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VIDEO ANALYSIS OF APPARATUS DIFFICULTY AT THE 2019 WORLD CHAMPIONSHIPS BAKU

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Abstract: *The purpose of this paper was to analyse the apparatus difficulty at the World Championships and observe what apparatus gymnasts manage the most valuable handling, but also the differences between the score of the eight finalists for each object and the representatives of Romania, to see how much they have to recover to qualify for this year's Olympics. For this paper we analysed a number of 40 video executions, eight finalists for each object and eight executions of the two representatives of Romania. We conclude that the Romanian gymnasts are far from the average of the finals, the first representative exceeding the minimum value in the finals on two apparatus, and the second on a single object. The highest value of 9.3 points was observed at clubs, the lowest in the ribbon of 4.3 points, the smallest average is also in the ribbon of 5.1 points, and the highest in the hoop of 8.28 points.*

Key words: *apparatus difficulty, video analysis, hoop, clubs.*

1. Introduction

World Championships are held annually, except in Olympic years; they are open to senior competitors (16 and older).

Greatly influenced by ballet and modern dance, Rhythmic Gymnastics is a combination of sport and art. Performing routines with music, either as individuals or in groups, rhythmic gymnasts move audiences with their extraordinary skill as they execute enormously difficult manoeuvres with hand-held apparatus: Hoop, Ball, Clubs, Ribbon and Rope. Flexibility and musical interpretation are essential in an exercise of rhythmic; however, the risk that a gymnast takes, often by throwing the apparatus several meters into the air and losing sight of it while performing astounding leaps, turns and acrobatic movements before catching it - often in ways seemingly impossible sets the routines apart [13].

Rhythmic gymnastics can be a hard and complex sport that requires optimal coordination between body movements and the apparatus [12].

The use of drills with portable objects during official competitions represents a basic characteristic of rhythmic gymnastics, and each object has a wide range of elements specific to its shape and size. The totality of possibilities meant to set in motion the competition objects constitute the general bases of their technique [9].

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The international competitive Rhythmic Gymnastics Code of Points (RG-CoP) is used for assessing rhythmic gymnastics compositions. This code is improved and published by Rhythmic Gymnastics Technical Committee, of the *International Gymnastics Federation (IGF)* every 4 years, at the end of the Olympic Games. The main purpose and goal of the RG-CoP is to provide a more objective evaluation of the compositions and to promote the development of the sport [1].

The composition requirements become more demanding and increasingly difficult as the FIG-RG-CoP changes in every Olympic cycle [1].

Nowadays, the assessment of individual routines of rhythmic gymnastics considers two main components: Difficulty and Execution. In the evaluation of Difficulty (D), the judges D1 and D2 assess the number and value of the Body Difficulties (BD), dance steps (s) and number of fundamental apparatus elements and the judges D3 and D4 appraise the number and value of the Dynamic Elements with Rotation (DER) and apparatus difficulties (AD). In the evaluation of Execution (E), the judges E1 and E2 assess the artistic component (Unity of composition, Music and Movement, Body expression and variety), while the judges E3, E4, E5 and E6 evaluate the technical faults (all technical deviations from correct performance) [4]. The value of each difficulty element is from 0.10 points to 1.50 points or more, which may be absolutely determinant in the final score obtained in the competition. The inclusion of complex abilities in the routines is essential in order to obtain a high score [8]. The dynamic elements with rotation are represented by throwing the apparatus, executing at least two 360° body rotations and catching the apparatus [4]. Apparatus difficulty means a particularly technically difficult synchronization between apparatus and body, comprising a minimum 1 Base + a minimum 2 criteria or 2 Bases+ 1 criteria or an interesting or innovative use of the apparatus (not performed on a regular basis as standard apparatus movements for RG) comprising a minimum 1 Base + a minimum 2 criteria or 2 Bases+ 1 criteria [4].

Rhythmic Gymnastics has been experiencing a constant and outstanding technical evolution for the last decades, given the amendments to the Code of Points [11].

Female athletes – who harmoniously combine technically correct fulfilment of Body Difficulty and Apparatus Difficulty elements with artistry of competition compositions – are assessed highly [6]. The coordination of body and equipment represents a definitive factor in scoring the program of sportswomen, since losing balance in a physical move or dropping the apparatus impairs the score of the program due to a rise in cognitive stress in the gymnast [5]. Each apparatus – through its shape and weight – determines the emergence of external forces influences bodily motion and induces the need to adjust motor scheme, thus achieving a balance between bodily motion and the movement of the apparatus, ensuring technical accuracy [7]. Gymnasts are encouraged to use both hands for handling the apparatus and perform movements on both sides of their bodies, the purpose being to develop muscle control and coordination on the nondominant side [10].

The training process in RG has high demands in terms of both volume and intensity, as well as technical elements with a high difficulty level [3]. The increase

of training volume in RG has been underpinned by several authors (Ávila-Carvalho et al., 2013; Berlutti et al., 2010; Georgopoulos et al., 2012; Zetaruk et al., 2006) as the main characteristic of the training process in elite gymnasts nowadays, given the high physical and technical requirements in RG [2].

2. Material and Methods

In Rhythmic Gymnastics, the performance of exercises is assessed in competitions in terms of difficulty and execution, adding up and resulting in the final grade. In difficulty, there is no maximum score to achieve, while execution may reach a maximum of 10 points. The difficulty consists in: the body difficulty, the dynamic elements with rotation (risks), dance step combinations and the difficulty with the apparatus.

The purpose of this research was to perform a video analysis on the difficulty with the apparatus at the World Championships and to observe what apparatus the gymnasts manage to handle better (implicitly get higher grades handling with the apparatus) but also the differences between the eight finalists for each apparatus and the Romanian gymnasts, attending the World Championships. The goal was to see how much they have to catch up with from this perspective, thus improving their grades and manage to qualify for the Olympic Games of this year. For this paper, we analysed 40 video executions, eight for the finalists at each competitive apparatus and eight executions of the two representatives of Romania.

This video analysis process consisted in the evaluation of the dynamic elements with rotation (DER) and the difficulty with the apparatus (AD), in summing them up and comparing the four competitive apparatus, to observe to which of them it is easier to get a higher grade, more precisely what apparatus is easier to handle, faster and provides the gymnasts with the possibility of achieving difficulties with the apparatus and perhaps several risks at the same execution time of exercises, imposed by the regulation, between 1’15’’-1’30’’.

3. Results and Discussions

The average of the grades obtained by the first eight gymnasts of the world in D3 and D4 for every apparatus may be observed in figures 1, 2, 3 and 4, while the grades of Romania’s representatives are feature in Figure 5. As these Figures show, even among the first eight gymnasts for every apparatus, there are major points differences between the minimum value and the maximum value, but the means are relatively close, with very small differences in values. The only mean much lower than the rest is in ribbon, with approximately 2.50 points compared to the rest of the values. The values of the Romanian gymnasts are similar for the first two apparatus, but in clubs and ribbon, higher differences were recorded between them.

Figure 1 and 3 also show that – in hoop and clubs, the minimum value is the same: 6.2; figures 2 and 3 show a mean different by only 0.01 points. In ribbon (fig. 4), we found a difference of 3.3 points between the minimum and the maximum value, in clubs (figure 3) a difference of 3.1 points, in hoop (figure 1) a difference of 3 points, while in ball (figure 2) a difference of 2.9 points.

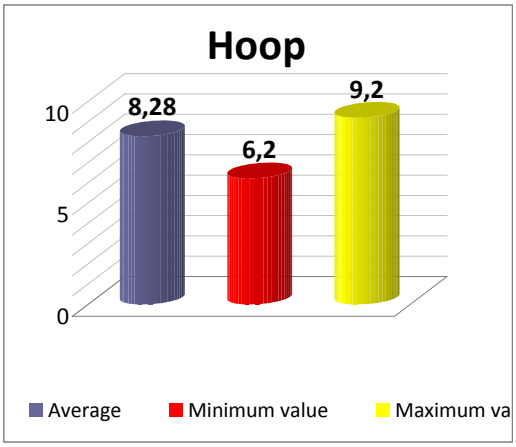

Fig. 1. *Results of the video analysis for the difficulty with the hoop, at the World Championships 2019, apparatus finals*

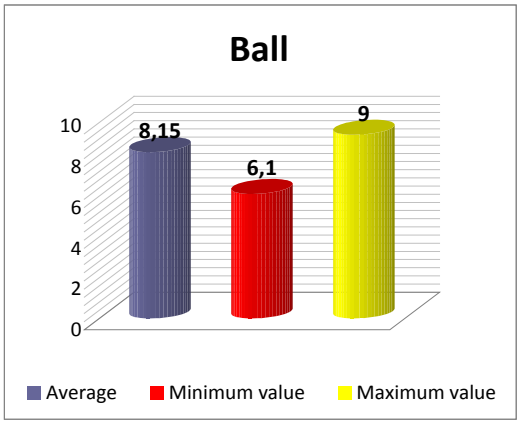

Fig. 2. *Results of the video analysis for the difficulty with the ball, at the World Championships 2019, apparatus finals*

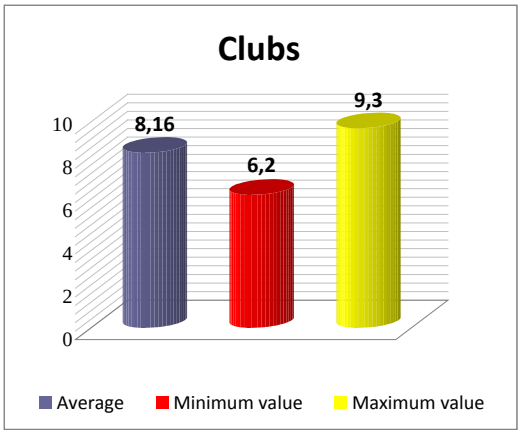

Fig. 3. *Results of the video analysis for the difficulty with the clubs, at the World Championships 2019, apparatus finals*

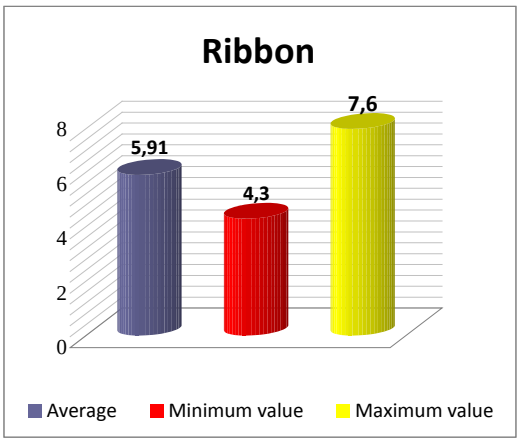

Fig. 4. *Results of the video analysis for the difficulty with the ribbon, at the World Championships 2019, apparatus finals*

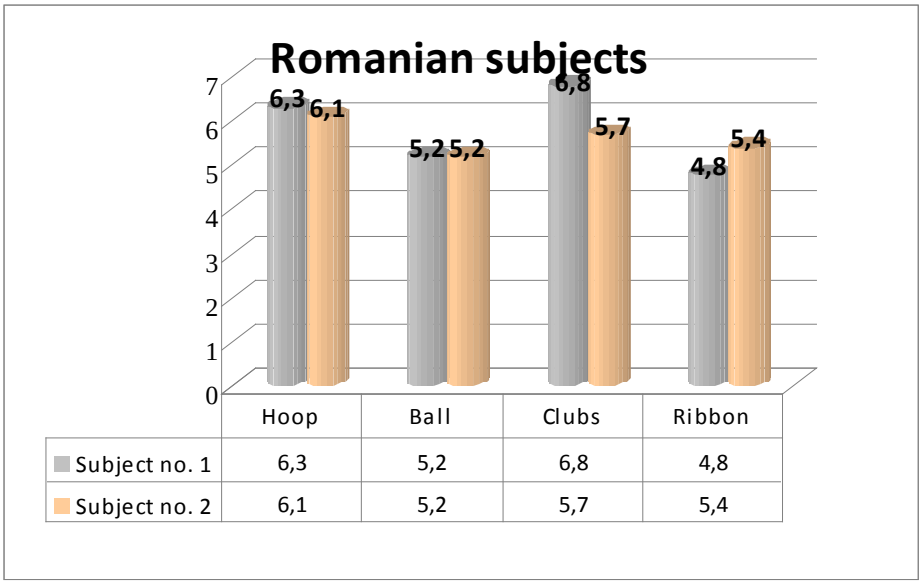

Fig. 5. *Results of the video analysis for the difficulty with the apparatus at the World*

4. Conclusions

1. The first four Figures featured above stand to show that, in ribbon, gymnasts find it hardest to get a high score for D3 and D4, thus fewer difficulties with the apparatus and valuable risks, compared to the other three apparatus, but it is encouraging that both Romanian representatives exceeded the minimum value; one of them was even at a difference of 0.51 points from the ribbon mean final.

2. Hoop, ball and clubs record close values – of maximum 0.2 points more or less than the mean, for both the minimum and maximum values; compared to ribbon, where the differences are of around 2 points in all three values.

3. The findings suggest that the handling with the lowest values pertains to ribbon, with a higher difference in points compared to the other apparatus; the highest one in hoop, with a mean of 8.28 points, closely flowed by clubs and ball.

4. From the perspective of grades for D3 and D4, the difficulty with the apparatus and the dynamic elements with rotation, the first Romanian representative exceeded the minimum value in two apparatus, while the second just in one apparatus, which means they are quite far from the mean of the first eight gymnasts in this competition.

References

1. Ávila-Carvalho, L., Da Luz Palomero, Klentrou, P. and Lebre: *Analysis of the technical content of elite rhythmic gymnastics group routines.* In: The Open Sports Science Journal, 2012, 5 p.146-153.
2. Batista, A., Gomes, T.N., Garganta, R., Avila-Carvalho, L.: *Training intensity of group in rhythmic gymnastics.* In: Science, Movement and Health, 2018, 18 (1), p. 17-24.
3. Bobo-Arce, M., Méndez-Rial, B.: *Determinants of competitive*

performance in rhythmic gymnastics. In: A review. Journal of Human Sport & Exercise 8(3), p. 711 717.

4. FIG – International Gymnastics Federation. Code of points for Rhythmic Gymnastics 2017-2020. Available at: http://www.fig-gymnastics.com/publicdir/rules/files/rg/RG_CoP%202017 2020_updated%20with%20Errata_February%202017_e.pdf.
5. Hardy, L.: *A catastrophe model of anxiety and performance*. In: G. Jones & L. Hardy (Eds.), Stress and Performance in sport, 1990, p. 81-106.
6. Kovalenko, Y.O., Boloban, V.N.: *Analysis of Olympic Games (Rio de Janeiro, 2016) participants individual competition compositions in calisthenics.* In: Pedagogics, psychology, medical – biological problems of physical training and sports, 2017, 21 (3) p. 111 – 119.
7. Macovei, S., Buțu, I.M.: *Tehnica de mânuire a obiectelor în antrenamentul de gimnastică ritmică (Apparatus handling technique in rhythmic gymnastics training).* Craiova. Editura Universitaria, 2018, p. 42.
8. Massidda, M., Calò, M.C.: *Performance scores and standings during the 43rd Artistic Gymnastics World Championships, 2011*. In: Journal of Sports Sciences, 2012, (30)13 p. 1415-1420.
9. Moraru, C.E., Radu, L.E., Grosu, E.F., Puni, A.R.: *Influence of mental training on the execution technique in rhythmic gymnastics*. In: Global Journal on Humanites & Social Sciences. 01, 2015, pp 176-181. Available from: http://www.world-education-center.org/index.php/pntsbs
10. Palmer, H.C.: *Teaching Rhythmic Gymnastics: a developmentally appropiate approach. USA,* Human Kinetics, 2003, p. 5.
11. Palomero, M.L.: *Hacia una objetivación del Código Internacional de Gimnasia Ritmica Deportiva*. Barcelona, 1996.
12. Tsopani, D., Dallas, G., Tasika N., Tinto, A.: *The effect of different teaching systems in learning rhythmic gymnastics apparatus motor skills*. In: Science of Gymnastics Journal, 2012, 4, p. 55-62.
13. https://www.gymnastics.sport/site/pages/disciplines/pres-rg.php. Accessed: 17-02-2020.