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Determination of Optimal Readiness to Specialized Loadings of Qualified Boxers and Fencers on the Basis of the Integral Indicator of Coordination Abilities[1]

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Abstract

The purpose of the research was to optimize competitive activity of qualified boxers and fencers. Methods used in research: analysis of literature sources, pedagogical testing, expert assessment, methods of mathematical statistics. In the research participated 46 skilled athletes aged 18-21 years (25 boxers, 21 fencers (rapier)). During the experiment, the accuracy indicators of the ball throwing into the target (as an integral criterion of coordination abilities) have been recorded. In order to determine the influence of athletes` level of coordination abilities on the effectiveness of their accuracy during competitive activity, competitive fights were held. Independent experts (two boxing judges of the national category and two international judges in fencing) recorded only those punches and touches that were accurately put on target. According to the results of the ball throwing accuracy, boxers and fencers are divided into two different types: first type includes athletes with higher ($P < 0.01$) accuracy indicators at the beginning of training session; second type includes athletes with higher ($P < 0.01$) accuracy indicators at the end of training session. The fact of determining the stable indicators of coordination abilities at the beginning or at the end of a training session indicates a certain kind of workability of each athlete – fast or inert. Competitive fights showed that athletes with fast kind of workability have higher effectiveness of technical and tactical actions in the first half of fight ($P < 0.01$) and worsening in the second half, but athletes with inert kind of workability – on the contrary.

Keywords: Accuracy, Ball Throwing, Coordination Abilities, Training Session, Workability

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Introduction

The training of skilled athletes requires a vivid individualization (Tyshler et al., 2007; Shinkaruk et al., 2016; Shiryayev, 2002). An important factor in the athlete's readiness to compete is workability of his body's systems (Platonov, 2015). Workability of the athlete body systems is the first phase of functional changes during the period of training or competition. During workability period the establishment of nerve and neuron-hormonal mechanisms of motion management and vegetative processes, the gradual formation of the necessary stereotype of movements by character, form, amplitude, velocity, strength and rhythm, accuracy take place. That is, on the basis of better coordination of movements (Kots, 1986).

Scientists define the following features of workability: the relative slowness in the strengthening of vegetative processes, the inertia in the development of autonomic functions, which is largely due to the nature of the nervous and humoral regulation of processes in this period. There is a direct relationship between the intensity of the work performed and the speed of changes in physiological functions. Workability is starting faster, if the level of athletes` preparedness is higher (Platonov, 2015; Kots, 1986).

Coordination abilities are in a close relationship with the technical skill of an athlete and determine its level. The level of coordination of movements substantially affects the achievement of high sports results in martial arts (Platonov, 2015). In addition, scientists believe that the accuracy of object throwing into the target is a manifestation of the integrated ability to coordinate movements (Ozolin, 2004; Platonov, 2015, Romanenko, 2005). Consequently, the integral indicator of the coordination abilities of athletes, the above-mentioned scientists believe is the throwing of objects for accuracy.

The results of the analysis of the special literature indicate lack of research and determination of criteria in sports, which influence the effectiveness of competitive activities at the present stage of development of the specified types of sports (Kiselev, 2006; Sharipov et al., 2007).

The ultimate purpose of the research was to optimize competitive activities of qualified boxers and fencers at the stage of specialized basic training.

During the research, the following tasks have been solved:

- to analyze literature sources on the subject of research;
- to determine indicators of coordination abilities (accuracy of the ball throwing into the target), as well as criteria characterizing the individual effectiveness of boxers` punches and fencers` touches during competitive fights;
- to carry out a comparative analysis of the number of accurate boxers` punches and fencers` touches at the beginning and the end of competitive fights, depending on the period of athletes` training.

Hypothesis

It was assumed that observing the dynamics of the effectiveness of competitive activities of boxers and fencers during individual fights will reveal the peculiarities of individual performance of athletes. Analysis of the effectiveness of athletes in different parts of certain matches will create conditions for rational management and increase the effectiveness of athletes` competitive activities.

Materials and Methods

During the research we used the following methods: analysis of literature sources, pedagogical testing, expert assessment, methods of mathematical statistics.

The prerequisites for our research began from 2012, when we noticed that boxers with the same level of skill and readiness demonstrate their best performance in different parts of the training session: someone at the beginning, but someone at the end.

The study involved 46 skilled athletes aged 18-21 years (25 boxers, 21 fencers (rapier)). Research has been conducted at the special preparatory stage of the annual macrocycle.

After standard warm-up for each athlete, indicators of athletes` coordination abilities were measured by using the small medicine ball (weighing 0.5 kg), that was throwing for the accuracy into the target, located on the floor from a distance of 5 meters. Such measurements took place at the beginning and at the end of the main part of the training session. We determined the distance from the point of the ball landing to the target in centimeters. Each athlete made up to 15 attempts of the ball throwing. During the experiment, the accuracy indicators of the ball throwing of each athlete were recorded at several (12-15) training sessions.

In order to determine the possible connection between of above-mentioned athletes` level of coordination abilities and the effectiveness of their accuracy during competitive activity, training fights were held (competitive fights were modeled). Athletes were divided into pairs according to indicators of their sports readiness. Each boxer participated in three rounds of boxing, and each fencer took part in three periods of a competitive fencing match. The duration of each boxing round and each fencing period was three minutes. Boxing experts (two judges of the national category) and fencing experts (two international judges) recorded only those punches and touches that were accurately put on target.

The average arithmetic value (mean) of each athlete was determined by the accuracy of the ball throw into the target separately at the beginning and at the end of the training, the same way as the dynamics of the number of precise punches of boxers in each round and the accuracy of fencers` touches in each competitive period.

Results

The results of determining the accuracy of ball throwing into the target (Table 1) indicate that boxers and fencers conditionally have divided into two different types (TYPE 1 and TYPE 2). TYPE 1 includes two groups of: boxers (Group 1) and fencers (Group 3), who have significantly ($P < 0.01$) higher accuracy of the ball throwing at the beginning of the main part of the training session, than in its end. TYPE 2 includes another two groups of: boxers (Group 2) and fencers (Group 4), who have, on the contrary, significantly ($P < 0.01$) higher accuracy of the ball throwing at the end of the main part of the training session, than in its beginning. These indicators are quite stable in time. Consequently, we identified four groups of athletes: two groups of boxers (Groups 1 and 2) and two groups of fencers (Groups 3 and 4).

During study we did not find any athletes, who had equally good accuracy indicators both at the beginning and at the end of the main part of training session.

Table 1. Indicators of the ball throwing accuracy into the target of boxers and fencers at the beginning and at the end of the main part of the training session

Groups of athletes	Indicators of the ball throwing accuracy (cm)				P
	at the beginning of the main part of the training		at the end of the main part of the training		
	Mean	Standard deviation	Mean	Standard deviation	
Group 1 of boxers (n=10)	11	± 3,01	19	± 4,71	< 0,01
Group 2 of boxers (n=15)	13	± 2,89	10	± 2,09	< 0,01
Group 3 of fencers (n=9)	12	± 2,91	18	± 2,43	< 0,01
Group 4 of fencers (n=12)	17	± 3,34	9	± 2,01	< 0,01

Determination of quantity of boxers` precise punches in each round of fight (Table 2) indicates the following. Boxers, who, according to the accuracy of ball throwing, entered the Group 1 (have higher accuracy of the ball throwing at the beginning of the main part of the training), in fights made significantly more accurate punches to the opponent, namely, in the first round ($P < 0.01$), than boxers of the Group 2 (who have higher precision of the ball throwing into the target at the end of the main part of the training).

Boxers, who, according to the accuracy of the ball throwing, entered the Group 2 (with higher precision of ball throwing at the end of the main part of the training), in the fights made significantly more accurate punches to the rival, namely, in the third final round ($P <0.01$) than boxers of the Group 1.

Table 2. Dynamics of number of accurate punches in each round of a fight, depending on the peculiarity of boxers` workability

Groups of boxers	Competitive fight						total amount of accurate punches	
	Round 1		Round 2		Round 3			
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Group 1 (n=10)	13	± 3,76	12	± 3,03	7	± 2,15	32	± 6,32
Group 2 (n=15)	8	± 2,24	10	± 2,29	16	± 3,52	34	± 10,45
P	< 0,01		> 0,05		< 0,01		> 0,05	

A similar tendency of the research results was also found in fencing (Table 3). Fencers of the Group 3 have significantly better accuracy indicators at the beginning of the fight than at the end. Fencers of Group 4 are more accurate at the end of the competitive duel than in its beginning.

Table 3. Dynamics of number of accurate touches in each period of a match, depending on the peculiarity of fencers` workability

Groups of fencers	Competitive match						total amount of accurate touches	
	Period 1		Period 2		Period 3			
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Group 3 (n=9)	6,2	± 1,09	3,4	± 1,23	3,0	± 1,22	12,6	± 2,69
Group 4 (n=12)	2,5	± 1,01	3,9	± 1,05	6,56	± 1,33	13,0	± 2,50
P	< 0,01		> 0,05		< 0,01		> 0,05	

Discussion

Thus, proceeding from all mentioned above, we can state that athletes are divided into two different types (TYPE 1 and TYPE 2).

TYPE 1 includes athletes (Groups 1 and 3), whose accuracy indicators are best at the beginning of training or competitive activities. We conditionally identify them as athletes with a fast kind of workability. We can assume that they do not have good endurance, but they have good coordination of movements at the beginning of the fight, until they lose their psychical freshness. These athletes by analogy can be equated to sprinters in running: they have very similar external signs of individual psycho-physiological peculiarities.

TYPE 2 includes athletes (Groups 2 and 4) who, on the contrary, demonstrate the best performance in the accuracy of movements precisely towards the end of training or competitive activities. We conditionally identify them as athletes with an inert kind of workability. Thus, they need more time to expand their coordination abilities. It can be assumed that they have good endurance. These athletes by analogy can be equated to long-distance runners: they have very similar external signs of individual psycho-physiological peculiarities. In any case, the above-mentioned two types require additional interpretation from the position of sports medicine and physiology. In the near future, we plan to conduct research in this direction.

The scientists, mentioned in the beginning (Ozolin, 2004; Platonov, 2015, Romanenko, 2005) believe that the accuracy of object (ball) throwing into the target is a manifestation of the integrated ability to coordinate movements, and namely, is the integral indicator of the coordination abilities of athletes. Our study confirms this thesis. This simple test has best reflection of the specifics of the coordination peculiarities of athletes in those martial arts, where the result depends on the accuracy of the movements (boxing, fencing, karate, kickboxing, etc.). We also propose to use the accuracy of the ball throwing into the target not only as a mean to find out the individual peculiarities of coordination abilities of boxers, fencers (and other martial arts athletes), but also as a criteria for determining the optimal readiness of boxers and fencers to specialized loadings (as a criteria characterizing the

individual effectiveness of boxers` and fencers` competitive activity). That is, using this test, you will be able to diagnose your boxer (fencer etc.) for optimal readiness (or not) to effectively conduct his competitive activity.

Conclusion

1. According to the results of the coordination abilities testing (accuracy of the ball throwing), boxers and fencers are divided into two different types:

- The first type includes athletes with significantly higher accuracy indicators at the beginning of the main part of the training session, than at the end;
- The second type includes athletes with significantly higher accuracy indicators at the end of the main part of the training session, than at its beginning.

2. Repeated measurements of the ball throwing accuracy at the beginning and at the end of the main part of the training session indicate their stability in a certain part of the training.

The fact of determining the stable indicators of a higher manifestation of coordination abilities at the beginning or at the end of a training session indicates a certain kind of workability of specific athlete – fast or inert.

3. The conducted studies in the simulation of competitive activities (combat practice), with the participation of independent experts, showed that athletes with fast kind of workability (so called "sprinters") have higher effectiveness of technical and tactical actions in the first half of competitive matches and worsening in the second half, and athletes with inert kind of workability (so called "long-distance runners") – on the contrary: the results of the number of accurate punches of boxers and precise touches of fencers in fights testify to the higher efficiency of competitive activity at the beginning of a fight at athletes with fast kind of workability, as well as the higher efficiency of competitive activity at the end of the fight at athletes with inert kind of workability.

Practical recommendations

Based on the accuracy indicators of the ball throwing at the beginning or at the end of the main part of the training session, it is expedient to determine individual peculiarities of athletes` workability (fast or inert) and the period of effective use of special actions in a competitive fight.

It is recommended to apply an individual approach when planning technical and tactical actions of fencers and boxers to a certain competitive fight. Athletes with a fast kind of workability should try to get the majority of winning points in the first half of the fight; athletes with inert kind of workability should gain winning points throughout the whole bout.

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Conflict of Interest

The authors have not declared any conflicts of interest.

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