

Studying the Manifestations of Higher Mental Functions of the Gymnasts as a Factor for Increasing the Performance of the Competitive Activity

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ABSTRACT

The competitive program in rhythmic gymnastics is represented by two types of exercises – individual and group. Group exercises are the most spectacular and bright type of competition, and at the same time, represent a fairly complex type of program.

Unlike individual, group exercises have a number of features. Exercises are performed by five gymnasts simultaneously; the group presents two exercises performed with a different set of apparatuses and with different music. One composition (both compositions for juniors) with five identical apparatuses, the second with two different (2 + 3). Interaction between gymnasts, ways of their cooperation, new possibilities in the technique of elements with and without apparatuses, characterize the originality of the composition. In the process of preparing gymnasts participating in group exercises for competitions, various manifestations of the higher mental functions of a person are rarely taken into account. Coach selects tools for the development of the psychic component of gymnasts, mostly intuitively, not systematically analyzing the individual characteristics of athletes. This can lead to various negative effects in the jointly performed sports activity: prolonged learning of exercises and their unstable performance, lack of understanding of a partner, conflicts. When preparing a team in group exercises for competitions, it is important to take into account the similarity and difference of personality psychological features, along with their morphofunctional indicators, the level of physical and technical readiness, functional state.

1. Introduction

Teams training with the help of group rhythmic gymnastics exercises for competitive activity based on athlete psycho-physiological characteristics, which include higher mental functions (attention, cogitation, memory, perception, mental performance), should be considered as a factor in improving their performance.

The scientific novelty is the development and introduction into training activities of athletes, a set of exercises aimed at improving the performance of high mental functions of highly qualified gymnasts, influencing the result of competitive activities, based on the gradual introduction of tasks to improve one or another criterion.

The study practical significance lies in the fact that the identified higher mental functions of gymnasts participating in a group exercise, influencing their results, suggest differential control over the level of psychological

and physical training of athletes. Developed within the study, the system of gradual introduction of tasks for improving one or another manifestation of human higher mental functions, allowed to increase the level of general indicators and the result of highly qualified gymnasts performances, participating in group exercises during the training for competitions.

2. Literature Review

However, at present, the issue of integrating the various manifestations of human higher mental functions, such as the processes of memory, cogitation, attention, perception and mental performance, which participate in group exercises, is insufficiently developed and hardly used in practice at the stage of training for the upcoming events.

3. Methods

The research methods were proven methods for attention processes evaluating: selectivity (Munsterberg test), concentration (Pieron-Ruser test), selectivity (Thorndike test), allocation (ready standard forms), volume of dynamic attention (Gorbov tables); cogitation: lability level and learn ability detection ("Intellectual lability" test), complex logical relations understanding ("Complex analogues" test), cogitation peculiarities detection ("Exclude undue" test); perception: assessment of eye estimation or spatial segments perception), angular eye estimation, spatial signs perception ("Compass" method), time perception.

4. Results

Modern training of highly qualified athletes of rhythmic gymnastics dictates the need to take into account in the sports of various psycho-physiological characteristics, including the highest mental functions that directly influence the training and competitive activities of athletes. Group performances in which gymnasts, in addition to body and subject control, demonstrate psycho-physiological state control (attention, memory, cognition) give the greatest visual appeal to this sport. The constant interaction of athletes during the training and competitive processes requires constant tension of higher mental processes from them, at the same time it is the main factor influencing the effectiveness of their performances.

Analysis of materials, scientific and methodological publications, survey allowed to identify the most important higher mental functions influencing the gymnasts successful competitive activity, performing in a group exercise. The most significant higher mental functions are attention (25%), perception (25%), cognition (21%), memory (15%) and mental performance (14%) - figure 1.

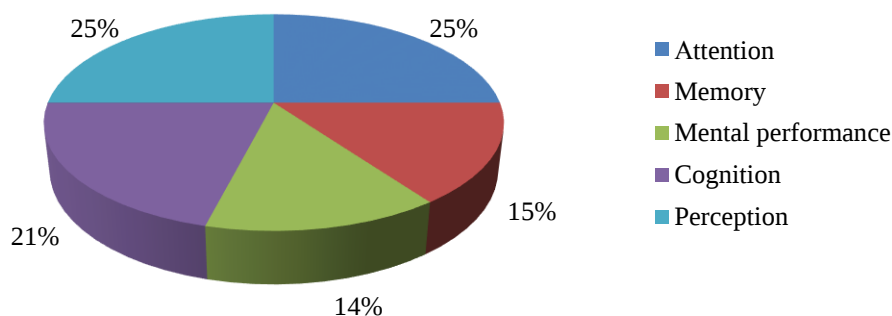


Figure 1 - The percentage of the higher mental functions significance

When interviewing coaches for the importance and significance of higher mental functions in training and competitive activity, the results confirmed the above data and determine the need to introduce into training activities of athletes exercises aimed at developing of human higher mental functions, which is due to the progressive development of rhythmic gymnastics and increased technical requirements in sport.

The next stage of our work was to find the interrelation between the results of testing the higher mental functions manifestations level and the number of mistakes made by highly qualified gymnasts participating in a group exercise - table 1.

Table 1. The number of made mistakes in the competitive program of gymnasts and the level of higher mental functions

Higher mental functions	Results of testing the mental functions level	Number of mistakes	Interrelation
Selectivity of attention	7,91±1,37	0,6±0,14	-0.2
Attention concentration	3,5±0,79	0,6±0,14	0.1
Perceptual attention	13,41±2,06	0,6±0,14	0.02
Attention allocation	6,58±0,9	0,6±0,14	0.8
Attention span	12,15±1,05	0,6±0,14	0.5
Lability level	5,25±0,96	0,6±0,14	0.1
Complex logical relations	5,66±0,77	0,6±0,14	0.5
Analytical and synthetic brain activity	37,83±2,91	0,6±0,14	0.7
Spatial signs perception	5,58±2,77	0,6±0,14	0.8
Angular values perception	3,95±3,01	0,6±0,14	0.4
Time perception	4,25±2,70	0,6±0,14	0.6
Line length perception	5,58±2,31	0,6±0,14	-0.3

Thus, based on the table data of interrelation of mistakes made by gymnasts during the performance of competitive compositions, with manifestations of the higher mental function of attention, we identified 3 main manifestations of higher mental functions that influence the result of gymnasts competitive activity. These mental functions certainly need to be developed during the training process of highly qualified gymnasts, namely: attention allocation, features of analytical and synthetic brain activity, spatial signs perception.

For the development of these manifestations in highly qualified gymnasts participating in a group exercise, we developed a set of exercises consisting of three blocks:

- Block 1 - exercises of the development of attention allocation.

- Block 2 - exercises of increasing the characteristics of the analytical and synthetic brain activity.
- Block 3 - exercises of increasing the spatial signs perception level.

A set of exercises was distributed over the entire experiment period (17 weeks), taking into account the division into periods, stages, meso and micro cycles of sport training process.

We offered to do the set of exercises in stages for 4 months (17 weeks, December - April) during 6 training sessions per week.

During the pedagogical experiment 2 groups were formed: experimental (team 1) and control (team 2). The teams consisted of 6 highly qualified athletes (the title is not lower than the Master of Sports of Russia). The gymnasts of the control group (team 2) trained according to the standard plan. The gymnasts of the experimental group trained with the inclusion of the proposed set of exercises aimed at the development of higher mental functions manifestations.

At the end of the experiment, re-testing was carried out on the studied manifestations: attention allocation, ability for analytical and synthetic cognition, spatial signs perception.

Tests indicators of the experimental group are presented in Figure 2.

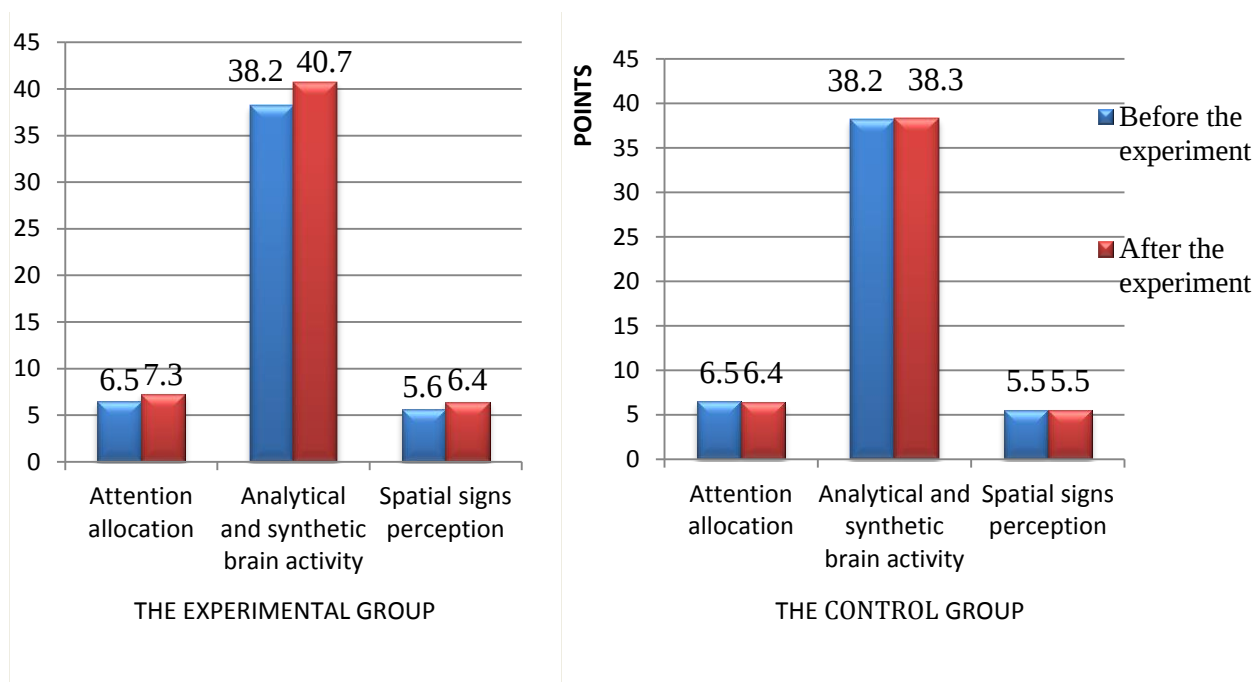


Figure 2 - Change of indicators of the highly qualified gymnasts mental functions

As a result of the proposed exercises, the indicators of attention allocation increased by 0.8 (an increase of 12% to the initial value), features of the analytical and synthetic brain activity increased by 2.5 (an increase of 6% to the initial value). The indicator of the spatial signs perception increased by 0.8 (an increase of 14%).

Changes in the tests results of various higher mental functions manifestations before and after the experiment of the control group were as follows. The tests result of attention allocation decreased by 0.1 (decrease by 2%), of features of analytical and synthetic brain activity increased by 0.1 (increase by 2%). The test result of spatial signs perception remained at the same level.

5. Discussion and Conclusion

The highest mental functions that have the greatest importance in training gymnasts for competitive activity are defined: perception (31%), attention (29%), cogitation (24%). The manifestations of higher mental functions, which have the greatest degree of interrelation with the number of mistakes made by gymnasts in the competitions, were revealed: attention allocation (degree of interrelation - 0.8), features of analytical and synthetic brain activity (degree of interrelation - 0.7), spatial signs perception (degree of interrelation - 0.8).

Thus, analyzing the data obtained, we can conclude that the test results improved for various higher mental functions manifestations of the experimental group by an average of 10% of the initial value, and there was no improvement in the indicators of the control group. Analyzing the results of the number of mistakes made by gymnasts in competitions before and after conducting a pedagogical experiment, we concluded that the average value of the number of mistakes made by the experimental group after the experiment decreased by 0.41, while the number of mistakes made by the control group remained unchanged. Experimental verification of the developed set of exercises for the experimental group (team 1) showed its advantage over the traditional scheme of training of the control group (team 2) for successful competitive activity. Significant changes were found in the results of the number of mistakes made by gymnasts of the experimental group during the performance of competitive compositions before and after the experiment, with $r < 0.05$, and there are no significant differences in the control group before and after the experiment, with $r > 0.05$. This confirms the effectiveness of proposed set of higher mental functions manifestations development level corrections of highly qualified gymnasts participating in group exercises.

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