

The influence of sexual dimorphism on the choice of tactical decision in the playing situation in individual sports

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Abstract

Planning of tactical training of elite athletes should be made taking into account their individual characteristics and style of play. *Purpose:* study of the influence of sexual dimorphism on the choice of tactical decision in the playing situation in individual sports such as tennis and billiards.

Material: two groups of elite athletes (members of Ukraine National Team of tennis and billiards) were examined. The first group – 40male, aged 18-38, the second group – 40female, aged 18-38. Methods of research: theoretical analysis and generalization, pedagogical observation, pedagogical testing, the study of psychophysiological parameters of the top tennis players, methods of mathematical statistics.

Results: our research allowed to determine the model characteristics of the preparedness of elite athletes with the assessment of the relationship of the properties of the main nervous processes of varying complexity in response to sensorimotor reactions in athletes and to identify the probable link between latent periods of simple and complex sensorimotor reactions, as well as between latent periods of the visual-motor reaction of choice, functional mobility and strength of the nervous processes. The interconnections of individual-typological properties and sensorimotor reactions with psychophysiological indicators of elite athletes with regard to sexual dimorphism are established. The analysis of the style of competitive activity and the individual characteristics of the elite athletes made it possible to reveal the peculiarities of the tactical training of tennis and billiard players in view of the gender. *Conclusions:* The data obtained allowed us to determine a greater percentage of athletes attacking the style of play among men. The analysis of the style of competitive activity and the individual characteristics of athletes reveals the peculiarities of the tactical training of tennis and billiard players, taking into account sexual dimorphism.

Key words: spatiotemporal parameters of movements, elite athletes, sensomotor reactions, strength of nervous processes, sexual dimorphism.

Introduction

Modern sport characterized by high speed, variety and unexpected change in attacking and defensive actions, the tension of tactical struggle and emotional stress. Increasing the level of special physical, technical, tactical and psychological preparedness of athletes requires the development of indicators of functional states, which require an individual approach to the study of psychophysiological parameters of the athlete. In order to achieve a high score result during competitions in individual sports, it is indispensable to have quality integral preparedness of the athlete (Platonov, 2013; Platonov, 2015). But quite often in sports games the result of the match depends on the right choice of tactical decision by the player. That is why, both in tennis and in billiards, an effective role is the effective choice of a tactical decision in a particular game situation for a particular athlete. Unfortunately, the planning of tactical training of high-skill athletes is practically carried out without taking into account the individual characteristics and style of play, which is often directly dependent on the gender of the athlete. Therefore, it is necessary to assess the impact of sexual dimorphism on the choice of tactical decision in the game situation in such individual sports as tennis and billiards.

The strength and mobility of nerve processes, as highly genetically determined properties of the nervous system, is one of the essential factors that determines individual differences in psychophysiological features. The previous studies (Baich, 2014; Boloban, 2015; Korobeynikov et al., 2016; Kravchenko, 2000; Makarenko, 1997) proved that certain mental functions of humans are dependent on the development of their properties of nerve processes.

According to the literature (Korobeynikov et al., 2003; Korobeynikov et al., 2016;), individual-typological peculiarities of higher nervous activity are the natural basis for the psycho-physiological properties

of the individual and, in addition to the special factors, significantly affect not only the dynamic structure of activity but also the final result of human work.

The purpose of the work is to assess the spatiotemporal parameters of movements of the top male and female athletes in modern tennis.

Materials and methods

Two groups of elite athletes (members of Ukraine National Team of tennis and billiards) were examined. The first group – 40 men, aged 18-38, the second group – 40 women, aged 18-38. Methods of research: theoretical analysis and generalization, pedagogical observation, pedagogical testing, the study of psychophysiological parameters of the top tennis players, methods of mathematical statistics.

From all of the athletes before the study was gave permission on used the results of the study for scientific purposes. From of athletes written authorization has been received in accordance with to recommendation of ethical committees.

Results.

When assessing competitive activity in tennis and billiard sports, it is necessary to take into account the individual characteristics of the athletes and the style of tactics of the game.

The obtained results on revealing certain parameters of spatial-temporal characteristics of movements and analysis of competitive activity of leading tennis and billiard players of Ukraine and the world allowed to determine three types of models of tactical style of competitive activity of players. In the research group of athletes, after determining the leading indicators, players were distributed according to tactical styles of competitive activities: A - universal, B - active, C –defensive (for tennis fig. 1 and for billiards fig. 2).

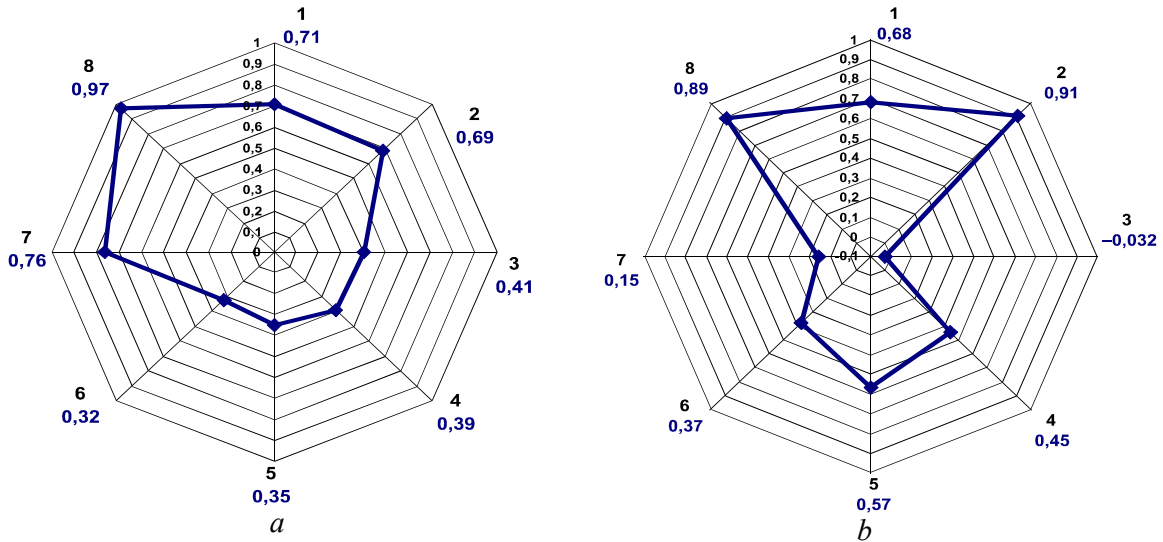


Fig. 1. The relationship between the effectiveness of sports performance and technical and tactical evaluation of tennis players (a – male; b – female):

1 - technique of execution of feeds and strikes; 2 - differentiation of muscular effort; 3 – working memory; 4 - complex visual-motor reaction; 5 - speed of information processing in the visual analyzer; 6 - functional mobility of nerve processes; 7 - switching attention; 8 - the final comprehensive assessment of tactical preparedness

For players of the universal style of competitive activity in tennis, there are advantages in the indicators of switching attention, speed of information processing, accuracy of cross and direct filing. Athletes of the attacking style are characterized by the speed of complex visual-motor reaction, the accuracy of the reaction to the moving object, the speed of mental processes, the variation in the choice of technical and tactical actions and the accuracy of their performance, especially the filing in different directions.

Players of protective style are characterized by high values of indicators that characterize the mobility of nervous processes and change of attention. However, the players do not perform very well and steadily, in comparison bumps and volley.

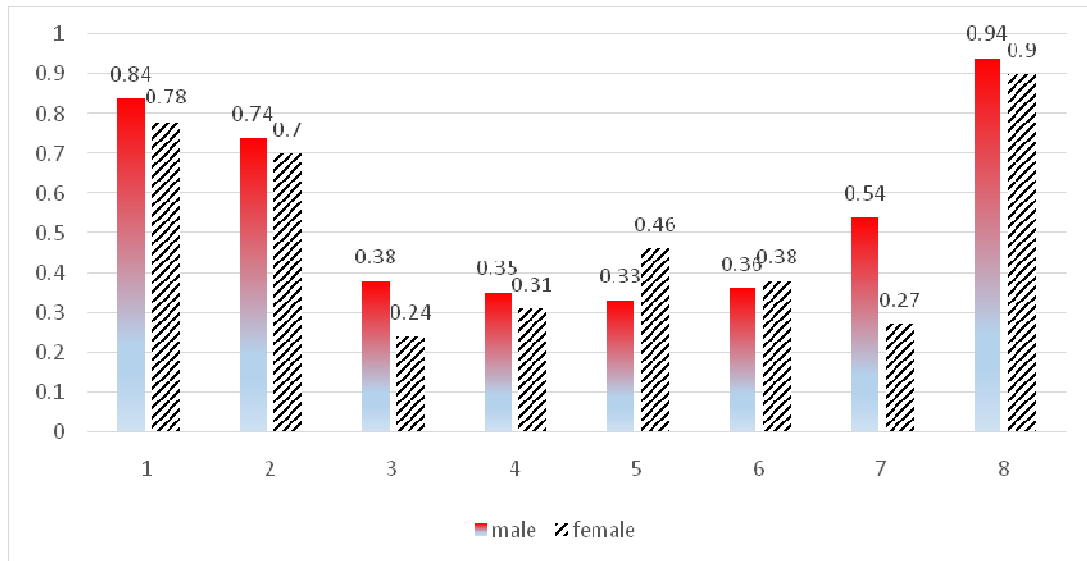


Fig. 2. The relationship of the effectiveness of sports results with the technical and tactical evaluation of billiard players (male and female):

1 - technique of execution of feeds and strikes; 2 - differentiation of muscular effort; 3 - working memory; 4 - complex visual-motor reaction; 5 - speed of information processing in the visual analyzer; 6 - functional mobility of nerve processes; 7 - switching attention; 8 - the final comprehensive assessment of tactical preparedness

For players of universal style of competitive activity in billiards the advantages in indicators of differentiation of muscular efforts, accuracy of performance of all kinds of shots. Athletes of the attacking style are characterized by the speed of complex visual-motor reaction, the speed of thought processes, the variability of the choice of technical-tactical actions and the accuracy of their execution, especially complicated shots with spin.

Defensive-style players are characterized by high values that characterize muscular effort differentiation, nerve mobility, and change of focus, use base shots, or play defense, rather than risking complicated shots with spin.

This analysis made it possible to determine that most athletes of attacking style, both in tennis and in billiard sports, belong to a male group.

The study of sensorimotor reactions and properties of the main nervous processes in athletes enabled us to determine the sexual characteristics of neurodynamic functions.

The statistical analysis of the results for the nonparametric U - Mann-Whitney criterion showed that in general, the men were significantly different from women according to the following indicators: the latent period of simple visual-motor reaction and the latent period of complex visual and motor reaction, the choice of two of the three stimulus ($p < 0.05$).

Determining the latent period of the reaction of choice in tennis and billiards is of great importance. The duration of this indicator determines the qualitative qualities of the athlete, which is very important in high-speed and precision sports. Thus, the average value of the latent period of the reaction of choice 2-3 for men was $\bar{x} = 411,26$ ms, standard deviation - $S = 43.84$ ms, for women, respectively, 451.18 ms and 51.84 ms.

Discussion

As a result of the study, differences in time characteristics of the various complexity of the visual - motor reactions in athletes of high qualification, which are associated with the detection of sexual dimorphism, have been revealed.

The data obtained by us coincide with the results of the majority of authors (Boloban,2015;Korobeynikov et al., 2016; Kravchenko, 2000;Makarenko, 1997) who investigated the relationship of individual-typological properties of higher nervous activity with psychophysiological indicators and came to the conclusion that athletes, in their physical, psychological and functional readiness, differ in essential individual characteristics, which largely determine the effectiveness competitive activities.

Conclusions.

Study of the relationships of properties of the main nervous processes with different complexity by sensorimotor reactions at athletes has revealed the probable relationship between the latent periods of simple and

complex sensorimotor reactions, as well as between latent periods of the visual-motor reaction of the choice of two of the three stimuli, functional mobility, and force of nervous processes.

With the help of correlation analysis, interconnections of individual-typological properties and sensorimotor reactions with psychophysiological indices of top tennis and billiard players of different sexes were established.

The data obtained allowed us to determine a greater percentage of athletes attacking the style of play among men. The analysis of the style of competitive activity and the individual characteristics of athletes reveals the peculiarities of the tactical training of tennis and billiard players, taking into account sexual dimorphism.

Conflict of interest. The authors state that there is no conflict of interest.

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