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The use of computer technologies at an assessment of sensory-motor reactions in single combats

Abstract. Purpose: to develop a complex of program applications by an assessment of sensory-motor reactions of sportsmen who are engaged in different types of single combats. **Material and Methods:** theoretical analysis and generalization of scientific and methodical literature, method of computer programming. **Results:** the computer program applications by an assessment of sensory-motor reactions of sportsmen-wrestlers are developed and the preliminary approbation of appendices is carried out, their metrological informational content is confirmed. **Conclusions:** during the approbation the received results confirm the data on characteristic values of the level of psychomotor reactions of sportsmen which are available in literature. It allows recommending the developed computer applications for a practical use.

Keywords: sensory-motor reaction, program computer applications, tablet personal computer, single combats.

Introduction. Modern computer technologies open before researchers in the field of sport new opportunities. The improvement of technical characteristics of computers, the reduction of their sizes, the emergence of essentially new devices transfer the dialogue a user to a new level.

The software product also improves with the growth of a technical component. The use of new computer programs with a simple and clear interface allows increasing accuracy and speed of receiving results, and also saves the time at their processing for making decisions [1; 4].

One of new devices which appeared in the last years and deserve attention is a tablet personal computer which is equipped with a touch screen. The use of tablet computers fell within many scope of human life; they found the application for designers, artists, writers, musicians etc. The appeal of a tablet consists first of all in its portability, in good technical characteristics which are coming nearer at the leading producers to the level of desktop computers, and opportunity to communicate with a user via a touch screen.

Having the customized program applications on a tablet, it is possible to expect sufficient efficiency of its use and in the field of sports metrology.

The analysis of the existing appendices testifies to a large number of the programs devoted to sports subject, both an information orientation, and a methodical orientation. But, unfortunately, the specialized programs allowing estimating a psycho-physiological condition of a sportsman are available generally on desktop computers and cost rather much.

As psycho-physiological functions of a person represent a biological basis of separate and typological features of the highest nervous system, they characterize the process of formation and improvement of special skills of the movement in the conditions of the educational and competitive activity. The functional condition of psychophysiological functions can be an indicator as the degree of preparedness of a sportsman and the development of processes of exhaustion and overstrain in it [5; 8; 9].

According to experts [2; 7; 10], on fighting sports where takes place a high intellectual tension where technical and tactical actions are executed with various existential features, and the success of competitive fight depends not only on actions of a sportsman, but also and on actions of a competitor, an assessment of psychomotor indicators allows receiving an additional information on a functional condition of a sportsman for the improvement of a method of its sports preparation.

The above-mentioned confirms a relevance of the development of a complex of statements on the basis of a tablet personal computer for an assessment of sensory-motor reactions of sportsmen, namely, sportsmen who engage in various types of single combats. These appendices will be calculated, first of all, for students and teachers of specialized higher educational institutions in their professional and scientific activity.

The objective of the research: to develop a complex of appendices on an assessment of sensory-motor reactions of sportsmen who are engage in various types of single combats.

The tasks of the research:

1. To make the analysis of special literature on a problem estimates of sensory-motor reactions of sportsmen.
2. To take a complex of tests for sportsmen of single combats.
3. To develop and approve a tablet personal computer application allowing defining the complex of sensory-motor reactions of sportsmen who engage in single combats.

Material and methods of the research. The following methods are used for the solution of objectives: theoretical analysis and generalization of scientific and methodical literature, method of a computer programming.

Results of the research and their discussion. An approximate complex of test tasks is selected, which in our opinion and opinion of experts, is possible to use in single combats, on the basis of studying of special literature on psychophysiological diagnostics [1; 3; 5; 6; 12, etc.] and modern program complexes ("Psychodiagnostics" [4], "A sports psychophysiologicalist" (LLC SMC Analitik, Omsk), the program complex Diagnostician-1 (laboratory of a higher nervous activity of Cherkassy pedagogical university, in the co-authorship with Doctor of Biological Science, professor V. N. Makarenko), etc.).

Test tasks by an assessment both simple and difficult sensory-motor reactions are given below:

1. Assessment of a motility and simple reaction to a visual signal.
2. Assessment of a simple motive reaction to a visual signal (SVMR).

3. Assessment of a simple acoustical motor reaction (SAMR).
4. An assessment of reaction of a choice among static objects.
5. An assessment of reaction to a moving object (RMO).
6. An assessment of feeling of speed.
7. Assessment of reaction of distinction, reaction to a dynamic object.
8. An assessment of reaction of a choice from two dynamic objects.
9. An assessment of force of nervous system (Tepping-test).
10. A time sense assessment, both with a use of sound intervals, and light.

The program applications including the above-named test tasks are developed in the Swift programming language and calculated on a use on tablet computers with the operating system iOS [13].

The preference to these tablets and the operating system were caused by their speed, reliability, technical characteristics and simplicity of communication with the user.

The interface of all developed programs is simplified and consists of two operating buttons "Start" and "Reset" (pic. 1).

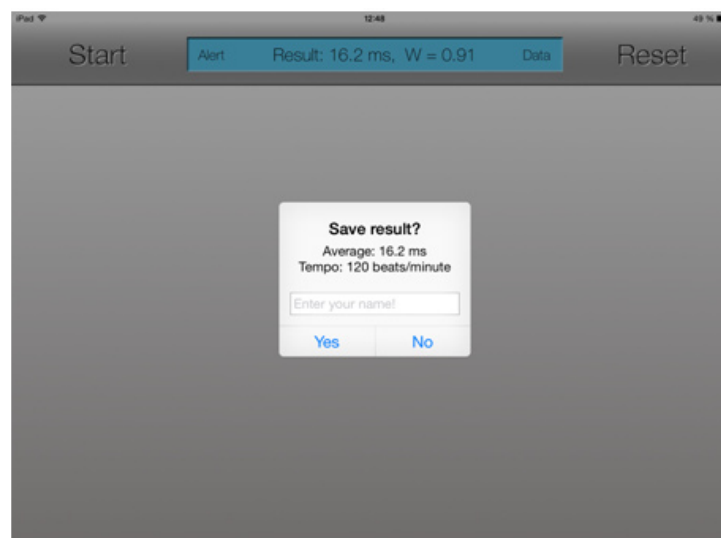


Pic. 1. Interface of a working window of the program for an assessment of a reaction of distinction, reaction to a dynamic object

All tests are developed in one style, and the process of testing is carried out in the automatic mode.

The testing technique practically of all tests includes the offer to the examinee to execute 12 attempts, and after the implementation of the test the program selects 10 best results, calculates an arithmetic average, defines a normality of distribution of the received results according to the criterion of Shapiro-Wilk and, at the compliance of data of the law of normal distribution, suggests to keep result in a database (pic. 2).

At the unsuccessful implementation of the test it is offered to pass it repeatedly. No more than one minute is on average spent for the implementation of the test.



Pic. 2. Window of preservation of the result of the test "An assessment of feeling of speed"

More than 50 sportsmen who are engaged in different types of single combats (fight, taekwondo, karate) having qualification from 1 category to the master of sports of the international class (MSIC), various age (from 16 till 22 years old) took part in a preliminary approbation of the developed applications. As the tested the tablet computer iPad of the 4th generation was used.

Results on some tests (SVMR – simple visual motor reaction, SAMR – simple acoustical motor reaction, RMO – reaction to a moving object) are presented in tab. 1.

Table 1
Results of an assessment of psychomotor reactions, ms

Qualification of sportsmen	SVMR	SAMR	RMO
MS, MSIC	220,9±3,21	197,9±2,35	18,3±0,85
1 category, CMS	251,2±4,81	214,1±4,32	24,7±0,93

Note. SVMR – is a simple visual motor reaction, SAMR – is a simple acoustical motor reaction, RMO – is a reaction to a moving object.

The given results in the tab. 1 and the results received by us according to other tests confirm the data which are available in literature [5; 7; 11] on characteristic values of the level of psychomotor reactions of sportsmen. It allows recommending the developed computer applications for a practical use.

Conclusions:

1. The analysis of special literature confirmed the relevance and the importance of a problem of an assessment of psychomotor reactions at sportsmen, and also defined the directions of improvement of a technique of preparation in single combats taking into account a functional condition of psycho-physiological functions at a sportsman.

2. The test tasks for an assessment of psychomotor reactions of sportsmen of single combats including the tasks according to simple and difficult motor reaction, and also the tasks according to specific perceptions, such as feeling of speed, time sense are selected.

3. The computer program applications by assessment sensory-motor reactions of sportsmen of single combats are developed and the preliminary approbation of appendices is carried out, their metrological informational content is confirmed.

Prospects of further researches. The further research will be directed on an approbation of appendices on tablet computers of other models, the question of transfer of appendices on smartphones and their optimization according to technical capabilities of mobile devices, import and export of databases to cloudy storages with possibility of their further use is also considered.

References:

- Ashanin V. S. *Slobozans'kij nauk.-sport. visn. [Slobozhanskyi science and sport bulletin]*, Kharkiv, 2002, vol. 5, p. 164–166. (rus)
- Bleyer A. N. *Teoriya i praktika fizicheskoy kultury [Theory and Practice of Physical Culture]*, 2006, vol. 6, p. 28–31. (rus)
- Ilin Ye. P. *Psikhomotornaya organizatsiya cheloveka [Psychomotor organization Human]*, SPb., 2003, 384 p. (rus)
- Kozina Zh. L., Barybina L. N., Mishchenko D. I., Tsikunov A. A. *Fizicheskoye vospitaniye studentov [Physical education students]*, 2011, vol. 3, p. 56–59. (rus)
- Korobeynikov G. V., Korobeynikova L. G., Kozina Zh. L. *Otsinka ta korektsiya psikhofiziologichnikh staniv u sporti [Estimation and correction of physiological conditions in sport]*, Kharkiv, 2012, 340 p. (ukr)
- Lizogub V. S. *Fiziologichniy zhurnal [Physiological magazine]*, 2010, T. 56, vol. 1, p. 148–151. (ukr)
- Pirozhkov O., Kochetkova S. *Chelovek v mire sporta: Novyye idei, tekhnologii, perspektivy [The man in the sports world]*, Moscow, 1998, vol. 2, p. 386–387. (rus)
- Rovniy A. S., Rovniy V. A., Rovna O. O. *Fiziologiya rukhovoivoi aktivnosti [Physiology of physical activity]*, Kh., 2014, 344 p. (ukr)
- Romanenko V. A. *Diagnostika dvigatelnykh sposobnostei [Diagnostics of motor abilities]*, Donetsk, 2005, 290 p. (rus)
- Saenko V. G. *Slobozans'kij nauk.-sport. visn. [Slobozhanskyi science and sport bulletin]*, Kharkiv, 2015, vol. 2, p. 166–171. (ukr)
- Pavlova V. I., Terzi M. S., Saraikin D. A. *Vestnik Chelyabinskogo gosudarstvennogo pedagogicheskogo universiteta [Bulletin of Chelyabinsk State Pedagogical University]*, Chelyabinsk, 2014, vol. 6, p. 1412–1417. (rus)
- Praktikum po psikhofiziologicheskoy diagnostike [Workshop on psychophysiological diagnostics]*, Moscow, 2000, 128 p. (rus)
- Apple Developer, Access mode : developer.apple.com.
- Yablyk – Apple news, Access mode : yablyk.com. (rus)

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