

Differences in manifestation of sensory-motor reactions and specific perceptions at the men and women doing martial arts

Curby D.¹, Tropin Y.²

International Network of Wrestling Researchers, UWW Scientific Commission, USA¹

Kharkov state academy of physical culture, Ukraine²

Abstract. Purpose: to establish features of manifestation of sensory-motor reactions and specific perceptions at the men and women doing martial arts. **Material and methods:** analysis of scientific-methodical information, generalization of the best practical experience, psycho-physiological methods of the research, methods of mathematical statistics. 46 sportsmen, who are engaged in different types of combat sports, participated in the research. Participants were divided into two groups: 1 – 27 men, median age (19,41±1,75) years; 2 – 19 women, median age (19,69±1,90) years, reliable differences on age, ($p>0,05$). Sportsmen had qualification Candidate Master of Sports and Master of Sports. **Results:** assessment of simple, difficult sensory-motor reactions and specific perceptions of martial artists is executed. The most significant qualities for success of men and women in martial arts allowed distinguishing the analysis of results of the held psycho-physiological testing. In the course of the research it was defined that the best indicators of simple sensory-motor reactions are observed at female martial artists (from 1 % till 2 %), and at male martial artists results in difficult sensory-motor reactions (from 2 % till 11 %) and specific perceptions are higher (from 1 % till 19 %). It is defined that pedagogical features of the organization of educational-training process of martial artists of various sexes is rational planning of loads and volume of trainings, structures of the competitive period, account and use of means of recovery of the lost working capacity. **Conclusions:** it is established that abilities to analyze, estimate and predict situations quickly and in due time to make the correct decisions during a single combat, that is explained unreliable distinctions ($p>0,05$) in psycho-physiological indicators of the studied sportsmen are formed at men and women who are engaged in different types of martial arts.

Keywords: martial arts, men, women, indicators, sensory-motor reactions, specific perceptions.

Introduction. Diagnostics of functional states of organism of the sportsman is one of the relevant directions of modern sports science. High sporting achievements are closely connected with psycho-physiological functions of the person. It is known that full devotion in training activity and the competitive results achieved by the sportsman in many respects are caused by the level of development of psycho-sensorial abilities (Алексеев, 2007; Таймазов, & Голуб, 2004).

Number of authors (Барыбина, & Козина, 2010; Ильин, 2006; Dudnyk, and et. al., 2017) consider that psycho-physiological functions of the person represent the biological base of individual and typological features of the highest nervous system, they

characterize process of forming and improvement of special motor skills in the conditions of training and competitive activity. Only the special training increasing the physiological power of the sensory-motor and functional systems responsible for adaptation gives the chance to the sportsman to cope with exercise and mental stresses, high-intensity and big on volume (Шацьких, 2012; Korobeynikov, Korobeinikova, & Shatskih, 2013; Podrigalo, and et. al., 2017). The functional state of psycho-physiological functions can be the indicator, both the level of preparedness of the sportsman, and the development of exhaustion processes in it and overstrain.

The main properties of the nervous system define the functional and

psychological preparedness of sportsmen responsible for sports efficiency, especially, in different types of martial arts (Бойченко, Алексєнко, & Алексєєва, 2015; Усков, 2013; Romanenko, and et. al., 2018).

Now the progress of sporting achievements and the increased competition in martial arts on the world scene resulted in need of search of unused reserves which realization will allow intensifying the process of sports improvement. Therefore, studying of physiological and psycho-physiological features of influence of exercise and psycho-emotional stresses of training and competitive activity of modern combat sports on functional state of organism, activity of the central regulatory systems, connections of single elementary movements with complete specialized actions in martial arts is relevant (Бойченко, Алексєєва, & Алексєнко, 2013; Chaabene, and et. al., 2017; Tropin, & Shatskikh, 2017).

Ability to carry out a large number of difficult technical and tactical actions, accounting of possible actions of the rival in a single combat, adoption of courageous and instant decisions in extreme situations against the background of influence of the forcing-down factors – all this is a necessary condition for achievement of success in competitive activity of martial artists and reflects the level of their psychological preparedness (Ермаков, Тропин, & Пономарев, 2015; Тропин, 2018; Curby, 2013; Tünnemann, & Curby, 2016).

Communication of the work with scientific programs, plans and subjects. The research was conducted according to the subject of the research work of Kharkov state academy of physical culture «Psycho-sensory regulation of motor activity of sportsmen of situational sports» (number of the state registration is 0116U008943).

Purpose of the research: to establish features of manifestation of sensory-motor reactions and specific perceptions at the men and women doing martial arts.

Research problems:

– to reveal psycho-physiological features in martial arts on the basis of the analysis of methodical literature and

generalization of the best practical experience;

– to define indicators of sensory-motor reactions and specific perceptions at martial artists;

– to carry out the comparative analysis of indicators of sensory-motor reactions and specific perceptions at the men and women doing martial arts.

Material and methods of the research. The following methods were used for the solution of the research problems: analysis of scientific-methodical information, generalization of the best practical experience, psycho-physiological methods of the research, and methods of mathematical statistics.

46 sportsmen who are engaged in different types of martial arts participated in the research. Participants were divided into two groups: 1 – 27 men, median age (19,41±1,75) years; 2 – 19 women, median age (19,69±1,90) years, reliable differences on age, (p>0,05). Sportsmen had qualification Candidate Master of Sports and Master of Sports.

Results of the research and their discussion. On the basis of the analysis of methodical literature and generalization of the best practical experience it was revealed that psycho-physiological features of sportsmen in martial arts, have rather powerful value, in many respects define success of competitive activity and provide high sports result (Камаев, & Тропин, 2013; Korobeynikov, and et. al., 2017; Mirzaei, Curby, Barbas, & Lotfi, 2011).

The assessment of psycho-physiological reactions is carried out by complex of the tests developed for tablet personal computers (Ашанин, & Романенко, 2015). Tests were divided into three groups:

– assessment of simple sensory-motor reactions;

– assessment of difficult sensory-motor reactions;

– assessment of specific perceptions.

Variation coefficient was used for determination of uniformity of selective observations. The obtained data confirm uniformity of indicators of simple sensory-motor reactions of the studied sportsmen, both

in the first (the coefficient of variation is ranging from 6,18 % till 7,33 %), and in the second group (from 7,05 % till 7,88 %). Also the uniformity in indicators of difficult sensory-motor reactions is observed: in the first (from 8,70 % till 12,35 %) and in the second group (from 8,10 % till 10,70 %), except an indicator of reaction to a moving object which has high coefficient of variation

in the first (27,38 %) and in the second group (28,90 %).

Indicators in tests which display specific perceptions of martial artists also have high coefficient of variation in the first (from 14,16 % till 34,83 %) and in the second group (from 13,39 % till 44,63 %), it is explained by qualification of sportsmen at whom lookahead of situations (anticipation) is individually displayed (table 1).

Table 1

Coefficient of variation of indicators of psycho-physiological reactions of martial artists of the first (men) and second (women) groups (n=46)

№	Indicators	the 1 st group (n=27)	the 2 nd group (n=19)
Simple reactions			
1	Simple motility (the number of pressing for 10 s)	6,48	7,88
2	Resistance to the forcing-down factors (%)	6,18	7,61
3	Simple visual and motor reaction (ms)	7,33	7,05
4	Simple auditory and motor reaction (ms)	6,22	7,63
Difficult reactions			
5	Reaction of the choice from static objects (ms)	12,02	10,70
6	Reaction to a moving object (ms)	27,38	28,90
7	Reaction distinction (ms)	8,70	8,10
8	Reaction of the choice from dynamic objects (ms)	12,35	9,78
Specific perceptions			
9	Assessment of speed feeling (80 bpm ⁻¹) (ms)	34,83	44,63
10	Assessment of reproduction of accuracy of the set line (mm)	29,89	18,22
11	Speed of reproduction of the set line (mm/s)	31,84	31,49
12	Assessment of perception of change of the size of an object (s)	14,16	13,39

Results of testing of sensory-motor reactions and specific perceptions of martial artists are presented in table 2.

Comparing indicators of sensory-motor reactions and specific perceptions of examinees it is revealed that results of simple sensory-motor reactions are higher at representatives of the second group (women) in tests: simple motility on 1 %, resistance to the forcing-down factors on 1 %, simple visual and motor reaction on 1 %, simple auditory and motor reaction on 2 %; and

difficult sensory-motor reactions and specific perceptions are better at sportsmen of the first group (men): reaction of the choice from static objects on 2 %, reaction to a moving object on 11 %, reaction distinction on 3 %, reaction of the choice from dynamic objects on 5 %, assessment of speed feeling on 19 %, assessment of reproduction of accuracy of the set line on 8 %, the speed of reproduction of the set line on 1 %, assessment of perception of change of the size of an object on 4 %.

Table 2

Indicators of psycho-physiological reactions of martial artists of the first (men) and second (women) groups (n=46)

№	Indicators	the 1 st group (n=27)	the 2 nd group (n=19)	Confidence level	
				t	p
Simple reactions					
1	Simple motility (the number of pressing for 10 s)	26,13±0,33	26,35±0,49	-0,37	p>0,05
2	Resistance to the forcing-down factors (%)	79,85±0,95	80,78±1,45	-0,54	p>0,05
3	Simple visual and motor reaction (ms)	229,64±3,24	226,28±3,76	0,68	p>0,05
4	Simple auditory and motor reaction (ms)	215,42±2,58	211,27±3,80	0,91	p>0,05
Difficult reactions					
5	Reaction of the choice from static objects (ms)	612,15±14,16	621,73±15,68	-0,45	p>0,05
6	Reaction to a moving object (ms)	19,06±1,00	21,00±1,43	-1,11	p>0,05
7	Reaction distinction (ms)	276,01±4,62	283,42±5,41	-1,04	p>0,05
8	Reaction of the choice from dynamic objects (ms)	351,01±8,35	367,99±8,48	-1,43	p>0,05
Specific perceptions					
9	Assessment of speed feeling (80 bpm ⁻¹) (ms)	37,10±2,49	44,12±4,64	-1,33	p>0,05
10	Assessment of reproduction of accuracy of the set line (mm)	0,39±0,02	0,42±0,02	-0,94	p>0,05
11	Speed of reproduction of the set line (mm/s)	75,58±4,63	75,13±5,58	0,06	p>0,05
12	Assessment of perception of change of the size of an object (s)	0,84±0,02	0,87±0,03	-0,82	p>0,05

Note: reliability t=2,01; p<0,05.

The received results of the research are explained by distinctions of male and female organisms which are reflected in pedagogical features of the organization of educational-training process.

The done analysis allowed establishing that when planning training process it is necessary to develop complexes of special exercises of the psycho-physiological reactions directed to development taking into account features of male and female organisms. It is also confirmed by the results of researches presented in scientific works (Latyshev, Korobeynikov, & Korobeinikova, 2014; Miarka, 2016).

Use in the analysis of psycho-physiological indicators of modern statistical methods allows building models. They allow representing more accurately the changes

happening in organism of sportsmen. Ровный, & Романенко, (2016), model characteristics of sensory-motor reactions and specific perceptions of taekwondo-fighters of high qualification as a result of which, rating scales were developed investigated.

Zi-Hong, H. (2013), defined a physiological profile of elite Chinese female wrestlers. The author recommends comparing the obtained data with other wrestlers to help defining individual shortcomings or strengths and to develop training programs which will allow achieving success in wrestling.

Iermakov, and et. al. (2016) marked out the most significant psychophysiological qualities for forecasting of success in martial arts on the basis of model characteristics.

Коваленко, & Ляпин, (2013) carried out the comparative analysis of separate psycho-physiological reactions in competitive

activity at representatives of different types of martial arts which allowed to define that kickboxers differ in faster simple sensory-motor reaction on a sound and a choice behavior. The strong type of the nervous system is characteristic of them. More slowed down simple sensory-motor reactions, than at kickboxers are characteristic of karatekas, the average type of the nervous system is characteristic of them.

Павлова, Терзи, & Сарайкин, (2014) defined physiological and psycho-physiological features of sensory-motor adaptation at taekwondo-fighters of different qualifications. On the basis of the conducted research positive influence of taekwondo classes on the neuromuscular system and state of the nervous system of youth-taekwondo-fighters with growth of their sports qualification is established. It demonstrates that taekwondo classes form extensive base of the adaptable devices in an organism focused on precision and high-speed activity of the lower extremities and functional mobility of nerve centers what point adaptive reorganizations of the sensory-motor system of youth-taekwondo-fighters with growth of their sports qualification to.

The data obtained earlier are added (Первачук, и др., 2017; Тропин, & Бойченко, 2018; Тропин, и др., 2018; Тропин, Романенко, & Ронмарыов, 2016) on a perspective of psycho-physiological control in martial arts.

Conclusions.

1. On the basis of the analysis of methodical literature and generalization of the best practical experience it was revealed that psycho-physiological features of sportsmen in martial arts have rather powerful value, in many respects define success of competitive activity and provide high sports result.

2. During the research the following indicators were received: the level of simple sensory-motor reactions (tests: «Simple motility and stability to the forcing-down factors», «Simple visual and motor reaction», «Simple auditory and motor reaction»), the level of composite sensory-motor reactions (tests: «Choice behavior from static objects», «Distinction reaction», «Reaction to a moving

object», «Choice behavior from dynamic objects»), the level of specific perceptions (tests: «Assessment of speed feeling», «Assessment of accuracy and speed at reproduction of the set line», «Assessment of perception of change of the size of an object»).

The most significant qualities for success of men and women in martial arts allowed distinguishing the analysis of results of the held psycho-physiological testing.

3. In the course of the research it was defined that the best indicators of simple sensory-motor reactions are observed at female martial artists (from 1 % till 2 %), and at male martial artists results in difficult sensory-motor reactions (from 2 % till 11 %) and specific perceptions are higher (from 1 % till 19 %).

It is established that abilities quickly are formed to analyze, estimate and predict situations and in due time to make the correct decisions during a single combat, that is explained unreliable distinctions ($p>0,05$) in psycho-physiological indicators of the studied sportsmen at men and women who are engaged in different types of martial arts.

4. The conducted research confirmed importance of psycho-physiological features of men and women of different types of martial arts as success factors.

It is defined that pedagogical features of the organization of educational-training process of martial artists of various sex is rational planning of loads and volume of trainings, structures of the competitive period, account and use of means of recovery of the lost working capacity.

Prospects of further researches in this direction will be directed to determination of interrelations between psycho-physiological indicators and special physical fitness of martial artists of various sexes.

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Анотація. Кербі Д., Тропін Ю. М. Відмінності в прояві сенсомоторних реакцій і специфічних сприйняття у чоловіків і жінок, що займаються єдиноборствами. Мета: встановити особливості прояву сенсомоторних реакцій і специфічних сприйняття у чоловіків і жінок, що займаються єдиноборствами. Матеріал і методи: аналіз науково-методичної інформації, узагальнення передового практичного досвіду, психофізіологічні

методи дослідження, методи математичної статистики. У дослідженні взяли участь 46 спортсменів, які займаються різними видами спортивних єдиноборств. Учасники були розділені на дві групи: 1 – 27 чоловіків, середній вік ($19,41 \pm 1,75$) років; 2 – 19 жінок, середній вік ($19,69 \pm 1,90$) років, достовірних відмінностей за віком немає, ($p > 0,05$). Спортсмени мали кваліфікацію кандидат в майстри спорту і майстер спорту. **Результати:** виконано оцінку простих, складних сенсомоторних реакцій і специфічних сприйняття єдиноборців. Аналіз результатів проведеного психофізіологічного тестування дозволили виділити найбільш значущі якості для успішності чоловіків і жінок в єдиноборствах. У процесі дослідження було визначено, що найкращі показники простих сенсомоторних реакцій спостерігаються у жінок-єдиноборців (від 1 % до 2 %), а у чоловіків-єдиноборців вище результати в складних сенсомоторних реакціях (від 2 % до 11 %) і специфічних сприйняттях (від 1 % до 19 %). Визначено, що педагогічними особливостями організації навчально-тренувального процесу єдиноборців різної статі є раціональне планування навантажень і обсягу тренувань, структури змагального періоду, обліку та використання коштів відновлення втраченої працездатності. **Висновки:** встановлено, що у чоловіків і жінок, які займаються різними видами єдиноборств, формуються вміння швидко аналізувати, оцінювати і прогнозувати ситуації і своєчасно приймати правильні рішення під час поєдинку, що і пояснює не достовірні відмінності ($p > 0,05$) в психофізіологічних показниках досліджуваних спортсменів.

Ключові слова: єдиноборства, чоловіки, жінки, показники, сенсомоторні реакції, специфічні сприйняття.

Анотація. Керби Д., Тропін Ю. Н. **Различия в проявлении сенсомоторных реакций и специфических восприятий у мужчин и женщин, занимающихся единоборствами.** **Цель:** установить особенности проявления сенсомоторных реакций и специфических восприятий у мужчин и женщин, занимающихся единоборствами. **Материал и методы:** анализ научно-методической информации, обобщение передового практического опыта, психофизиологические методы исследования, методы математической статистики. В исследовании приняли участие 46 спортсменов, занимающихся различными видами спортивных единоборств. Участники были разделены на две группы: 1 – 27 мужчин, средний возраст ($19,41 \pm 1,75$) лет; 2 – 19 женщин, средний возраст ($19,69 \pm 1,90$) лет, достоверных отличий по возрасту нет, ($p > 0,05$). Спортсмены имели квалификацию кандидат в мастера спорта и мастер спорта. **Результаты:** выполнена оценка простых, сложных сенсомоторных реакций и специфических восприятий единоборцев. Анализ результатов проведенного психофизиологического тестирования позволили выделить наиболее значимые качества для успешности мужчин и женщин в единоборствах. В процессе исследования было определено, что лучшие показатели простых сенсомоторных реакций наблюдаются у женщин-единоборцев (от 1 % до 2 %), а у мужчин-единоборцев выше результаты в сложных сенсомоторных реакциях (от 2 % до 11 %) и специфических восприятиях (от 1 % до 19 %). Определено, что педагогическими особенностями организации учебно-тренировочного процесса единоборцев различного пола является рациональное планирование нагрузок и объема тренировок, структуры соревновательного периода, учета и использования средств восстановления утраченной работоспособности. **Выводы:** установлено, что у мужчин и женщин, которые занимаются различными видами единоборств, формируются умения быстро анализировать, оценивать и прогнозировать ситуации и своевременно принимать правильные решения во время поединка, что и объясняет не достоверные различия ($p > 0,05$) в психофизиологических показателях исследуемых спортсменов.

Ключевые слова: единоборства, мужчины, женщины, показатели, сенсомоторные реакции, специфические восприятия.

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Information about the authors:

David Curby: EdD, director of the International Network of Wrestling Researchers, UWW Scientific Commission Member; USA

Кербі Девід: доктор філософії, директор Міжнародної мережі досліджень боротьби, Член Наукової комісії UWW; США

Керби Девид: доктор философии, директор Международной сети исследователей борьбы, член научной комиссии UWW; США

<http://orcid.org/0000-0002-7691-3427>

E-mail: davcurb@gmail.com

Yura Tropin: Phd (Physical Education and Sport), Associate Professor; Kharkiv State Academy of Physical Culture: Klochkovskaya st., 99, Kharkov, 61058, Ukraine.

Тропін Юрій Миколайович: к.фіз.вих., доцент; Харківська державна академія фізичної культури: вул. Клочківська, 99, м. Харків, 61058, Україна.

Тропин Юрий Николаевич: к.физ.восп., доцент; Харьковская государственная академия физической культуры; ул. Клочковская 99, г. Харьков, 61058, Украина.

<http://orcid.org/0000-0002-6691-2470>

E-mail: tyn.82@ukr.net