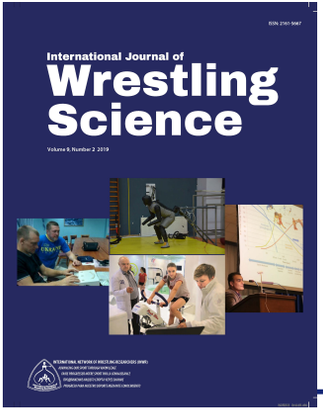

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Yuriy Tropin, Georgiy Korobeynikov, David Curby, Andrey Vorontsov & Vladymir Shatskih

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MODEL CHARACTERISTICS OF SENSORIMOTOR REACTIONS AND SPECIFIC PERCEPTIONS OF WRESTLERS AMONG DIFFERENT WEIGHT CATEGORIES

Yuriy Tropin[1], Georgiy Korobeynikov[2], Curby David[3], Vorontsov Andrey[2], Shatskih Vladymir[4]

[1]Kharkiv State Academy of Physical Culture. Ukraine
[2]National University of Physical Education and Sport of Ukraine
[3]International Network of Wrestling Researchers
[4]Ukrainian Wrestling Association

k.george.65.w@gmail.com

ABSTRACT
Research has been conducted, in which 24 elite level Greco-Roman wrestlers between 19 and 24 years old took part. For the convenience of analysis wrestlers were divided into 3 wide-ranging weight groups: lightweight (under 70kg); middleweight (from 70kg to 92kg) and heavyweight (over 92kg). Based on the test results, model characteristics of sensorimotor reactions and specific perceptions of elite level wrestlers among different weight groups were developed. It was found. that practicing wrestling forms an ability to quickly analyze, assess and predict situations to make right decision in due time during wrestling bout, which explains unreliable differences ($p>0.05$) in the majority of psychophysiological indicators of the studied athletes.
Key words: elite wrestlers, models, individual characteristics, weight groups.

INTRODUCTION
Modern high-performance sport requires high level athletes' preparedness in all aspects. Inability to perpetually increase training loads is a major problem of high-performance sports. which leads to necessity of further research, to identify more effective pedagogical tools and methods in preparation systems for elite level athletes (Korobeynikov, Korobeinikova & Latyshev, 2014; Podrigalo, Iermakov, Romanenko, Rovnaya, Tropin, Goloha & Halashko, 2019).

Ability to execute a large number of complex technical and tactical actions, assessment of possible opponents' actions during a bout. making immediate and sharp decisions in extreme situations considering impact of disturbing factors – are the major and necessary athletes' characteristics for achieving competition performance success, which also displays the level of their psychological preparedness (Latyshev, Rybak, Golovach, Korolev, Lyashenko & Kvasnitsa, 2019; Tropin & Boychenko, 2018).

Human psychophysiological functions depend on characteristics of the higher nervous system, which characterize formation and development process of special motor skills in sports (Alekseev, 2007).
Indicators of sensorimotor reactions with different level of complexity can be considered as objective criteria of the current functional state of the central nervous system (CNS). Sensorimotor reaction time is one of the simplest neurophysiological indicators, which is relatively accurate and easy to obtain. These indicators display speed dynamics of nerves processes and their shifts, motor coordination, general working capacity and activity of the CNS during various periods of athlete preparation (Ashanin & Romanenko, 2015).

Training and competitive activity in martial arts promotes formation a whole complex of specific reactions and perceptions among athletes. They are based on perception threshold, received by various sensory systems. A major role is played by musculoskeletal levels, visual, vestibular and audio perceptions. The higher level of an athlete, the higher value level of psychophysiological functions to achieve better competition results (Podrigalo, Iermakov, Romanenko, Rovnaya, Tropin, Goloha & Halashko, 2019).

PURPOSE – to develop model characteristics of sensorimotor reactions and specific perceptions among wrestlers of various weight categories.

METHODS
Research methods: analysis of scientific and methodical information, best practices exploration, psychophysiological research methods, and mathematical statistics methods.

RESULTS
An analysis of methodological literature and generalization of best practice has established, that in order to achieve high performance results in sports following structures must be used: a clear management system,

planning and purposeful use of domestic and foreign best practices in training process with of simulation of studied systems. (Pervachuk, Tropin, Romanenko & Chuev, 2017; Tünnemann & Curby, 2016).
Models can be designed in the form of model characteristics. In most cases. model characteristics are the parts. margins. elements of sports type in numbers or other units. characterizing competition performance and properly describing various aspects of athletes' preparedness. (Nikitushkin & Suslov, 2017).

24 elite level athletes from 19 to 24 years old. practicing freestyle and Greco-roman wrestling, participated in this research. For the convenience of analysis. wrestlers were divided into three weight groups: lightweight (under 70kg); middleweight (70kg to 92kg) and heavyweight (over 92kg). Assessment of sensorimotor reactions and specific perceptions was conducted through series of tests developed for portable computer devices (Ashanin & Romanenko, 2015). Tests were divided into three groups: assessment of simple sensorimotor reactions; assessment of complex sensorimotor reactions; and assessment of specific perceptions.

Coefficient of variation was used to determine the homogeneity of sample selection observations (V). It is believed, that if coefficient of variation is not above 10%. then sample selection can be considered homogenous. Obtained data indicates about homogeneity indicators of simple and complex reactions, since coefficient of variation is in range between 2.30% and 10.08%. Indicators of specific perceptions have higher coefficient of variation (between 13.48 % and 41.67 %), due to the fact that specific perceptions reflect more individually psychological states of elite wrestlers (Table 1).

Table 1. Coefficient of variation (V, %) of indicators for sensorimotor reactions and specific perceptions among elite level wrestlers (n=24)

№	Indicators of sensorimotor reactions and specific perceptions	Weight groups		
		Lightweight (n=8)	Middleweight (n=8)	Heavyweight (n=8)
Simple reactions				
1	Simple motility (number of pressing within 10s)	5.78	7.19	5.33
2	Steadiness to distracting factors (%)	8.05	2.30	6.71
3	Simple hand-motor reaction (msec)	5.41	4.31	9.60
4	Simple auditory motor reaction (msec)	5.77	5.61	8.38
Complex reactions				
5	Selection reaction from static objects (msec)	6.42	8.56	10.08
6	Reaction to a moving object (msec)	9.40	9.03	9.38
7	Distinction reaction (msec)	7.34	4.50	7.18
8	Selection reaction from dynamic objects (msec)	6.85	6.61	9.82
Specific perceptions				
9	Pace assessment (80 BPM $^{-1}$) (msec)	36.84	33.34	41.67
10	Line accuracy reproduction rate assessment (mm)	15.21	17.25	36.33
11	Set line reproduction speed assessment (mm/s)	21.90	32.46	40.17
12	Object resize perception assessment (s)	15.20	22.02	13.48

Based on the tests results. model characteristics of sensorimotor reactions and specific perceptions among elite level wrestlers were developed (Table 2).

Table 2. Model characteristics of sensorimotor reactions and specific perceptions among elite level wrestlers of various weight groups (n=24)

№	Indicators of sensorimotor reactions and specific perceptions	Weight groups		
		Lightweight (n=8) $\overline{X}$ ±m	Middleweight (n=8) $\overline{X}$ ±m	Heavyweight (n=8) $\overline{X}$ ±m
Simple reactions				
1	Simple motility (number of pressing within 10s)	25.26±0.55	25.48±0.69	25.36±0.51
2	Steadiness to distracting factors (%)	79.90±2.43	80.71±0.70	80.19±2.03
3	Simple hand-motor reaction (msec)	232.76±4.76	230.05±3.75	231.64±8.40
4	Simple auditory motor reaction (msec)	213.64±4.66	211.46±4.49	214.31±6.79
Complex reactions				
5	Selection reaction from static objects (msec)	637.78±15.48	650.83±21.05	616.26±23.48
6	Reaction to a moving object (msec)	17.36±0.62	22.59±0.77	16.11±0.57
7	Distinction reaction (msec)	280.33±7.78	283.90±4.83	283.91±7.70
8	Selection reaction from dynamic objects (msec)	361.74±9.37	363.01±9.07	383.85±14.25
Specific perceptions				
9	Pace assessment (80 BPM $^{-1}$) (msec)	39.56±5.51	35.81±4.51	37.16±5.85
10	Line accuracy reproduction rate assessment (mm)	0.42±0.02	0.45±0.03	0.50±0.07
11	Set line reproduction speed assessment (mm/s)	99.38±8.23	84.39±10.35	93.10±14.14
12	Object resize perception assessment (s)	0.93±0.05	0.87±0.07	0.89±0.05

Analysis of table 3 allows one to explore similarity of functional states of research samples, along with specific distinctions between wrestler groups. Differentiation of reliability was observed between light and middleweight weight groups (t=-5.29; p<0.001), and also between middle and heavyweight weight groups (t=6.75; p<0.001), during moving object reaction test.

Table 3. **Reliability of differentiation indicators of sensorimotor reactions and specific perceptions among elite level wrestlers of different weight groups**

№	Indicators of sensorimotor reactions and specific perceptions	Weight groups		
		1 and 2	1 and 3	2 and 3
Simple reactions				
1	Simple motility (number of pressing within 10s)	t=-0.24; p>0.05	t=-0.13; p>0.05	t=0.13; p>0.05
2	Steadiness to distracting factors (%)	t=-0.32; p>0.05	t=-0.09; p>0.05	t=0.24; p>0.05
3	Simple hand-motor reaction (msec)	t=0.45; p>0.05	t=0.12; p>0.05	t=-0.17; p>0.05
4	Simple auditory motor reaction (msec)	t=0.34; p>0.05	t=-0.08; p>0.05	t=-0.35; p>0.05

Complex reactions				
5	Selection reaction from static objects (msec)	t=-0.50; p>0.05	t=0.76; p>0.05	t=1.10; p>0.05
6	Reaction to a moving object (msec)	t=-5.29; p<0.001	t=1.49; p>0.05	t=6.75; p<0.001
7	Distinction reaction (msec)	t=-0.39; p>0.05	t=-0.33; p>0.05	t=0.01; p>0.05
8	Selection reaction from dynamic objects (msec)	t=-0.10; p>0.05	t=-1.30; p>0.05	t=-1.23; p>0.05
Specific perceptions				
9	Pace assessment (80 BPM $^{-1}$) (msec)	t=0.53; p>0.05	t=0.30; p>0.05	t=-0.18; p>0.05
10	Line accuracy reproduction rate assessment (mm)	t=-0.87; p>0.05	t=-1.05; p>0.05	t=-0.57; p>0.05
11	Set line reproduction speed assessment (mm/s)	t=1.13; p>0.05	t=0.38; p>0.05	t=-0.50; p>0.05
12	Object resize perception assessment (s)	t=0.71; p>0.05	t=0.54; p>0.05	t=-0.30; p>0.05

Note: 1 – lightweight; 2 – middleweight; 3 – heavyweight. Reliability t=2.15; p<0.05; t=2.98; p<0.01; t=4.14; p<0.001.

Obtained results show the importance of psychophysiological states of athletes, as a determining factor of success in various types of wrestling. This also can be proved by research results of several studies. (Shackih, 2012; Korobeynikov, Korobeinikova, Latishev & Shackih, 2017; Tropin, Romanenko & Ponomaryov, 2016).

Usage of psychophysiological indicators of modern statistical methods allows one to create models. They allow to represent changes, that occur in the body of athletes, more accurately. Rovny & Romanenko (2016). examined model characteristics of sensorimotor reactions and specific perceptions of elite taekwondo players, and as a result assessment scales were developed.

He, (2013). determined physiological profile of elite female wrestlers. Author recommends to compare retrieved results with other wrestlers as a tool to identify individual weaknesses or strengths and to develop education programs. which will allow to achieve success in wrestling.

Krikukha (2015) created models of psychophysiological indicators of Greco-Roman wrestlers at the technical development phase and identified the ways for management of technical, tactical and physical preparation of athletes with consideration of individual psychophysiological status and weight category.

Previously obtained results were supplemented (Curby & Tropin 2019; Pervachuk, Tropin, Romanenko & Chuev, 2017; Tropin & Boychenko, 2018) related to the issues of psychophysiological control in wrestling, and also about particular features of wrestlers' preparedness among different weight categories. (Priymakov, 2014; Tropin, Korobeynikov, Shatskykh, Korobeynikova & Vorontsov, 2019).

CONCLUSIONS

Based on the analysis of methodical literature and generalization of best practices it was identified, that competition performance specificity of wrestlers has an impact on the level of psychophysiological reactions development. which ensures high athletic result.

It was established. that wrestling forms an ability to quickly analyze, assess and predict situations and make correct decisions during the bout in a timely manner, which explains unreliable differentiations (p>0.05) in most psychophysiological indicators among the studied athletes.

Model characteristics of sensorimotor reactions and specific perceptions among elite level wrestlers in various weight groups were developed. Application of psychophysiological methods can be considered as an effective way to predict athletes' success.

REFERENCES

Ashanin V., Romanenko V. (2015). The use of computer technology to evaluate sensorimotor reactions in martial arts. Slobozhansky Science and Sports Newsletter. 4. 15-18.

Alekseev A. (2007). Overcome Yourself. Mental preparation of athletes for competitions. Moscow: Soviet Sport. 280.

Curby D., Tropin Y. (2019). Differences in manifestation of sensory-motor reactions and specific perceptions at the men and women doing martial arts. Edinoborstva. 2(12), 68-78.

He, Z. (2013). Physiological profile of elite Chinese female wrestlers. The Journal of Strength & Conditioning Research. 27, 2374-2395.

Korobeynikov G., Korobeinikova L.. Latyshev S. (2014). Individualization of training in wrestlers. International Journal of Wrestling Science. 4(2). 28-33.

Korobeynikov G., Korobeinikova L., Latishev S.. Shackih V. (2017). The impact of emotions on visual-movement performance and effectiveness of competitive activity of elite wrestlers. Applicable Research in Wrestling. 1, 123-128.

Krikukha Y. (2015). Modeling of psychological preparation in Greco-Roman wrestling at the stage of improving sportsmanship. Omsk Scientific Herald, 4(141). 241-245.

Latyshev N., Rybak L., Golovach I., Korolev B., Lyashenko E.. Kvasnitsa O. (2019). Analysis of the performances of the participants of the European Championships among cadets in women's wrestling. Slobozhanskyi herald of science and sport. 5(73), 45-50.

Nikitushkin V., Suslov F. (2017). Sport of the highest achievements: theory and methodology. Tutorial. Litres. 187.

Pervachuk R., Tropin Y., Romanenko V., Chuev A. (2017). Model characteristics of sensorimotor reactions and specific perceptions of trained wrestlers. Slobozhanskyi herald of science and sport. 5(61), 72-74.

Podrigalo L., Iermakov S., Romanenko V., Rovnaya O.. Tropin Y., Goloha V.,Halashko O. (2019). Psychophysiological features of athletes practicing different styles of martial arts – the comparative analysis. International Journal of Applied Exercise Physiology. 8(1), 84-91.

Priymakov A. (2014). Comparative characteristics of the physical fitness structure of highly qualified wrestlers of light. medium and heavy weight categories. Pedagogy. psychology and biomedical problems of physical education and sports. 9, 47-53.

Rovny A., Romanenko V. (2016). Model characteristics of sensorimotor reactions and specific perceptions of highly qualified combatants. Martial Arts. 12. 54-57.

Shatskikh V., (2012). Informative criteria of psychophysiological wrestlers in the minds of trivial activities. Pedagogy, psychology and medical and biological problems of physical wrestling and sport. 3,137-142.

Tropin Y., Romanenko V., Ponomaryov V. (2016). Model characteristics of sensory-motor reactions and perceptions of specific wrestlers of different styles of confrontation. Slobozhanskyi herald of science and sport. 3, 70-73.

Tropin Y., Korobeynikov G.. Shatskikh V., Korobeynikova L., Vorontsov A. (2019). Model characteristics of technico-tactical fitness of highly skilled Greco-Roman wrestlers of different weight categories. Science in Olympic Sport. 2, 29-35.

Tropin Y., Boychenko N. (2018). Interrelation of psychophysiological indicators and physical readiness of qualified wrestlers. Slobozhanskyi herald of science and sport. 2(64), 65-69.

Tünnemann H., Curby D.G. (2016). Scoring analysis of the wrestling from the 2016 Rio Olympic Games. International Journal of Wrestling Science. 6(4), 90-116.