

Influence of functional asymmetry on performance of technical actions at freestyle wrestlersShandrygos V.I.¹, Boychenko N.V.², Tropyn Y.N.², Latyshev N.V.³Ternopil Volodymyr Hnatyuk National Pedagogical University ¹Kharkiv State Academy of Physical Culture ²Borys Grinchenki Kyiv University ³

Abstract. Purpose: to reveal the influence of functional asymmetry on the performance of technical actions in freestyle wrestlers. **Material and methods.** Analysis of scientific and methodical literature and Internet sources; pedagogical testing; pedagogical experiment; methods of mathematical statistics. The profile of functional asymmetry of the brain in freestyle wrestlers was determined. We used the tapping test by E. Ilyin, tests to determine motor and visual asymmetry and dynamometry. According to the results of the tapping test, E. Ilyin, the coefficient of functional asymmetry was calculated based on the working capacity of the left and right hands. 24 freestyle wrestlers aged 18-21 took part in the study. **Results:** during the previous study it was found that wrestlers mainly perform technical actions in one direction. A sportsman at the initial stage of training must learn techniques in both directions. However, at the stage of maximum realization of individual capabilities this rule should not always be observed. Since the majority of respondents suggested that in order to improve sports results it is necessary to strengthen the asymmetry of the wrestler, a set of special exercises was applied in the experimental group. In the given complex the accentuated performance of basic technical actions in a convenient way, individual dosage of exercises on development of flexibility, force, and also static endurance on the leading side was provided. After conducting the pedagogical experiment, we again conducted educational and training matches and analyzed them according to the indicators that were interesting to us. Having processed the results obtained after conducting the pedagogical experiment, we reached the following conclusions. In the control group, the increase in results for all indicators was: «right-handed people to the right» - 4,4 %; «right-handed to the left» - 0,8 %; «left-handed to the right» - 3,9 %; «left-handed to the left» - 10,9 %. In the experimental group, according to the same indicators, we observed the following increase in results: «right-handed to the right» - 13,5 %; «right-handed to the left» - 0,4 %; «left-handed to the right» - 0,5 %; «left-handed to the left» - 18,7 %. The conducted statistical processing made it possible to establish that there was a reliable increase in technical actions in the convenient direction for both right-handed and left-handed players. Summarizing the results of the pedagogical experiment, we can come to the conclusion that the use of a set of exercises embedded in the accented execution of technical processes in the leading direction contributes to the increase in results and the increase in the efficiency of the execution of technical processes. **Conclusions.** The analysis of the distribution of the individual profile of functional asymmetry in freestyle wrestlers showed that among the 24 wrestlers we studied aged 18-21 years, the right-sided profile of functional asymmetry predominates – 66 % of wrestlers, the left-sided profile of functional asymmetry has 20 % of wrestlers, the rest 14 % are ambidexters. The presence of a connection between the performance of a technical action and the profile of functional asymmetry in wrestlers was revealed: athletes perform technical actions in the leading direction more often and more efficiently. The use of a complex of exercises aimed at increasing asymmetry contributes to the growth of technical processes, and more pronounced in the leading direction. Thus, the increase in the control group «right-handed to the right» was 4,4 %, «left-handed to the left» - 10,9 %, in the experimental group – 13,5 % and 18,7 %, respectively.

Keywords: functional asymmetry, profile, freestyle wrestling, training process, technical actions.

Introduction. At the current stage of the development of sports wrestling, the international federation (United World Wrestling) is changing the rules of the competition, both for Greco-Roman, and for free and women's wrestling. This process is connected with the growing popularity and spectacle of wrestling. Changes to the rules of the competition relate to motivating the athlete to perform effective, high-amplitude techniques. In addition, the referee motivates an active fight and punishes the passivity of the wrestler. In connection with this, there is a need to revise both the training system as a whole and the functional, psychological and tactical training of highly qualified wrestlers (Коробейников, та ін., 2020; Шандригось, та ін., 2021; Curby, 2016; Barbas, and et al., 2011; Mirzaei, and et al., 2009; Tropin, & Pashkov, 2015).

Among the latest studies of leading experts in sports wrestling, there is a tendency to develop and correct the system of training highly qualified wrestlers, taking into account the changes in the competition rules (Tünnemann, & Curby, 2016; López-González, & Miarka, 2013; Yamashita, and et al., 2017). A number of studies are devoted to the functional training of highly qualified wrestlers in modern conditions (Коробейников, та ін., 2020; Sybil, and et al., 2018; Podrigalo, and et al., 2017).

One of the genetically determined individual typological properties of athletes is the functional asymmetry of the brain. Functional asymmetry of the brain determines not only the characterological features of the individual, but also affects the behavioral and motivational activity of the athlete (Коробейников, та ін., 2020; Korobeynikov, & Korobeynikova, 2014; Moskvina, & Moskvina, 2016).

Functional asymmetry of the brain can determine the state and a number of human abilities, including determining the functional characteristics of voluntary movements and postures (Fedorchuk, and et al., 2018; Ulan, & Shynkaruk, 2019).

It has been established that the development of basic physical qualities (strength, speed, endurance) depends, among

other things, on the type of interhemispheric organization of motor and sensory processes, and in athletes, the profile of functional asymmetry of the brain is related to the chosen sport and the qualification of the athlete (Коробейников, та ін., 2018; Еганов, та ін., 2019; Улан, 2016; Grabinenko, & Zhurba, 2017).

Thus, the importance of accounting for the predominant type of functional asymmetry is beyond doubt. The results of such studies (Коробейнікова, 2014; Подригалю, 2016; Anisimov, 2015) conducted in groups of martial arts athletes and sambist wrestlers are known, but, unfortunately, the identification of the predominance of the profile of functional asymmetry of the brain of athletes-wrestlers and the influence of functional asymmetry of the brain on the construction of the training process continues to be insufficiently studied. In addition, the importance of taking into account the athlete's lateral profile is increasing due to the fact that there is a connection between lateralization and the athlete's adverse health condition.

Connection of work with important scientific programs and practical tasks. The work was carried out in accordance with the topic of the SRW of the Department of Theory and Methodology of Olympic and Professional Sports of Ternopil Volodymyr Hnatyuk National Pedagogical University «Scientific and methodological foundations of long-term technical and tactical training in freestyle wrestling».

The purpose of the study is to reveal the influence of functional asymmetry on the performance of technical actions in freestyle wrestlers.

Material and methods. The following generally accepted methods were used in the research: analysis of scientific and methodical literature and Internet sources; pedagogical testing; pedagogical experiment; methods of mathematical statistics.

In the course of the research, we collected and analyzed literary sources on the functional asymmetry of the brain of athletes, the study of the role of motor asymmetry in the practice of martial arts, and conducted a questionnaire, which allowed us to confirm

the relevance of the chosen topic and plan the future direction of work. Next, the profile of functional asymmetry of the brain in freestyle wrestlers was determined. And that is why the tapping test of E. Ilyin was used, tests for determining motor and visual asymmetry and dynamometry. According to the results of the tapping test, E. Ilyin, the coefficient of functional asymmetry was calculated based on the working capacity of the left and right hands.

The pedagogical experiment was conducted on the basis of the sport club «Galician Levy» (Ternopil) in the period from February to May 2021. 24 freestyle wrestlers aged 18-21 took part in the study.

MS Excel was used for statistical data processing and graphical presentation of results.

Research results and their discussion. To assess the level of knowledge about functional asymmetry and the use of this knowledge in the training process, a questionnaire was conducted among freestyle wrestlers who practice in the sport club «Galician Levy». As a result of the survey, it was established that 23 athletes know about functional asymmetry and 20 of them believe

that this feature must be taken into account in order to improve sports results. However, only 11 wrestlers take motor (movement) asymmetry into account in training.

At the same time, 13 interviewees believe that asymmetry should be developed in the training process, paying more attention to the leading side.

When analyzing their own actions during training, 12 people noted that they devote more time to training on the leading side, 8 - devote more time to training on the «non-leading» side, and 4 try to build a balanced training process.

Then the assessment of the prevalence of the functional asymmetry profile in relation to the detection of visual and motor asymmetry among freestyle wrestlers was carried out. The study was conducted in February 2021. When determining the leading eye, it was found that 17 (70,8 %) athletes have the right eye as the leading eye, and 7 (29,2 %) have the left eye.

According to the leading leg, the distribution was as follows: 12 (50 %) – the right leg, and 12 (50 %) – the left leg. In 15 (62,5 %) wrestlers, the leading hand is right, and 9 (37,5 %) - left (Fig. 1).

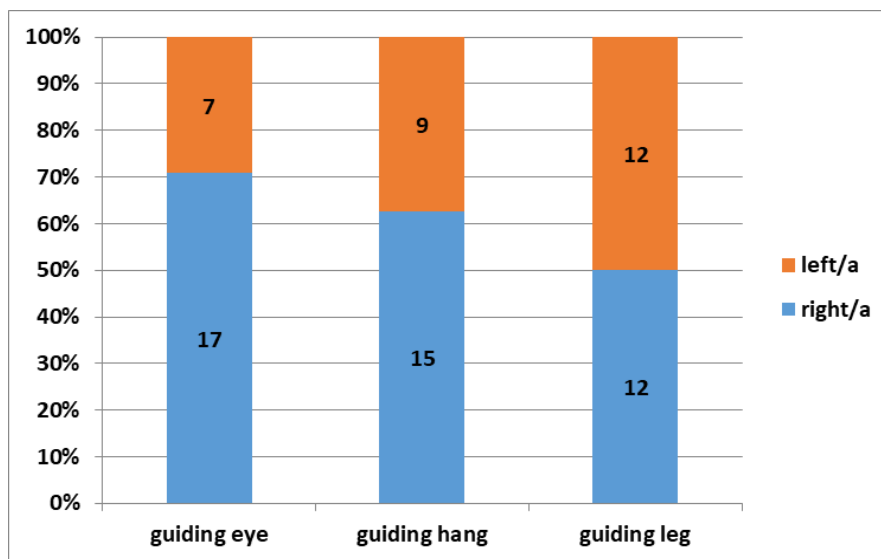


Fig. 1. Predominance of the leading arm, leg, eyes in freestyle wrestlers

Of great interest was not the assessment of a separate leading indicator of visual or motor asymmetry, but the

determination of the individual profile of functional asymmetry in athletes engaged in freestyle wrestling. Based on the sum of

points, it was established that 16 (66,7 %) athletes have a right-lateral profile of functional asymmetry, 5 (20,8 %) have a left-lateral profile, and 3 (12,5 %) are ambidextrous (Fig. 2).

Thus, it was established that most athletes note the importance of taking into

account functional asymmetry in the training process and competitive activity, half of the wrestlers believe that asymmetry should be developed in the training process, paying more attention to the leading side.

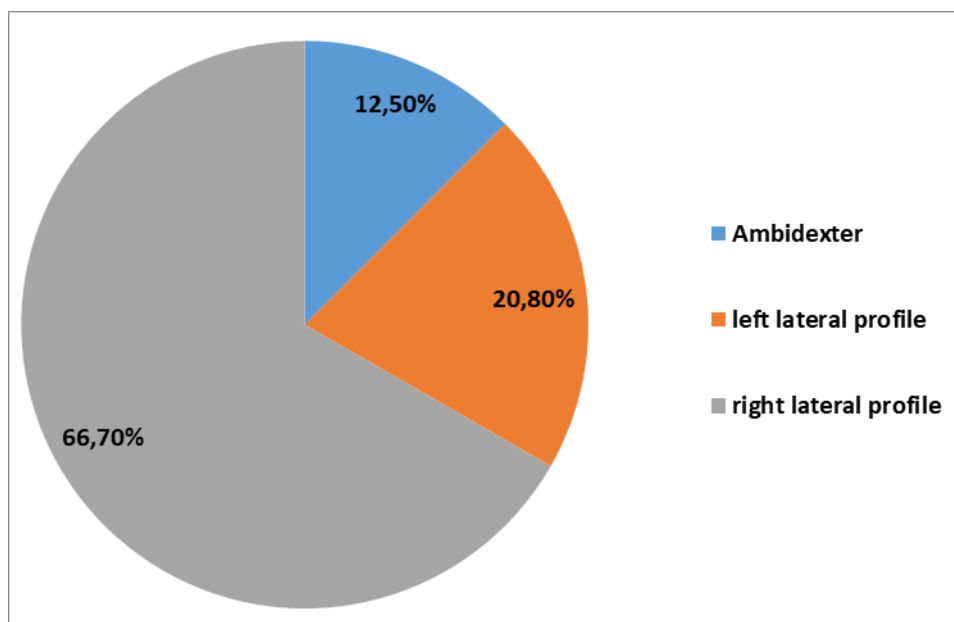


Fig. 2. Distribution of functional asymmetry profiles of freestyle wrestlers

The right-lateral profile of functional asymmetry is the most common among wrestlers aged 18-21 working in the sport club «Galician Levy». A comparison of the results obtained by us with the data of other authors showed that a similar distribution of wrestlers was observed earlier.

The conducted preliminary study of the profile of functional asymmetry allowed us to divide the study participants into two groups: control and experimental, each group consisted of 12 wrestlers, the ratio of wrestlers with right- and left-sided functional asymmetry, as well as ambidextrous wrestlers in the groups was approximately the same (control group: 9 right-handed, 2 left-lateral and 1 ambidextrous, and in the experimental one: 7 right-lateral, 3 left-lateral and 2 ambidextrous) (Fig. 3).

Since in the experimental group it was planned to use a set of exercises aimed at strengthening asymmetry, this group included

athletes who consider it more effective in the training process to increase the load on the «leading» side for its additional development.

In order to study the influence of the profile of functional asymmetry on the success and efficiency of technical actions during training and training matches, a pedagogical experiment was conducted in the period from January to May 2021 in the sport club «Galician Levy».

To do this, both groups watched 4 control-training bouts of each wrestler before and after the pedagogical experiment. A total of 192 educational and training matches were reviewed and analyzed during the pedagogical experiment.

In these meetings, the number of effective technical processes was recorded, and the effectiveness of technical processes was also monitored depending on the profile of functional asymmetry. According to the results of the analysis of educational and

training bouts in the control group before the pedagogical experiment, the following results were obtained: wrestlers with a right-sided profile of functional asymmetry per bout

perform an average of 1 technical action to the left side and 3,39 technical actions to the leading side.

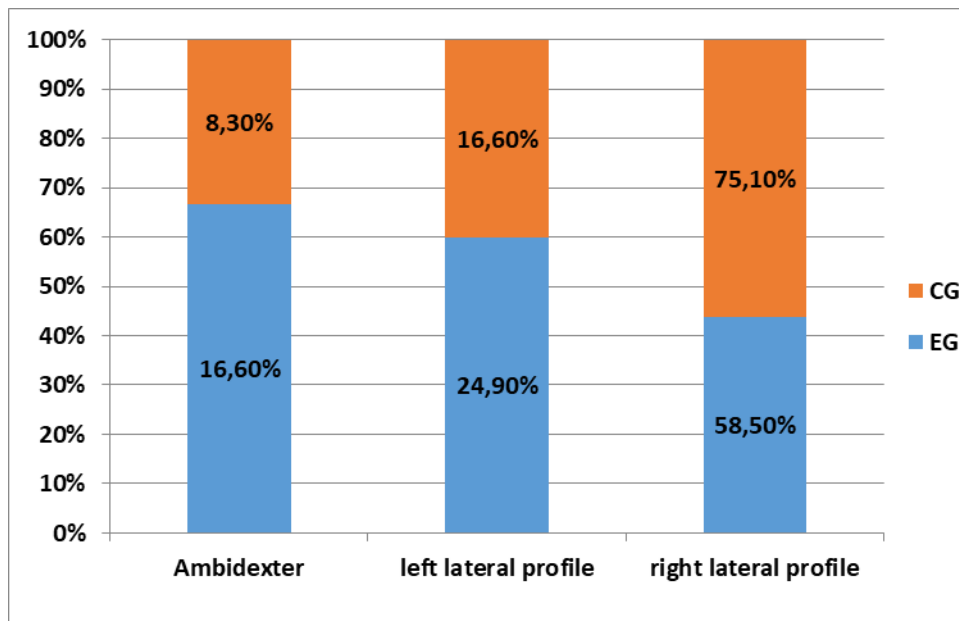


Fig. 3. Distribution of profiles of functional asymmetry of freestyle wrestlers in control and experimental groups

Wrestlers with a left-sided profile of functional asymmetry also perform more technical actions to the leading side, which averaged 3,38 technical actions during one

bout. The ambidextrous wrestler performed the same (2,25) number of technical actions in both directions (Fig. 4).

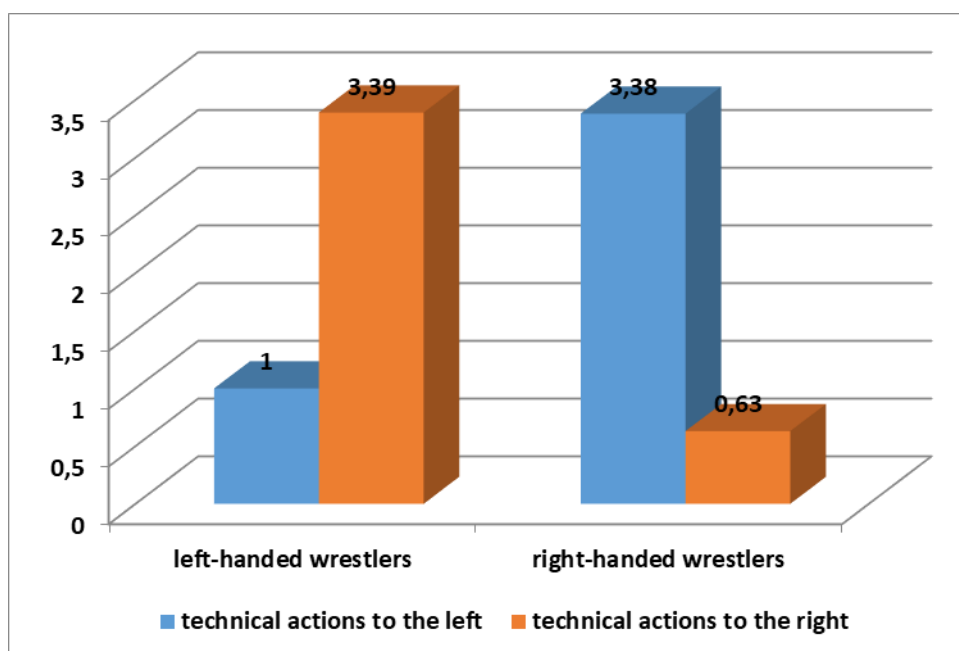


Fig. 4. Number of technical actions in the control group before the experiment

In the experimental group, according to the results of control and training bouts, it can be seen that freestyle wrestlers with a right-sided profile of functional asymmetry perform 3,47 technical actions in the leading side, wrestlers perform 0,97 technical actions in the inconvenient (left) side.

Wrestlers with a left profile of functional asymmetry also want to perform technical actions in a ratio of 3,25 to 1,13 in favor of the leading side (Fig. 5). Ambidextrous wrestlers spent 4,25 to the left and 3,5 to the right.

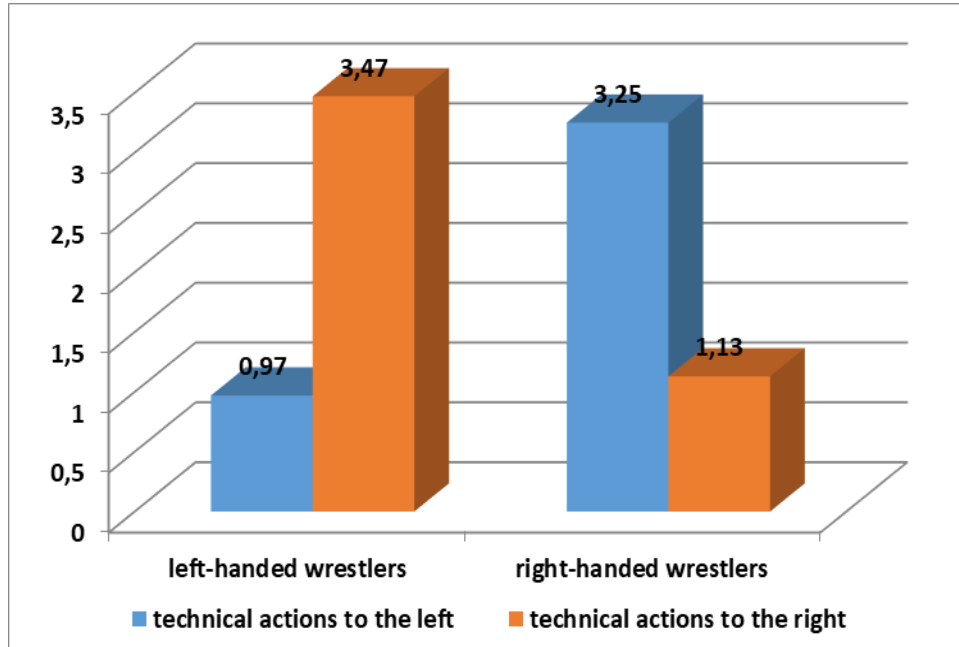


Fig. 5. Number of technical actions in the experimental group before the experiment

The statistical processing of the research results showed that there were no significant differences between the groups prior to the pedagogical experiment, which indicates the homogeneity of the samples and will allow the most objective assessment of

the effectiveness of the set of tasks developed by us (Table 1).

Due to the small number of the sample, ambidextrous are not presented in the table, so the results of only pronounced types of asymmetry were taken into account.

Table 1

Statistical processing of research results before conducting a pedagogical experiment

Indicator	CG	EG	t	p
Right-handed to the right	3,39±0,7	3,47±0,7	0,5	>0,05
Right-handed to the left	1±0,47	0,97±0,47	0,250	>0,05
Left-handed to the right	0,63±0,39	1,13±0,7	1,686	>0,05
Left-handed to the left	3,38±0,35	3,25±0,7	0,422	>0,05

The analysis of educational and training bouts of execution of throws showed that wrestlers mainly perform technical

actions in one direction. An athlete at the initial stage of training must learn techniques in both directions. However, at the stage of

maximum realization of individual capabilities, this rule should not always be followed.

Since the majority of respondents expressed the assumption that a wrestler's asymmetry should be strengthened in order to improve sports results, a set of special exercises was used in the experimental group. In this complex, an accented performance of basic technical actions in the comfortable direction, individual dosing of exercises for the development of flexibility, strength, and static endurance in the leading direction were expected. The following exercises were offered:

Exercises aimed at developing flexibility:

1. Sit down, try to put your legs behind your head with your hands.

2. Stand on the left leg, raise the right leg forward, bending it at the knee; holding the right foot from the inside with your right hand, gently straighten your knee.

3. Stand on the left leg and, holding on to the rise of the right leg with the right hand, pull it back.

4. Get on your knees, stretch your arms forward and connect your fingers. Sitting on the carpet to the left of the left shin, turn to the right and move your hands to the same side.

Exercises aimed at developing strength:

1. Imitation of throws on a rubber shock absorber.

2. Pushing stuffed balls with one hand.

3. Squeezing rubber balls or rubber bands with your fingers (for grip training).

4. Hit the tire with a sledgehammer.

5. Push with the shoulder, jumping on one leg. Stand on your right leg, crossing your arms on your chest. Jumping on the right leg, push the opponent with the shoulder, trying to force him to stand on the other leg. The opponent does the same.

Exercises aimed at developing static endurance:

1. Maintenance. Transfer the partner to the parterre from the convenient side, move to the hold, the partner, after the capture is fixed, tries to avoid the hold.

2. Preservation of static provisions. Lie on your back, hands in a lock, trying to maintain the same position, and the opponent tries to make an elbow lever, that is, to break the grip.

3. Struggle for capture. The task of the wrestlers, defending against the opponent's captures, is to make effective and reliable captures.

A task was also introduced into the training process of the experimental group, which was a model of a high-intensity (interval) competitive, technically saturated fight. The rhythm of the throws is as follows: 5 throws are performed within 40 seconds, after which 8 throws are performed at the maximum pace with a fixation of the spurt time. There are six such combinations. The weight of the dummy is 35-40 % of the athlete's body weight. The total duration of the test corresponds to the average time of the match.

Then, after conducting the pedagogical experiment, we again held educational and training matches and analyzed them according to the indicators that interested us.

Having processed the results obtained after conducting the pedagogical experiment, we reached the following conclusions. In the control group, the increase in results for all indicators was: «right-handed people to the right» - 4,4 %; «right-handed to the left» - 0,8 %; «left-handed to the right» - 3,9 %; «left-handed to the left» - 10,9 %.

In the experimental group, according to the same indicators, we observed the following increase in results: «right-handed to the right» - 13,5 %; «right-handed to the left» - 0,4 %; «left-handed to the right» - 0,5 %; «left-handed to the left» - 18,7 % (Fig. 6).

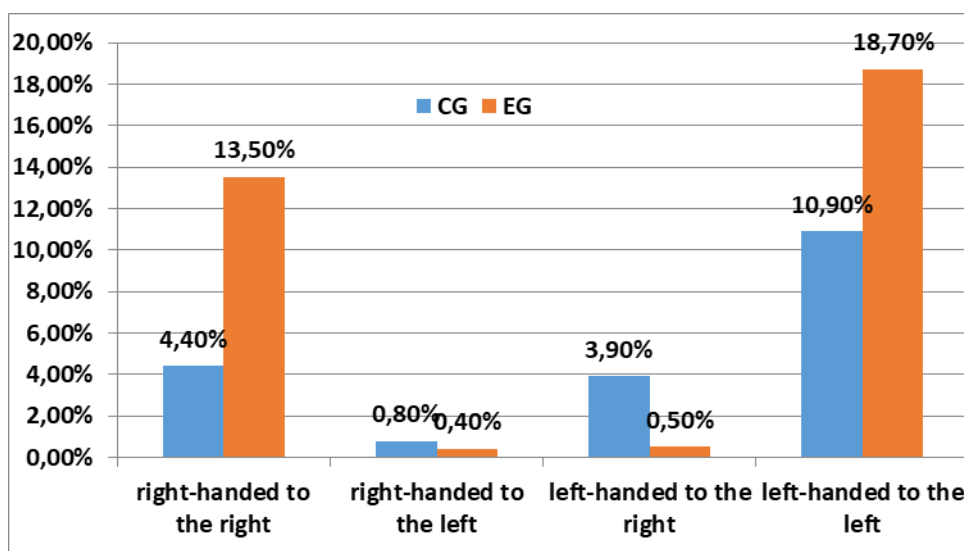


Fig. 6. Growth of results during the pedagogical experiment

The conducted statistical processing made it possible to establish that the detected increase in technical actions in the convenient

direction for both right-handed and left-handed players was reliable (Table 2).

Table 2

Statistical processing of research results after conducting a pedagogical experiment

Indicator	CG	EG	t	P
Right-handed to the right	3,54±0,47	3,94±0,47	2,545	<0,05
Right-handed to the left	1,08±0,47	0,92±0,47	1,499	>0,05
Left-handed to the right	0,88±0,7	0,93±0,7	1,323	>0,05
Left-handed to the left	3,75±0,7	4,5±0,35	2,529	<0,05

Summarizing the results of the pedagogical experiment, we can come to the conclusion that the use of a complex of exercises embedded in the accented performance of technical processes in the leading direction contributes to the increase in results and the increase in the efficiency of the performance of technical processes.

Thus, athletes with a pronounced profile of functional asymmetry more often and more efficiently perform technical actions in the leading side, and an increase in the load on the leading side has a favorable effect on the increase in technical actions.

Conclusions.

1. It has been established that the functional asymmetry of the brain manifests itself in three main forms: motor, sensory and mental. For athletes engaged in freestyle wrestling, motor (movement) asymmetry is

more important. The phenomenon of functional asymmetry can have both a positive and a negative impact on sports results. This influence depends on the type of sport, for martial artists, asymmetry is very important, because it determines their technical actions, and therefore the effectiveness of the fight.

2. The analysis of the distribution of the individual profile of functional asymmetry in freestyle wrestlers showed that among the 24 wrestlers we studied aged 18-21 years, the right-sided profile of functional asymmetry predominates - 66% of wrestlers, the left-sided profile of functional asymmetry has 20% of wrestlers, the rest 14% are ambidexters.

3. The presence of a connection between the performance of a technical action and the profile of functional asymmetry in

wrestlers was revealed: athletes perform technical actions in the leading direction more often and more efficiently. The use of a complex of exercises aimed at increasing asymmetry contributes to the growth of technical processes, and more pronounced in the leading direction. Thus, the increase in the control group «right-handed to the right» was 4.4%, «left-handed to the left» - 10.9%, in the experimental group - 13.5% and 18.7%, respectively.

Prospects for further research will be aimed at identifying the impact of functional asymmetry on the performance of technical actions in women's wrestling.

Conflict of interest. The author notes that there is no conflict of interest.

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Анотація. Шандригось В.І., Бйченко Н.В., Тропін Ю.М., Латишев М.В. Вплив функціональної асиметрії на виконання технічних дій у борців вільного стилю. Мета: виявити вплив функціональної асиметрії на виконання технічних дій у борців вільного стилю. Матеріал та методи дослідження: аналіз науково-методичної літератури та інтернет джерел, педагогічне тестування, педагогічний експеримент, методи математичної статистики. Було проведено визначення профілю функціональної асиметрії мозку у борців вільного стилю. Ми використовували теплінг-тест Е.П. Ільїна, тести для визначення моторної та зорової асиметрії та динамометрію. За результатами теплінг-тесту Є.П. Ільїна розраховували коефіцієнт функціональної асиметрії за працездатністю лівої та

правої руки. У дослідженні взяли участь 24 борці вільного стилю у віці 18-21 років. **Результати:** у ході попереднього дослідження було встановлено, що борці переважно виконують технічні дії в одному напрямку. Спортсмен на початковому етапі навчання мусить вивчати прийоми в обидві сторони. Однак, на етапі максимальної реалізації індивідуальних можливостей цього правила слід не завжди дотримуватися. Оскільки більшість респондентів висловили припущення, що для підвищення спортивних результатів слід посилювати асиметрію борця, в експериментальній групі був застосований комплекс спеціальних вправ. В даному комплексі передбачалося акцентоване виконання базових технічних дій у зручний бік, індивідуальне дозування вправ на розвиток гнучкості, сили, а також статичної витривалості на провідну сторону. Після проведення педагогічного експерименту, було виявлено, що у контрольній групі приріст результатів за всіма показниками склав: «правіш праворуч» - 4,4 %; «правіш вліво» - 0,8 %; «лівіш вправо» - 3,9 %; «лівіш вліво» - 10,9 %. В експериментальній групі за цими ж показниками ми спостерігали наступний приріст результатів: «правіш вправо» - 13,5 %; «правіш вліво» - 0,4 %; «лівіш вправо» - 0,5 %; «лівіш вліво» - 18,7 %. Проведена статистична обробка дозволила встановити, що було достовірним виявлене збільшення технічних дій у зручний бік як у правішів, і у лівішів. Встановлено, що застосування комплексу вправ, вкладених у акцентоване виконання технічних процесів у провідну сторону сприяє приросту результатів і підвищенню ефективності виконання технічних процесів. **Висновки.** Проведений аналіз розподілу індивідуального профілю функціональної асиметрії у борців вільного стилю показав, що серед досліджуваних нами 24 борців у віці 18-21 років, переважає в основному правосторонній профіль функціональної асиметрії – 66 % борців, лівосторонній профіль функціональної асиметрії мають 20 % борців, решта 14 % – амбідекстери. Виявлено наявність зв'язку між проведенням технічної дії та профілем функціональної асиметрії у борців: спортсмени частіше та ефективніше виконують технічні дії у провідну сторону. Використання комплексу вправ, вкладених у збільшення асиметрії, сприяє приросту технічних процесів, причому більш вираженому у провідну сторону. Так приріст у контрольній групі «правіш вправо» становив 4,4 %, «лівіш вліво» - 10,9 %, в експериментальній – 13,5 % та 18,7 % відповідно.

Ключові слова: функціональна асиметрія, профіль, вільна боротьба, тренувальний процес, технічні дії.

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