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STAN, PERSPEKTYWY I ROZWÓJ RATOWNICTWA, KULTURY FIZYCZNEJ I SPORTU W XXI WIEKU

STATE, PROSPECTS AND DEVELOPMENT OF RESCUE, PHYSICAL CULTURE AND SPORTS IN THE XXI CENTURY

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Spis treści

MODEL CHARACTERISTICS FOR PSYCHOPHYSIOLOGICAL PREPARATION OF ROWERS

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Key words: rowers, temperament, attention, neuroticism, extroversion, introversion, nervous system, balance, nervous processes motility.

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Summary

The article provides the results of the study on physiological parameters of rowers. The developed model of psychophysiological preparation for high-skilled rowers includes the parameters as follows: type of temperament, stability of attention, neuroticism, extroversion, the strength of nervous system, balance and nervous processes motility. It is proved that the average response time to light stimulant is 273.38 ms, a simple response to sound stimulant - 730.5 ms, complex disjunctive response - 829.8 ms, response to absence of signs-1212 ms, Tapping test - 5.43 ms. In the analysis of the results obtained, we have found that 60%-rowers have high neuroticism level, 80% are extroverts, 86.7% - having a high level of nervous processes motility, 46.6% - are with medium-weak nervous system and 46.7% - possess nervous system balanced.

Relevance. Recently, the natural rejuvenation of the sport is being noticed. More and more often, the winners of high-level competition become young athletes. The one of the ways to optimize the educational and training process for preparing rowers is to develop psychophysiological model of up-and-coming athlete and its characteristics. A using the parameters above described will facilitate correct estimate of shortcomings within training system of a particular athlete, give the possibility to bring an adjustment in the educational process (Barybina, 2009).

Difficulties of psychological simulation of training come from the need of understanding the approach, which is suitable for study of notable athletes personalities as a special and unique individuality, originality regarding features and displays, that indicate their heterogeneity. It is possible to simplify the psychological simulation foregoing by means of determination and study of those personal traits and expressions, which characterize successful athletes (Yermakov 2004).

The characteristic model of athlete psychophysiological preparation in the course of research are covering various personal level. Quantitative and qualitative characteristics of psychophysiological preparation of athlete, depending on age, qualifications, training phase,

etc., are summarized in a model of psychological preparation of athlete (Shalar and colleagues, 2015). Drawing of psychophysiological preparation patterns, highlighting the formation level of certain psychological manifestations of athlete, is complex and staged creative process, having specific rules and challenges that require profound expertise and practical skills in sport. The actualizing of above mentioned model is also associated with advanced knowledge of psychological characteristics of a particular kind of sport, implemented in its psychographic analysis (Rybchynskiy, 2000).

Modeling is widely used in various fields of science and technology, including a modern system on training different-skilled athletes, presents today the top-notch learning methods (Smolevs'kiy V.M., Haverdovskiy Y.K., 1999; Arkayev L.Y., Suchylyn N.H., 2004; Seluyanov V.N., Shestakov M.P., Kosmina I.P., 2001; Kholodov J.K., Kuzn'etsov V.S., 2001; Yakimov A.M., 2003, Hamaliy V.V., 2007). In particular, the psychophysiological factors investigation that accompanies the rowers' sports activities and often determine the success, is relevant.

Goal of research: experimental background for psychophysiological characteristics manifestation of rowers.

Research objective:

1. To investigate certain psychological (higher nervous activity type, extraversion, neuroticism) and psychophysiological capacities of higher nervous activity type (attention, simple and complex response to stimulant, strength of nervous system, balance, functional motility of nervous system) of high-skilled rowers.

2. To develop model characteristics of psychophysiological preparation of high-skilled rowers based on certain psychological and physiological properties of higher nervous activity (HNA) of athletes.

The findings of an investigation. The investigation has been held on a basis of the School of Higher Sportsmanship. The 21 rowers took part in experimental procedure. All examined participants are high-skilled sportsmen: Candidate Master of Sports (CMS), Master of Sport (MS), Master of sports of international class (WCMS) and Honored Master of Sports (HMS).

According to the tasks carried out the research has being staged. Each of the stages was especially featured and aimed to solve specific problems.

Stage1. The first phase of the study's deals with the goals as follows: relevance determining, object and subject of the study, research methods and contingent. In the course of stage, library catalogs and reference books have been examined, an analysis of scientific literature has been conducted, research methods studied up. It resulted in possibility to formulate goals and objectives, to develop a research program.

Stage2. In the course of second phase there was conducted the practical part of the research: testing, lesson observation, analysis of documentary sources. A test was held to determine:

- psychological characteristics of athletes using Eysenck test;
- physical development level through methods anthropometric standards and indexes methods;
- properties of nervous system of rowers, using Tamping test (E.P. Il'yin, 2010); "Sorting words" methods, proposed by Y.H.Cherepanov; methods for determining nerve processes balance, based on results of movement amplitude (without sense of sight) simulation (Y.P.Il'yin, 2010).

Stage3. The third stage audited results obtained; elaboration and analysis of results, data processing were conducted, generalized and systematized research materials, conclusions drawn, final design work was carried out according to the requirements.

Psychophysiological characteristics of rowers have been studied using a computerized test version of V.S. Ashanin. We determined level of attention (research of scope, precision and refocusing of attention according to the methodology "Correction Task" (Bourdon test), determination of concentration and refocusing of attention by the Gorbov's table, constancy of attention by Schulte table); determining a simple response to light and sound stimulants, Tapping test, reproduction and shortening of time intervals under audible signal. Tests were conducted on a computerized version of V.S. Ashanin (authorship certificate No 29956, No 29957).

Defining neurodynamic features of rowers, the appropriate methods have been applied: technique *"Tapping test" (E.P. Il'yin, 2010), methods "Sorting words"* proposed by Y.G. Cherepanov, a *method of determining nerve processes balance* based on results of movement amplitude (without sense of sight) simulation *(Y.P.Il'yin, 2010), Eysenck test (1998).*

The analysis of psychophysiological parameters of high-skilled rowers showed that the performance of simple response, sense of time and frequency of movements are important for rowers, due to requirements of a high degree concentration in crew boats, as one sitting back in the boat must fully keep a rhythm, rowing pace, to respond to changing conditions (environment, rivals performance, teammates etc.). So we can assume that indexes above mentioned being increased under improving the rowers skills.

We found the average mean of average time of responses, their standard deviation and quotient by all psychophysiological indicators. The findings approve that physiological parameters are reflection of functioning coherence of the body, and therefore, we can assume that they may be improved according to increased qualification not only of representatives of situational sports, but also cyclic, and especially rowing. Table 1 shows the average value of the research findings on physiological parameters of rowers.

Table 1. Psycho physiological parameters of high-skilled rowers

Parameters	*Median of reaction time (ms)*	*Standard deviation (ms)*	*Quotient, %*
Simple response to light stimulant	273,38	87,14	29,1
Simple response to sound stimulant	730,5	615,86	74,86
Complex disjunctive reaction	829,8	289,29	28,14
Time average of response to absence of signs	1212	1387,71	82,43
Tamping test	5,43	———	———
Short time intervals on a light signal	-1549,7	107,86	———
Long time intervals on a light signal	-1012	232,29	———
Reduction of short time intervals on a light signal	638	171,71	———
Reduction of long time intervals on a light signal	950	269,43	———
Display of set time intervals on acoustic signal	-769	227,57	———
Reduction of set time intervals on acoustic signal	328	136,14	———

From this perspective, we can assume if exercise, aimed at developing psychophysiological parameters of rowers, is integrated into training, it will enhance the effectiveness of training process through more comprehensive impact on diverse aspects of training.

Also among those examined their mental capacity and stability of attention were determined by "Schulte table". Moreover, working efficiency, worming-up degree and psychological attention stability were measured. The determination of working efficiency showed that average task performance time of rowers is 40.5 seconds per one table that corresponds to the average efficiency level of the rowers.

Rowers worming-up average level corresponds 0,984, which is good.

According to the study, it has been found that 70% of examinees have sustained attention, and 30% - unstable attention. Average attention stability is 0.962, consequently the overall result indicates a good level of attention stability.

Mental performance indicators can be defined according to the schedule "Exhausting curve", that shows the performance dynamics (Fig.1).

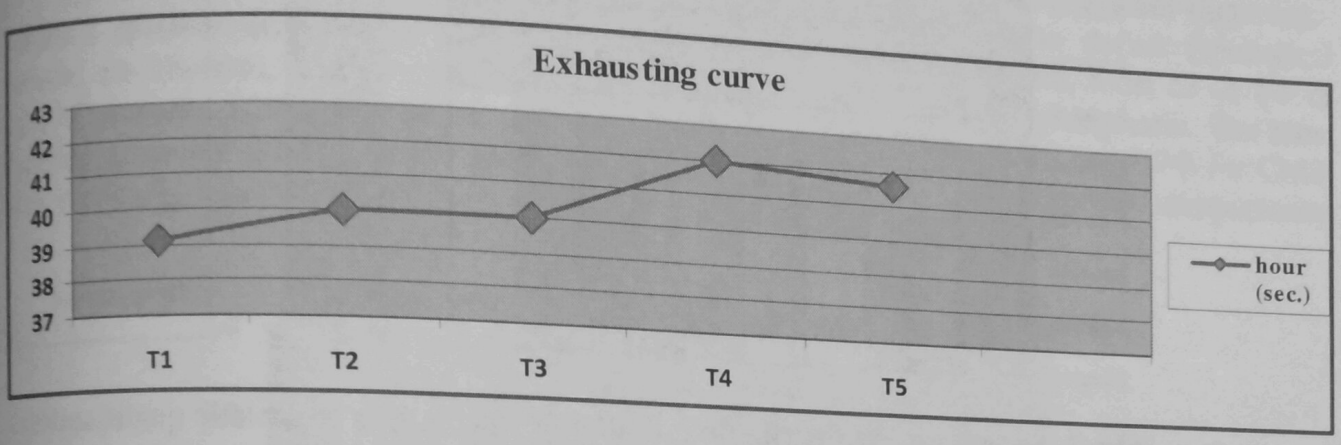

Fig.1. **Exhausting curve of rower mental performance**

The nature of the schedule can be concluded that mental performance is relatively stable, but significantly reduced at the end of the study. An exhausting was observed from 3 to 5 minutes.

Assessment of switch and distribution of rowers' attention conducted under the methodology Red and Black Table (Gorbov method). Switching attention - is the speed of moving the focus from one object to another, the transition from one kind of activity to another.

The obtained results indicate that the rowers require considerable conscious control over their training and competitive activities.

After analyzing the data we obtained the following results of average task performance time relatively to athletic qualification (Figure 2).

Table 2. Indicators of attention switch of rowers

Qualification	Number of persons	T1	T2	Average task performance time (ATPT)
HSM, WCMS	6	0:01:31	0:01:59	0:00:28
MS	5	0:01:35	0:02:29	0:00:54
CMS	5	0:01:43	0:03:23	0:01:40
I athletic title	5	0:01:51	0:04:39	0:02:47

Such a transition is always associated with a willful effort. The higher the degree of concentration on one activity, the more difficult to switch to another. According to data obtained the average performance time of the first table is 0:01:40 hrs., and the average performance time of the second table is 0:03:04 hours. The difference between the two time indexes is 84 seconds - this is the average switching attention time (ASAT) of rowers from one number sequence to another.

The results of switching and distribution of attention show that rowers who have the athletic skills of HSM and WCMS switch more quickly from one activity to another, and distribute attention more efficiently, that can be explained by the fact that sports qualifications and experience help to improve the indicators described above (Figure 2).

Experimental work was carried out by testing to determine the psychological characteristics of athletes. Testing was based on Eysenck test. This test detected certain

psychological indexes that indicate the functioning of the central nervous system and nerve interaction processes of athletes.

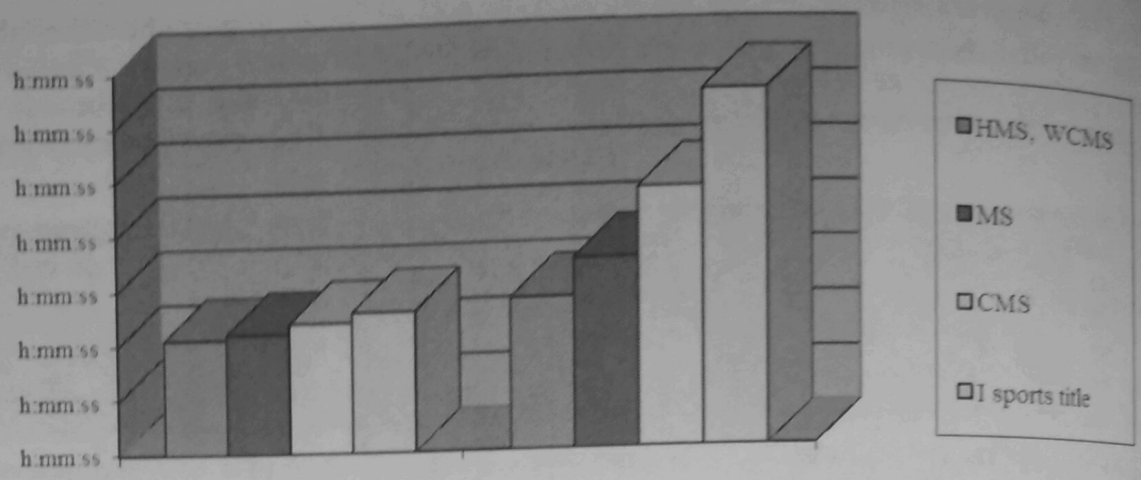

Fig. 2. Switching and distribution of attention according to athletic qualification.

Testing methodology detected the factors, characterizing the personality organization: higher nervous activity time; introversion - extroversion; neuroticism [6].

According to information received, 71.4% of rowers are extroverts, including HMS, WCMS, CMS and MS, and 28.6% - introverts, among which are CMS and I title athletes (Fig. 3).

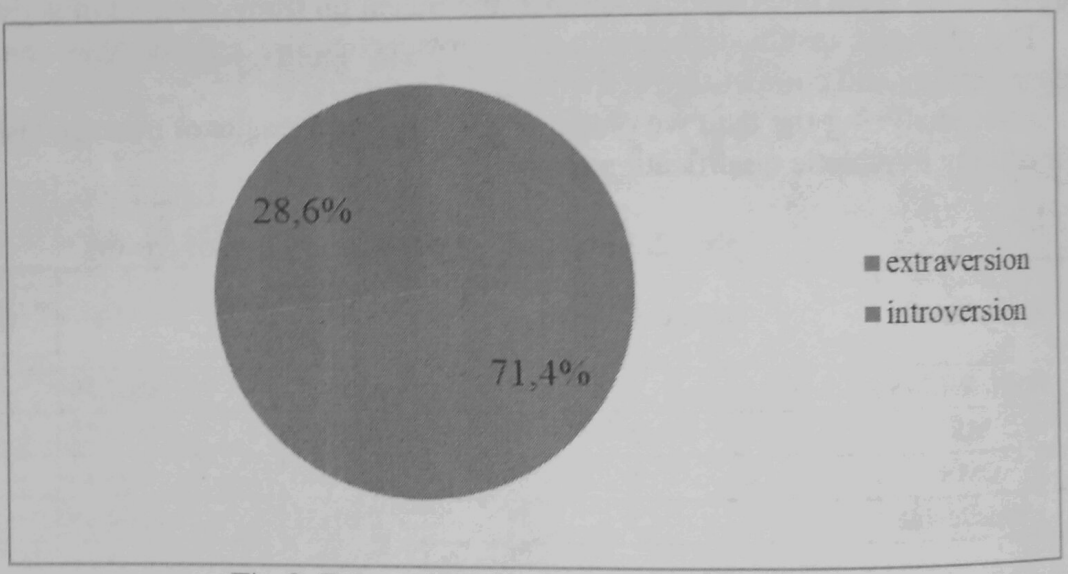

Fig.3. Properties of temperament of rowers

Based on data interpretation (by Eysenck), it is apparent that extraversive personality having a high sense of risk, sociability, needs contacts, impulsive, optimistic. These qualities can be assessed as necessary for sportsman, especially during competitive activity. But for extraversive persons some negative features (especially for athletic performance) are peculiar: high physical aggression; feelings and emotions of such a people are not under strict control.

Thus, we can conclude that almost all examined athletes are extraversive personality type. It is possible to assume that sports activities conduce the development of extroversion qualities.

Determination of neuroticism, which describes the emotional stability of a person, allowed to reveal the following: among rowers high neuroticism level the 60% of athletes have, intermediate - 40%, low is undetected.

To summarize, rowers possess prevailing high neuroticism, leading to possible excessive nervousness, instability, poor adaptation, possible depression, instability in stressful situations.

Discovered neuroticism level, extra- and introversion allowed to define typological features of examined athletes (see Fig.2). According to the questionnaire, most of 46.7% of rowers are choleric, 26.7% - sanguine, 20% - melancholic and 6.6% - phlegmatic. The most part of choleric, 20% in particular, are WCMS, 13.3% - MS, 6.7% - HMS and 6.7% for CMS. Among sanguine 20% are MS, and 6.7% - HMS. Melancholic and phlegmatic temperament was detected in qualified CMS.

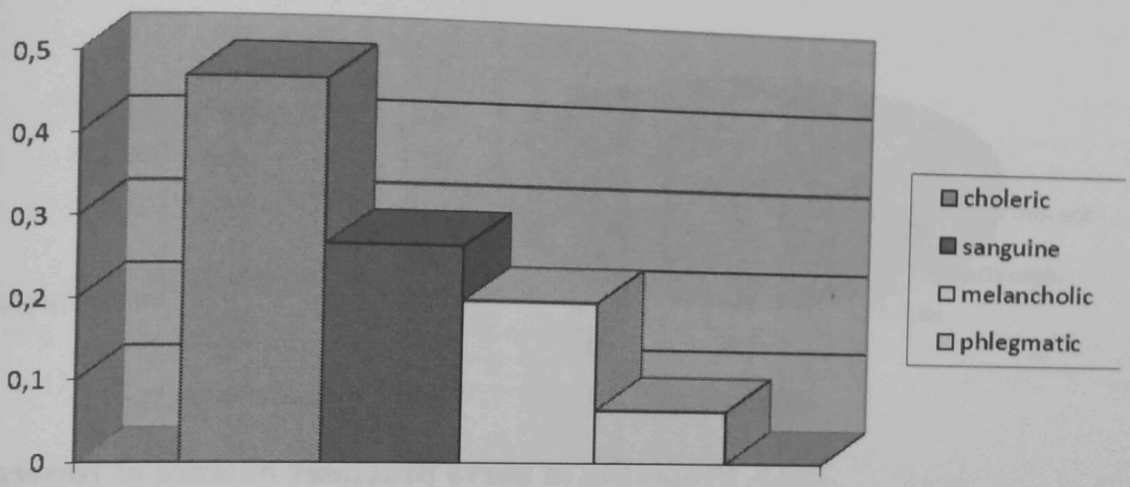

Fig. 4. **Typological features of rowers**

Choleric type of temperament refers to "strong" personality type. Excitatory processes in the choleric people outweigh inhibitory; people, having this type of higher nervious activity, are emotional, rapid, mobile. Notwithstanding, in choleric people, due to imbalance of nerve processes, an exhaustion, irritability, incontinence, temper may be observed, that can affect negatively on athletic performance.

The research of nervous system strength using Tapping test gave the results, indicating the predominance of medium-weak type of nervous system in rowers. Nervous system strength is determined by the type of performance curves. The predominance of rowers with medium-weak nervous system can be explained by the fact that they are able to distribute effort throughout the course by chosen moving tactic and respond immediately to competitors actions (increased rate, backlog reducing). Owners of medium-weak type of nervous system are different by keeping balance, regularity of action. The ability to endure longtime rowing competition is the predominant quality in this kind of sport. Table 3 shows the results of nervous system strength research.

Table 3. **Nervous system strength of rowers**

Nervous system type			
Strong	Medium	Medium-weak	Weak
13,3%	20%	46,7%	20%

We can assume this division due to the sport specificity. Determining of the nervous processes balance of rowers showed that 46.7% of athletes have steadiness of nervous processes, 13.3% - prevalence of neural excitation processes, 40% - the predominance of

inhibitory neural processes, indicating that athletes with a strong nervous system and medium, characterized by well-developed both excitation and inhibition processes, can significantly strain and even overtax their strength in responsible periods of competition without any damage for themselves. It should be noted that despite the simplicity of the methods for determining nerve processes balance, interpretation of results, reliability and validity of research methods need further scientific clarification. Even the reports of the examination results, obtained under the same methodological approaches by N.S. Leytes and Y.P.Il'yin are different.

Figure 5 shows the quotation of the results on nervous processes balance determination based on the results of rowers' movement amplitude (without sense of sight) simulation.

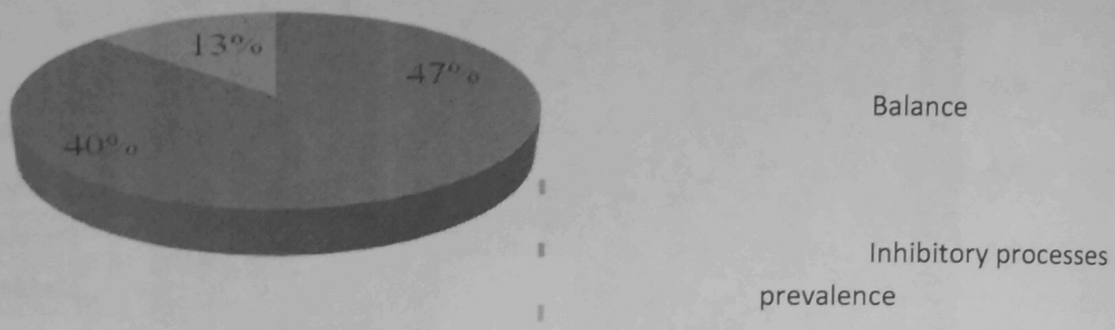

Fig.5. **Properties of nerve processes balance of rowers**

One of the research objectives is to evaluate the functional motility of nervous processes (FMNP) of those rowers, who participated in the experiment. Based on methods "sorting words", it was found that among examinee there is not any person, having low functional motility of nervous processes. The majority of rowers possess high FMNP: 13 persons, representing 86.7% of total quantity. The remaining 2 persons have medium FMNP, which amounts to 13.3% of total quantity. The highest FMNP, rated at 10 points, refers to 8 people. Overall, the medium FMNP of all the examinee (across gender) with a high level of functional motility reached 9.5 points.

For rowers, who have medium FMNP, the expected value reached 6 points.

Results of the study on functional motility of nervous processes of rowers are given in Table 4.

Table 4. **Quantity index for athletes of differing qualification according to the FMNP**

	FMNP					
	High level			Medium level		
Qualification	10 б	9 б	8 б	7 б	6 б	5 б
HMS	2	____	____	____	____	____
WCMS	3	1	____	____	____	____
MS	3	1	1	____	____	____
CMS	2	2	1	____	____	____
I athletic title	____	____	1	2		2

The analysis of FMNP indicators for rowers was carried out. It was found that among people with high FMNP the majority are HMS, WCMS, MS and CMS (17 persons). Medium FMNP was found from 4 rowers, who have I athletic title.

Therefore, the results, obtained during the research, showed us some patterns, as follows: the higher sports skills and experience athletes possess, the stronger nervous system and high

FMNP are available. This may indicate the ability of the nervous system to adapt to certain sports activity and to educate the necessary properties of the individual. The combination of these features creates a certain type of nervous system, which determines in its turn the type of temperament, i.e. individual peculiarities of mental processes.

One of the ways to optimize the educational and training process for rowers' preparation is to develop the psychophysiological model of come-and-up athlete and its characteristics.

The developed model of psychophysiological preparation for high-skilled rowers includes the parameters as follows: type of temperament, stability of attention, neuroticism, extroversion, the strength of nervous system, balance and functional motility of nervous processes (Fig. 6).

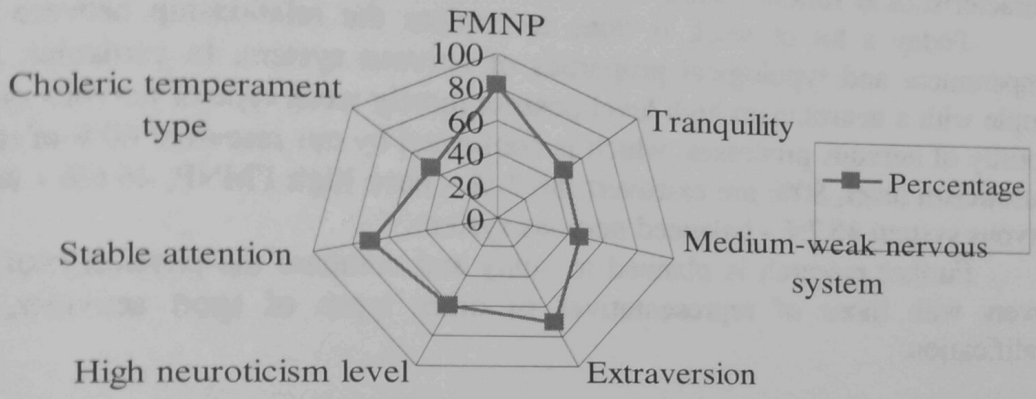

Fig.6. Model of psychophysiological preparation of high-skilled rowers

The results of the analysis of physiological characteristics on the personality of high-skilled rowers found that high-skilled rowers possess a high level of functional motility of nervous processes (81%), which determines a high speed of operations performance during activities, motor performance, high mental activity in particular task fulfillment. Stability of nervous processes (47%) indicates that to achieve good results in rowing athlete should feel situational change better and adjust strategy of competitive behavior.

Choleric temperament type (46.7% of rowers) belong to the group of "strong" personality types. Excitatory processes in the choleric people outweigh inhibitory; people, having this type of higher nervious activity, are emotional, rapid, mobile. Medium-weak nervous system (46.6%) describes the ability to distribute efforts alongside the distance in the chosen moving tactic at a fast pace and respond immediately to competitors actions (increased rate, backlog reducing).

The emotional stability value - neuroticism – which is 60%, testifies the balance between absolute emotional stability and instability of high-skilled rowers, providing to a certain extent of ability to be sensitive to changes, occurring in internal and outside world, and at the same time to have significant control over its own internal state, which in turn requires from the rower to possess a high level of attention (70%).

The extraversion level (71.4%) indicates the high-skilled rowers' orientation to surrounding objects and their impulsiveness, initiative, flexibility and communicative behavior. Extraverts inherent a high sense of risk, sociability, need in contacts, impulsiveness, optimism.

Summary. Psychophysiological parameters of rowers are scarcely studied nowadays. Therefore, we have established the value of physiological parameters of rowers. Thus the average value of simple reaction time to light stimulator is 273.38 ms, a simple reaction to sound stimulator - 730.5 ms, complex disjunctive reaction - 829.8 ms, response to the lack of signs -1212 ms, Tapping test -5.43 ms. This is to show the importance of physiological abilities not only for situational sports members, but also for cyclic types. We can also assume that these figures are being increased depending to skills improving of athletes.

After have studied the temperament properties of rowers we determined that 46.7% of rowers are choleric, 26.7% - sanguine, 20% - melancholic and 6.6% - phlegmatic. Each type of temperament is manifested differently in sports activities.

Exploring the neurodynamic level of rowers psychological characteristics we have identified such properties of nervous system as strength, tranquility, motility and temperament characteristics as follows: extraversion / introversion, neuroticism level.

Today a lot of work is done to explore the relationship between the properties of temperament and typological properties of nervous system. In particular, it was found that people with a neuroticism high level possess mostly weak type of nervous system and the high motility of nervous processes, which is confirmed by our research: 60% of rowers have a high neuroticism level, 80% are extrovert, 86.7 % - have high FMNP, 46.6% - with medium-weak nervous system 46.7% - balanced nervous system.

Further research is planned to study and compare the physiological characteristics of rowers with those of representatives of other types of sport activities, having different qualification.

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