Assessment of psychophysiological indicators of e-sports players, winners of the international e-sports festival «Battle for science» 2023

L.S. Shuvalova1
Postgraduate student **V.S. Grebenkov[1, 2]**
[1]Moscow University for Industriy and Finance "Synergy", Moscow
[2]Federal Science Center of Physical Culture and Sport (VNIIFK), Moscow

Corresponding author: lilia9292@mail.ru

Abstract
Objective of the study was to determine the psychophysiological indicators characterizing the properties of attention and cognitive processes of the winners of the Battle for Science - 2023 festival in the disciplines "Caliber", "League of Legends" and "DOTA 2".
Methods and structure of the study. To collect data, standardized methods were used to assess psychophysiological indicators characterizing concentration, stability of concentration, and speed of information processing. Additionally, operational and combinatorial abilities were assessed; ability to analyze and synthesize.
Results and conclusions. The results of a study of the psychophysiological indicators of the winners of the international e-sports festival "Battle for Science" 2023 are presented. The need for prospective studies of the psychophysiological indicators of e-sportsmen competing in selected disciplines is determined.

Keywords: eSports, "Battle for Science", attention, concentration, attention span.

Introduction. Student eSports events are one of the important components of the tools for working with the younger generation, the scalability of which is increasing and supported by educational organizations and the state [2, 4]. International festival of student e-sports and computer science science "Battle for Science-2023", implemented with grant support from the Ministry of Science and Higher Education within the framework of the federal project "Popularization of Science and Technology" of the state program "Scientific and Technological Development of the Russian Federation", as well as events , dedicated to the "Decade of Science and Technology in Russia", became one of the flagship events for university students from all over the country, where student teams fought among themselves in eight disciplines – "League of Legends", "VALORANT", "StandOff 2", " PUBG", "Caliber", "Tanks Blitz", DOTA 2, "World of Tanks" [1].

Some of the most spectacular tournaments in the festival program were tournaments in such disciplines as "Caliber", "League of Legends" and "DOTA 2". The high level of competition in these disciplines places very significant demands on the psychophysiological characteristics of the nervous system of e-sportsmen and their cognitive abilities, as one of the leading factors in achieving maximum sports results [3].

Objective of the study was to determine the psychophysiological indicators characterizing the properties of attention and cognitive processes of the winners of the "Battle for Science – 2023" festival in the disciplines "Caliber", "League of Legends" and "DOTA 2".

Methods and structure of the study. To collect data, standardized methods for assessing psychophysiological indicators were used, characterizing concentration of attention, stability of concentra-

tion, speed of information processing based on the Bourdon correction test. Additionally, operational and combinatorial abilities were assessed; ability to analyze and synthesize based on the Raven's Progressive Matrices test.

Research results and discussion. The study obtained the results of assessing psychophysiological indicators characterizing the attention properties of e-sportsmen in the disciplines "Caliber" (n=4), "DOTA 2" (n=5) and "League of Legends" (n=3), table 1.

Analysis of the results obtained indicates a high level of manifestation of psychophysiological indicators characterizing the properties of attention among athletes in the presented disciplines. Among the studied contingent of athletes in the presented disciplines, indicators of attention concentration and its stability are determined in the range of high values among representatives of the three studied disciplines. However, among athletes competing in the "Caliber" discipline, the stability of concentration demonstrates higher values than among athletes in the "DOTA 2" discipline (t = 8.13 at α = 0.05) and in the "League of Legends" discipline (t=5.31 at α = 0.05). The indicator of information processing speed among representatives of the studied disciplines corresponds to the range of normal values for adults, according to the data used to analyze the results of the Bourdon test. However, athletes competing in the "Caliber" discipline showed higher values of information processing speed than athletes in the "DOTA 2" discipline (t = 11.67 at α = 0.05) and in the "League of Legends" discipline. (t=14.14 at α = 0.05). The given values are probably due to

the specific features of the game situation, which require immediate response and consideration of various game situations extended over time in order to achieve maximum sports results in selected disciplines.

Along with the obtained psychophysiological indicators, which characterize a high level of expression of attention properties, the cognitive processes of e-sportsmen in three disciplines were studied based on the "Raven's Progressive Matrices" test, table 2.

During the analysis of the results obtained in the "C" series, reflecting operational abilities, a higher level of the studied indicator was demonstrated by athletes in the "Caliber" discipline in comparison with the results of athletes in the "DOTA 2" disciplines (t = 7.06 at α = 0.05) and "League of Legends" (t=8.34 at α = 0.05). Analysis of the results in the "D" series, reflecting the combinatorial abilities of athletes, demonstrated the highest scores for athletes in the "Caliber" discipline in comparison with representatives of the "DOTA 2" discipline (t = 9.01 at α = 0.05) and "League of Legends" (t=20.08 at α = 0.05). Along with the established differences in the "D" series, significant differences in the results obtained were recorded between representatives of the "DOTA 2" and "League of Legends" disciplines (t = 8.10 at α = 0.05). Presumably, this circumstance indicates that a select contingent of athletes competing in the "Caliber" discipline have the most pronounced combinatorial abilities when solving cognitive problems in comparison with athletes in the "DOTA 2" and "League of Legends" disciplines. However, due to the small size of the sample, this

Table 1. *Characteristics of psychophysiological indicators characterizing the properties of attention in e-sportsmen - winners of the International e-sports festival "Battle for Science" 2023*

Indicator under study	Caliber	DOTA 2	League of Legends
Concentration of attention	86,75±0,76	84,16±1,13	86,50±0,3
Stability of concentration	172,75±0,38	161,82±1,29	166,17±1,18
Information processing speed	1,45±0,02	1,12±0,02	1,05±0,02

Table 2. *Characteristics of indicators of cognitive processes among e-sports athletes - winners of the International e-Sports Festival "Battle for Science" 2023*

Indicator under study	Caliber	DOTA 2	League of Legends
Series C	11,75±0,11	10,6±0,12	10,33±0,13
Series D	10,75±0,11	9±0,16	7,33±0,13
Series E	5,75±0,38	1,0±0,5	1,33±0,34

assumption requires prospective studies on a larger sample of cybersportsmen. The highest values demonstrated in the "E" series, reflecting the ability to analyze and synthesize, were also demonstrated by athletes in the "Caliber" discipline in comparison with the values in "DOTA 2" (t = 7.56 at α = 0.05). "League of Legends" (t=3.93 at α = 0.05). At the same time, no significant differences were found between athletes representing two disciplines - "DOTA 2" and "League of Legends", however, similarity of results was revealed, recorded in the range of low values. The results obtained probably indicate that there is no need for DOTA 2 and League of Legends athletes to use these abilities during dynamically changing game conditions due to the limited time factor for making a decision and a clear game role with strict competitive functionality.

Conclusions.

• The presented results of a study of psychophysiological indicators of the winners of the international e-sports festival "Battle for Science" 2023 indicate a high level of manifestation of attention properties in athletes - concentration, stability of concentration and speed of information processing.

• The need has been determined to conduct prospective studies of the psychophysiological indicators of e-sportsmen competing in selected disciplines and the characteristics of cognitive processes for a more detailed study, determining their impact on competitive success.

• Presumably, the integration of students as participants in e-sports events in the disciplines "Caliber", "League of Legends" and "DOTA 2" allows them to demonstrate a high level of concentration and attention span, speed of information processing, and analytical abilities, which can create favorable conditions for educational activities in general, since it is the processes of attention and the ability to analytical activity that play one of the priority roles in the successful development of educational programs.

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