

The space and time perception. Configurations. Illusions. Recognition of visual patterns. Perception and action. The volume of perception. The selectivity of perception and structural models. Attention as a mental effort and resource models. The problem of the features integration. Automatic and controlled processes.

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2. Psychology of memory

Functional structure of the memory. Memory systems and levels. Three-components models. The theory of levels of processing. Working memory models.

3. Psychology of thinking

Global cognitive models. Higher cognitive functions. Approaches and models. Reasoning processes and models. The processes of problem-solving. Internal representation and problem solving. Decision-making.

4. Experimental Psychology

Basic and applied research. Development of new research ideas on the basis of theories and other studies. The measurements, sampling and data processing. Methods of specifying independent variables. The validity of experimental research. Types of validity. The main threats to the validity of the experiment. Problems of the control. Experimental plans: single-factorial, multi-factorial. Quasi-experimental plans. Correlational studies. Usage of the statistical methods.

5. The Psychophysiology of emotions

Basic emotions and the role of reflexive consciousness. Brain representation of the emotions (Panksepp). Fear system. Inhibition and regulation of emotions. Positive reinforcement.

6. Psychophysiology of perception and attention

General properties of sensory systems. Functional organization of the visual system. Color vision. The perception of space. Binocular competition. Object recognition. Filter Theory.

7. Psychophysiology of Memory

Functional organization of memory systems. Time-related memory organization. Explicit and implicit memory. Mechanisms of memory. Discontinuity of mnemonic processes. Prefrontal cortex and working memory. Memory extraction processes and metacognition.

- **Recommended literature**

COGNITION, BRAIN, AND CONSCIOUSNESS, INTRODUCTION TO COGNITIVE NEUROSCIENCE by Bernard Baars and Nicole Gage. ELSEVIER LIMITED of The Boulevard, Langford Lane, Kidlington, Oxford, OX5 1GB, UK. ISBN 978-0-12-375070-9. 2010.

BM Velichkovsky Cognitive Science: Foundations of cognitive psychology. [In 2 volumes]. - M.: Smysl / Academy 2006.

Goodwin J. Research in Psychology: Methods and Planning - 3rd ed.. - SPb.: Piter, 2004.

Martin D. Psychological experiments. SPb.: Praym-2004.

Solso RL Cognitive psychology. 6th ed. - SPb.: Piter, 2006