UDC [797.217/796.41]

ISSN (English ed. Online) 2311-6374

2021. Vol. 9. No. 6, pp. 66-76

CLASSIFICATION OF ACROBATIC MOVEMENTS OF GROUP P - "PLATFORMS" AND THEIR VARIETIES IN ARTISTIC SWIMMING

Anastasiya Petrenko

Kharkiv State Academy of Physical Culture,
Kharkiv, Ukraine

Purpose: to classify and determine the methodology for constructing the technical value of acrobatic movements of "group P".

Material and methods: theoretical analysis and generalization of scientific and methodological literature data, analysis of competition results, polls, methods of mathematical statistics. The competitive programs of the World and European Championships (2009-2021) and the Olympic Games (2008-2021) are analyzed.

Results: analyzing the performances of leading athletes at the Olympic Games, World and European Championships, from 2004 to 2021, we developed a diagram where we can determine what platforms are performed least of all in comparison with other groups. The next step we have combined the existing types of acrobatic movements of "group P" into a single table, forming the criterion for assessing the "area of support" or "value of the type of connection" (grip). In total, the value of 30 types of connections was calculated in the group P - "platforms". Taking into account all the data obtained, a matrix was built, an algorithm for calculating the technical value of the "group P". Based on the developed methodology for calculating the technical value of acrobatic movements, a unified table (scale) of the technical value of acrobatic movements of "group P" was developed - a platform where acrobatic movements were distributed in order from the easiest to the most difficult according to the calculated technical value.

Conclusions: the data of our research made it possible to create the author's system of classification of acrobatic movements, sort it out in detail and develop a methodology for determining and calculating the technical value of 81 acrobatic movements of "group P". The obtained data became the basis for the development of a unified table of the technical value of acrobatic movements of "group P" in artistic swimming. Preliminary approbation of this system and their discussion at international seminars of specialists, coaches and judges of various qualifications in artistic swimming made it possible to make a number of clarifications, additions and improve the development of a classification system for acrobatic movements of "group P" and an assessment of their complexity.

Keywords: artistic swimming, classification, competitive compositions, acrobatic movements, platforms.

Introduction

The current stage of development of artistic swimming demonstrates a significant increase in the "saturation" (filling) of competitive programs. The variety of elements has increased, which is an integral part of demonstrating the complexity of competitive programs. New complex combinations, connections, acrobatic movements and elements appear. At the same time, the requirements for executable elements are increasing from year to year. Claims that artistic swimming has reached the limit in its development are false. And every new World championship is a confirmation of that. Only those teams that invent new, original elements, demonstrate high stability of complexity of compositions and acrobatic movements reach the top of the pedestal [4; 9; 12].

For the practice of artistic swimming, the global problem is the availability and objectivity of quantifying the complexity of competitive programs [1; 3; 11].

Currently, the rules of FINA competitions in artistic swimming do not contain specific information about which element is more difficult than another, and an objective approach to determining its technical value [7; 8].

Analysis of the videos of the competitive programs of the leading teams in artistic swimming revealed that the greatest variety of acrobatic movements of group P "platform", compared to other years analyzed, was demonstrated in performances among “team free combination” routines at the 2018 European Championships in Glasgow (Scotland). Of all the movements performed, the platform took 18%, and in other competitions, this group occupies no more than 10%. Experts attribute this to the fact that performing these acrobatic movements requires the participation of 6 to 8 "basic" (lower) athletes, and a lot of time to perform, which is quite difficult to do in “team free routines”, because coaches prefer to demonstrate more understandable to judges components of the routine - "hybrids" of elements.

Purpose: to classify and determine the methodology for constructing the technical value of acrobatic movements of "group P".

Material and Methods of research

The following methods were used to solve the planned tasks: theoretical analysis and generalization of scientific and methodological literature data, analysis of competition results, systematical analysis (competitive programs were considered as a set of interconnected components, taking into account their properties and biomechanical characteristics), polls, methods of mathematical statistics. The competitive programs of the World and European Championships (2009-2021) and the Olympic Games (2008-2021) are analyzed.

Results of the research

The group "platform" got its name from Fr. plateforme from "flat" + forme "form". That is, athletes must demonstrate a "plane" on the water, formed from their body-parts (hands or legs) or the whole body, on which for some time the “featured-swimmer” balancing and demonstrates acrobatic movements.

In previous publications [2; 5; 6] identified two types of acrobatic movements of group P. Based on the principles of identifying structural groups in spectacular sports [10], the movements of this group were divided into two subgroups:

1) Classic Platforms (or “Standard”);

2) «Floats» (eng. Floats – to float, verb: stay on the surface of the liquid and do not drown).

Both subgroups differ significantly. First of all, due to the specifics of the formation and emergence from under the water to the surface to demonstrate acrobatic movement. Thus, all structures of the first subgroup "Classic Platforms" are formed by athletes under water, after which the whole “construction”, including the "featured-swimmer" rises, then held on the surface for some time, after which the entire structure is immersed back under water.

And the “constructions” of the subgroup "Floats" are formed on the surface of the water, after which the "«featured-swimmer» " climb on the formed "pattern" on the surface of the water and performs actions, then usually jumps into the water and the structure disintegrates.

Analyzing the performances of leading athletes at the Olympic Games, World Championships and European Championships, from 2004 to 2021, we developed a chart where we can determine that compared to other acrobatic groups, the platforms are the least performed. Leading experts attribute this fact to several reasons:

1) long-time maintenance of the «featured-swimmer» on the lying in a static position "support" (middle) athlete requires a lot of effort, which automatically requires the presence of a large number of athletes in the “base level”;

2) The acrobatic movement itself takes a long time, and coaches usually prefer more "fleeting" acrobatic movements to be able to demonstrate a greater variety of other elements during the routine.

It should also be noted that in acrobatic movements of the subgroup "Classic" (or "Standard") "support" (middle) athlete is always in a horizontal position, parallel to the water surface, regardless of the position of the limbs and «featured-swimmer».

The subgroup "Floats", as mentioned above, is formed on the water surface. Athletes form from their legs and/or arms a geometric pattern-plane on the surface of the water, thus forming a stable floating support on which "the «featured-swimmer» demonstrates various gymnastic actions.

The most important component that distinguishes the acrobatic movements of subgroups of group P, both "Classic" (Standard) and "Floats" - is the construction. The main criterion by which the constructions are divided among themselves is the position of the body of the "support" (middle) athlete. That is, in group P, subgroup "Classic" (Standard), always one or two “support” athletes rise from under the water in a horizontal position. And the complexity of the position of the body of the support athlete in the construction depends on whether the knees of the support athlete are bent, whether one of the legs is raised or both legs of the support athlete up. Experts attribute the complexity of such body positions to the fact that maintaining such static body positions for a long time is extremely difficult for the support athlete.

And for the subgroup "Floats" complexity and technical value depend on the number of support athletes, which are kept by basic athletes. There are constructions: "rhombus" (two support athletes from the legs form a geometric figure of a rhombus on which the «featured-swimmer» balances), "triangle" (where three athletes form a geometric figure on the surface of a triangle with legs with special leg grip on which the «featured-swimmer»balances), star "(Where 6-8 athletes form a special pattern leg grip on the surface of the water, on which the «featured-swimmer» balances), etc.

For group P - platforms, the value of "Connection" (“grip”) also plays an important role. Group P differs from B in that the support (middle) athlete lies in a horizontal position and so she and the «featured-swimmer» are lifted out of the water. That is, they begin their acrobatic movement already underwater, clinging (connecting) to each other. Therefore, it is very important for base (lower) athletes to carefully lift both athletes up and make a lot of effort to keep both athletes above the water for a long time, giving them a stable support on the water surface:

• large area of support - when the support athlete is "connected" to the «featured-swimmer's” abdomen or back (ie, the «featured-swimmer» is sitting or standing on the support-swimmer 's abdomen / back);

• middle support area - when the «featured-swimmer» is standing on two legs; leans on the shoulders, buttocks, lower abdomen on the support-athlete ;

• small area of support - when the «featured-swimmer» leans on the knees of the support athlete or when the «featured-swimmer» is standing on her head;

• very small ("extreme") support area - when the «featured-swimmer» is standing on hyк hands (leaning on the palms/hands), or when the support athlete holds the «featured-swimmer» with her hands.

It is important to note that the complexity depends not only on the area of support provided by the support athlete, but also on what part of the body leans or stands «featured-swimmer» on this area.

That is, if the «featured-swimmer» sits with her hips (large support area) on a very small support area, it cannot be evaluated in the same way as a stand on the «featured-swimmer's" hands (very small support area), which leans only on the support athlete's hand (very small support area). Taking into account these factors, we assigned numerical values to each type of area (Table 1).

Table 1

Numerical values and "size" of the area

Size of the area	Technical value of the component (points)
Large	0,1
Medium	0,3
Small	0,5
Very small	0,6

In the next step, we combine the existing types of acrobatic movements of groups P into a single table, which creates a criterion for estimating "Support area", or "Value of the connection type" (grip). In total, the value of 30 types of connections (grips) in groups P - platform was calculated.

The next factor that affects the technical value of acrobatic movemnts of group P - is the position demonstrated by the «featured-swimmer» .

As a basis for evaluating this criterion, we took developed by prof. Medvedeva [10] system of determining the technical value in rhythmic gymnastics.

The movements of the leg were distributed in the following directions: forward, sideways and backward. And depending on the degree to which it rises will receive +0,1. For example: evaluation starts at 90° and has a value of 0,1 (forward and sideways), 135° has a value of 0,2; and full “split” 180° is estimated at 0,3 points.

Except for the backward direction, where the value is slightly higher because it is physiologically harder to bend the back than to lift the leg forward.

Among the criteria for evaluating the position, we also derived certain "bonuses":

• if balancing is performed standing on one leg +0,1;

• both hands catch and grip the leg +0,1;

• the position is performed without "own support" (lying down) +0,15;

• the position is performed upside down +0,2.

The next component is the rotation of the construction. Group P refers to those types of acrobatic movements where the whole construction rotates. That is, the lower (base) athletes hold and rotate the lying support (middle, horizontal) athlete with the «featured-swimmer» on her. Depending on whether the «featured-swimmer» is sitting or standing, the rotation of the construction was divided into two types. Also, depending on the degree of rotation, the technical value increases.

Taking into account all the obtained data, a matrix, an algorithm for calculating the technical value of group P was constructed (Figure 1).

This figure shows that, depending on which components the coach chooses for the competitive routine, the "way" of building the matrix depends.

There can be 4 ways:

1) Construction + Position + Type of connection + Bonus = Technical value;

2) Construction + Position + Type of connection + Rotation of the construction = Technical value;

3) Construction + Position + Type of connection + Bonus + Rotation of a construction = Technical value;

4) Construction + Position + Type of connection = Technical value.

Take for example the acrobatic movement of group P, which is performed in competitions of all ages, from the construction "Simple Platform" (the number obtained by adding all the components of the structure = 1,1), where the construction rotates on 180 °, the featured-swimmer stands with both feet on the support athlete (whose body is straight) in the "Eye" position. To determine the value of this

acrobatic movement, we need to consider all the "components" of the acrobatic movement in the same units (points) to get an acceptable number for future mathematical operations, according to the existing system of coefficients of complexity (degrees of difficulty) of the required elements in technical routines and add them to each other.

It will look like this: 1,1 + 0,1 + 0,65 + 0,3 = 2,15

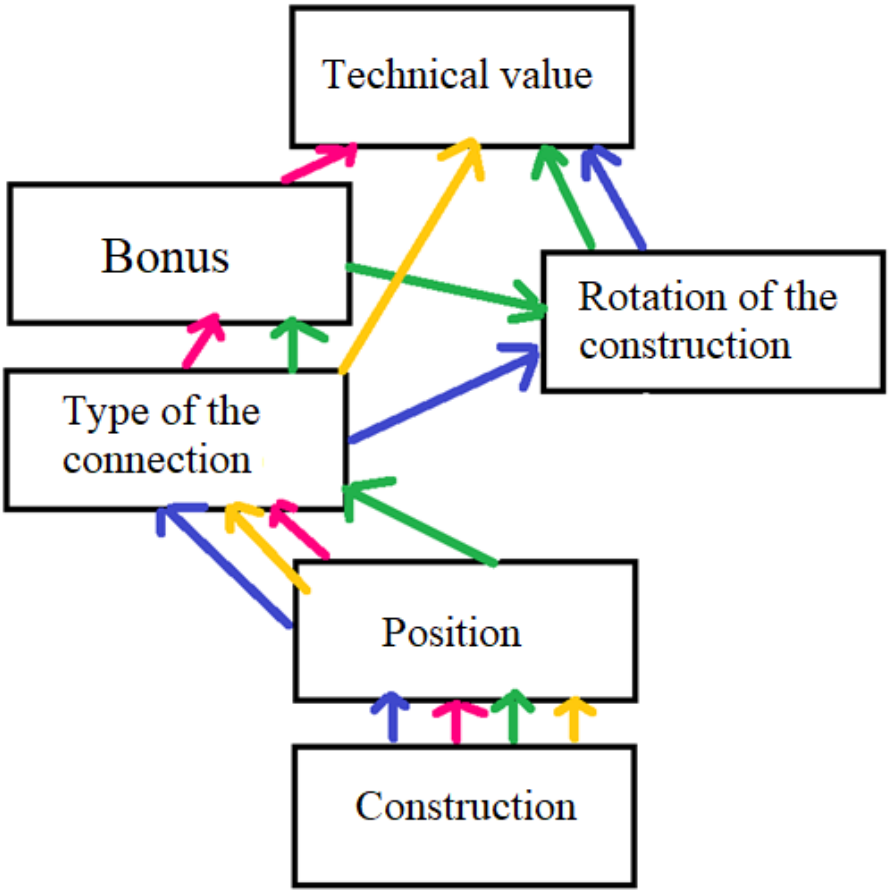

Fig. 1 Algorithm for determining and constructing the technical value of acrobatic movemets of group P - "platform" in artistic swimming.

Note: red arrow - demonstrates the "first" way to build a matrix of technical value of acrobatic movements of group P - "platform"; blue arrow - demonstrates the "second" way to build a matrix of technical value of acrobatic movements of group P - "platform"; green arrow - demonstrates the "third" way to build a matrix of technical value of acrobatic movements of group P - "platform"; yellow arrow - demonstrates the "fourth" way to build a matrix of technical value of acrobatic movements of group P - "platform".

That is, the total technical value depends on the sum of the points of all components of the acrobatic movement. In this example, it is 2,15 points. This score

is the coefficient by which the average execution score for a particular acrobatic movement is multiplied.

The technical value varies among all the acrobatic movements in this group, depending on the different components chosen by the coach. The developed system allows to create any combination ("set") of components that does not destroy the creativity of performance in artistic swimming, which is one of the main ideas in this sport.

Based on the developed method of calculating the technical value of acrobatic movements, a single table (scale) of technical values of acrobatic movements "Group P" – platform were developed, where acrobatic movements were distributed in order from easiest to most difficult according to the calculated technical value.

Conclusions / Discussion

The data of our study allowed to create an author's system of classification of acrobatic movements, to sort in detail and develop a method of determining and calculating the technical value of 81 acrobatic movements of group P. The obtained data became the basis for the development of a single table of technical value of acrobatic movements of group P in artistic swimming. Preliminary tests of this system and their discussion at international seminars of specialists, coaches and judges of various qualifications in artistic swimming allowed to make a number of clarifications, additions and improve the development of classification system of acrobatic movements of group P and assess their difficulty. The data of the research of Professor Miwako Homma [12], which considered the composition and components of competitive routines in artistic swimming in 2013, have been supplemented.

Prospects for further research. In the future, it is planned to analyze the relationships of hybrid-elements and classify them by complexity, taking into account the components of difficulty.

Conflict of interests. The authors declare that no conflict of interest.

Financing sources. This article didn't get the financial support from the state, public or commercial organization.

References

1. Isayeva, L. N., Nikitina, S. M., Shakina, Ye. Ye., (2018), «Analysis of refereeing in artistic sports based on synchronized swimming», Mezhdunarodnyy nauchnyy zhurnal "Young Scientist", № 15 (201), April 2018 Physical Culture and Sports, pp. 265 – 269. (in Russ.).

2. Petrenko, A. S. (2019), « Classification of acrobatic elements in artistic swimming», Molod′ ta olimpiys′kyy rukh: tezy dopovidey XII Mizhnarodnoyi konferentsiyi molodykh vchenykh, 17 travnya 2019 r. Kyyiv. (in Ukr.).

3. Shkrebtiy, Yu., Rudkovs′ka, T., Kozhukh, N. (2015), «Estimation of technical complexity of arbitrary compositions in synchronous swimming», Teoriya i metodyka fizychnoho vykhovannya i sportu, № 3, pp. 30-34. (in Ukr.)

4. Adachi Yumi (2015), "Tactics of Top 3 Countries in Synchronized Swimming", Master's thesis. Waseda University Graduate School of Sport Sciences, 5015A303-0. 64 p. (in Eng.)

5. Anastasiya Petrenko, Oleg Kamaiev (2019), «Features of the classification of acrobatic movements of group B – "balancing" and their varieties in artistic swimming», Slobozhanskyi herald of science and sport, Vol. 7 No. 5(73), pp. 57-60. (in Eng.)

6. Petrenko Anastasiia, Kamayev Oleg. (2021), «Classification and Assessing Methods of the Complexity of "Group A" Acrobatic movements in Artistic Swimming», Path of Science, [S.l.], V. 7, N. 11, pp. 6001-6013. (in Eng.)

7. FINA Synchronised Swimming Manual for Judges, Coaches & Referees 2017 – 2021, available at: https://www.fina.org/sites/default/files/fina_as_manual_-_updated_august_2018.pdf. (in Eng.)

8. Gökçe Akgün (2021), «Numerical analysis of the artistic swimming mixed duet free routine choreographies in world championships», 4th International Conference

of Sport Science – AESA 2021, available at: https://www.researchgate.net/publication/350122308_Numerical_analysis_of_the_artistic_swimming_mixed_duet_free_routine_choreographies_in_world_championships (in Eng.)
9. Li Li, Xu Xin, Mu Wei, Dong Hui, Pang Mei (2020), «Research on the Action Design of Team Artistic Swimming», International Journal of Sports Science and Physical Education, Vol. 5, No. 1, pp. 5-9. doi: 10.11648/j.ijsspe.20200501.12 (in Eng.)
10. Medvedeva, Ye. N. (2017), Ob"yektivizatsiya tekhnicheskoy tsennosti elementov strukturnykh grupp khudozhestvennoy gimnastiki [Objectification of the technical value of elements of structural groups of rhythmic gymnastics]: avtoreferat dissertatsii na soiskaniye uchenoy stepeni doktora pedagogicheskikh nauk, Spetsial'nost': 13.00.04 - teoriya i metodika fizicheskogo vospitaniya, sportivnoy trenirovki, ozdorovitel'noy i adaptivnoy fizicheskoy kul'tury. Sankt-Peterburg, 54 p. (in Russ.)
11. Miwako Homma & Haruka Fujishima (2013), "Analysis of team free routine choreography in synchronized swimming", FINA Synchronised Swimming Worldwide seminar, 1st – 3rd November 2013, St Petersburg, Russia. (in Eng.)
12. Tomali Stavroula (2021), «Which Factors are Influencing Artistic Swimming Performance?», European Journal of Physical Education and Sport Science, [S.l.], V. 6, N. 12, doi:http://dx.doi.org/10.46827/ejpe.v6i12.3674. (in Eng.)

Received: 12.11.2021.
Published: 23.12.2021.

Information about the Authors

Anastasiya Petrenko: graduate student; Kharkiv State Academy of Physical Culture: Klochkivska 99, Kharkiv, 61058, Ukraine.
ORCID: http://orcid.org/0000-0003-1112-9689
E-mail: nastia061193@ukr.net