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SPEED AND ACCURACY CHARACTERISTICS OF OPERATIONAL DECISIONS OF SUBJECTS IN EXTREME ACTIVITY

СКОРОСТНЫЕ И ТОЧНОСТНЫЕ ХАРАКТЕРИСТИКИ ОПЕРАТИВНЫХ РЕШЕНИЙ СУБЪЕКТОВ ЭКСТРЕМАЛЬНОЙ ДЕЯТЕЛЬНОСТИ

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Keywords: *extreme activities, operational solutions, reaction time, stress, model characteristics, professional selection.*

Abstract. ***The authors carried out a comparative analysis of speed and accuracy characteristics of the operational decisions the subjects of extreme activity. They show significant differences in cognitive performance between professionals and novices. The results of the model allow us to determine the characteristics of law enforcement officers on cognitive performance and can be used in the system of vocational qualification.***

Ключевые слова: *экстремальная деятельность, оперативные решения, время реакции, стрессоустойчивость, модельные характеристики, профессиональный отбор.*

Аннотация. ***В статье проведен сравнительный анализ скоростных и точностных характеристик оперативных решений субъектов экстремальной деятельности. Выявлены значимые различия по когнитивным показателям между профессионалами и новичками. Результаты работы позволяют определить модельные характеристики сотрудников силовых ведомств по когнитивным показателям и могут быть использованы в системе профессионального отбора.***

Introduction. Extreme activities are caused by the impact of risk factors, the need to make decisions in terms of information overload and time constraints. Representatives of dangerous professions of high qualification successfully resist the impact of various stressors, overcome the effects of increased stress on the psyche, and are able to maintain high working capacity under stressful conditions [1, 2, 3].

The modern system of preparation for extreme activities relies, basically, on the general patterns of adaptation of the organism to stresses, but does not fully take into account the general and individual psychophysiological and psychological mechanisms for ensuring this activity [3]. The determination of model characteristics of extreme activity subjects by cognitive indices can contribute to the improvement of the system of professional selection and programs of professional and applied training.

Purpose of the study was to conduct a comparative analysis of the dynamics of speed and accuracy parameters of operational decisions of subjects of extreme activity (professionals and novices), in the context of increasing complexity of the intellectual and stress components of the task.

Materials and Methods. The laboratory experiment was carried out using the universal psychodiagnostic complex «UPDK-MK» in the Research Institute of Sports Problems of the SCOLIPE on a contingent of representatives of law enforcement agencies. Further in the text the following terms will be used: professionals (N = 15), beginners (N = 38). The following diagnostic methods were used:

1. Visual-motor reaction – the test is designed for component-by-stage evaluation of reaction time of the subject.

2. Reaction to a moving object (RMO) – is one of the variants of the anticipatory reaction and allows to determine the individual characteristics of the subject in exact response to a moving object.

3. Stress-resistance-M-test is designed to assess the level of frustration resistance of the subject.

4. Attention distribution – the test is designed to assess the ability of the subject to simultaneously monitor and, if necessary, quickly and accurately perform the most urgent task, without losing control of other tasks.

Results. A comparative analysis of the data obtained in the laboratory experiment (more than 9000 individual measurements) of two groups of representatives of extreme activity.

RMO. Professionals (M1) showed statistically insignificant superiority over newcomers (M2) in the accuracy of anticipatory reactions (M1 = 5.07 ± 0.45, M2 = 4.21 ± 0.39 out of 10 samples).

Stress-resistance-M. In tests for differentiation reaction and reaction in frustrating conditions, professionals demonstrated significant accuracy at the level of $p \leq 0.05$.

Below is the dynamics of the reaction time in two groups of subjects in order of complication of the stress and intellectual components of the tasks:

1) the time of a simple reaction – M1 = 0.281 ± 0.002; M2 = 0.289 ± 0.001; $p \leq 0,05$;

2) the time of differentiation reaction – M1 = 0.369 ± 0.004; M2 = 0.392 ± 0.002; $p \leq 0,05$;

3) reaction time in frustrating conditions – M1 = 0.341 ± 0.004; M2 = 0.379 ± 0.002; $p \leq 0,05$;

4) reaction time in conditions of attention distribution between visual stimuli – M1 = 0.445 ± 0.002; M2 = 0.481 ± 0.01; $p \leq 0,05$;

5) time of reaction to visual stimuli in conditions of attention distribution between visual and auditory stimuli – M1 = 0.553 ± 0.004; M2 = 0.572 ± 0.003; $p \leq 0,05$;

6) time of reaction to auditory stimuli in conditions of attention distribution between visual and auditory stimuli – M1 = 0.633 ± 0.009; M2 = 0.723 ± 0.001; $p \leq 0,05$.

The figure graphically represents the dynamics of the reaction time in the groups under study.

Thus, the test groups of professionals demonstrate a statistically significant advantage over the test subjects of the novice group for all speed indicators. The groups demonstrate a proportional increase in reaction time due to the complication of the intellectual component of the tasks. There is also a shortening of the reaction time in frustrating conditions in both groups; professionals improve the accuracy of response, and beginners significantly worsen this indicator.

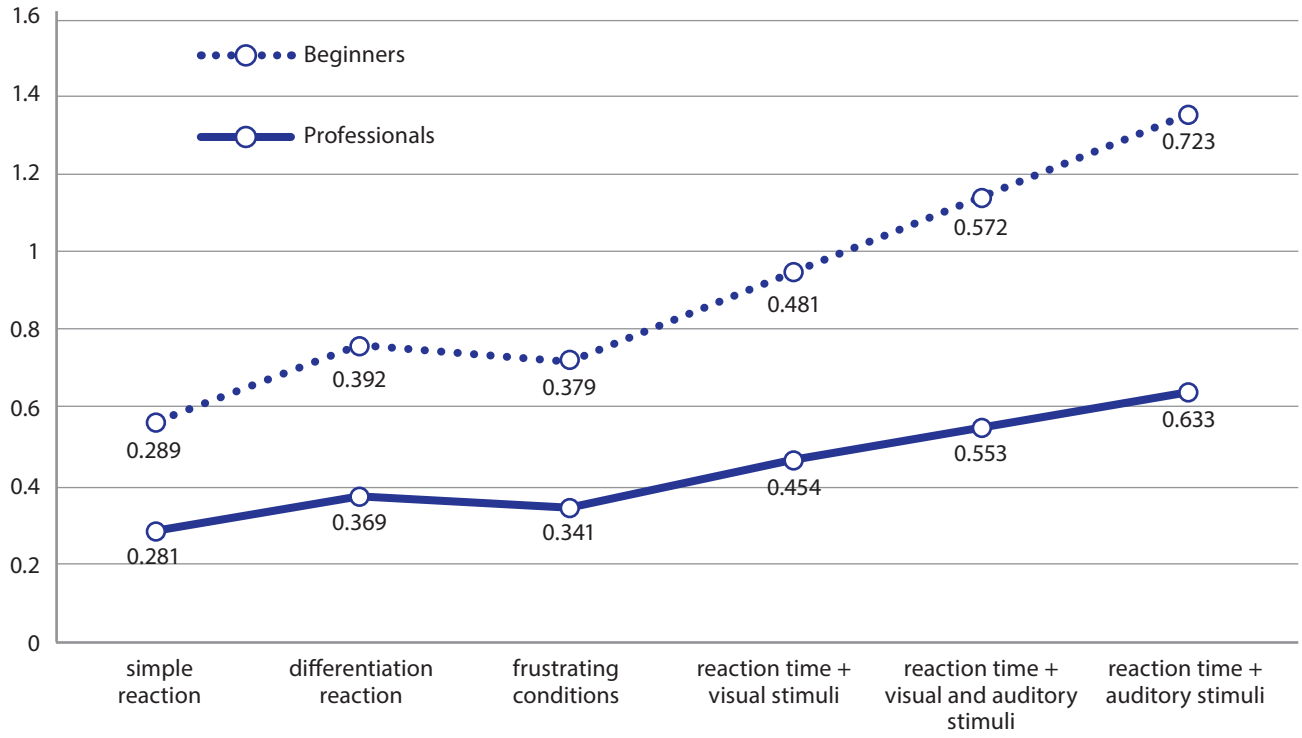

Figure – Dynamics of the reaction time in the study groups

Conclusions:

1. The tests used in the work showed their high sensitivity (0.01-0.03 sec) when comparing subjects of extreme activity with different qualifications by cognitive indices.

2. Highly qualified representatives of extreme professions have the advantage over newcomers in the speed and accuracy parameters of operational decisions in frustrating conditions and on the speed parameters of operational solutions in the context of the increasing complexity of the intellectual component of the task, which may be assumed to be the result of extreme preparedness. There is a tendency of growth of temporal differences between groups with complication of conditions of performance of tasks of the test.

The data obtained in the experiment make it possible to determine the model characteristics of employees of the law enforcement agencies by cognitive indicators that can be used in the professional selection system, and also outline additional guidelines for professional and applied training.

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