

ICPEBK 2015 : 5<sup>th</sup> International Congress of Physical Education, Sports and Kinetotherapy

## Using Motor Skills Tests in the Selection of Women Gymnasts for Learning the “Forward Danilova” on Beam

Silvia Alexandra Stroescu<sup>a\*</sup>

\* Corresponding author: Silvia Alexandra Stroescu, stroescusilvia@yahoo.com

<sup>a</sup>National University of Physical Education and Sports, 140 Constantin Noica Street, Bucharest, Romania

### Abstract

<http://dx.doi.org/10.15405/epsbs.2016.06.65>

Artistic gymnastics is such a spectacular sport due to the strength and elegance of women gymnasts, as well as to the difficulty of exercises they perform. Gymnastics has seen a considerable rise over the years. We can appreciate that technical level has reached now its upper limit, for example the execution correctness and the complexity of artistic level are the most important methods that may difference between two gymnasts equal in terms of technical performance. The learning of any element, in our case the “Free (aerial) forward walkover, landing on one foot”, Forward Danilova on beam, must be preceded by verification of the motor skills that condition the execution. Any aimed improvement will gradually lead to independent and creative execution of the element and whole exercises. In this research, motor skills tests were used to evaluate certain components of coordination ability, considered fundamental in the learning of any element, and results were applied to select the 6 gymnasts who accomplished the program for learning the “Free (aerial) walkover forward, landing on one foot”. Also, results of the following motor skills tests: *Balance rail*, *Bass test*, *Fukuda test*, *Miron Georgescu test* demonstrated that the different levels of motor skills of women gymnasts put their mark on learning of the technical element studied.

© 2016 Published by Future Academy [www.FutureAcademy.org.uk](http://www.FutureAcademy.org.uk)

**Keywords:** Artistic gymnastics; motor skills tests; balance beam.

### 1. Introduction

Analysis of major competitions in recent years highlights that women’s artistic gymnastics is developing continuously, especially in terms of increasing difficulty, complexity and vision it exercises, while perfecting the art and skill of execution. In artistic gymnastics, the learning of any technical element is carried out based on a physical support that includes the integration of specific motor skills and involves the identification of specific technical elements addressed (amplitude, muscle

strength or power, orientation in space, balance). There are also more specific analyses which can be used as a guide (Dragnea, 1996; Tudor, 2005).

Using the experience gained in 15 years of activity as a high performance gymnast, I want to underline that the coach should choose for the gymnast a learning element according to his/her technical knowledge, motor abilities, personal characteristics (the level of fear when starting with a new element) and morphological characteristics (we choose such elements which biomechanically better suit to morphological characteristics of gymnasts). Evaluative processes used offer milestones for control and are designed to ensure maximum effectiveness to training system, both in terms of directing and especially operating in perspective (Tudor, 2005).

*The hypothesis* of the research is that using the motor skills tests in the selection of women gymnasts shortens the time affected for learning the “Forward Danilova” on balance beam and provides appropriate gymnasts for learning it.

## 2. Materials and methods

This part of the research involved the following motor skills tests: Balance rail, Bass test, Fukuda test, Miron Georgescu test, and was applied to assess some parts of coordination ability and to select the 6 gymnasts of 12, who were to accomplish the algorithmic program for learning the “Forward Danilova” on balance beam.

### 2.1. Procedure and subjects

The first stage in the motor learning is to know what is needed to be done. The coach has to describe the element to the gymnast. The element “Free (aerial) forward walkover, landing on one foot” (Forward Danilova) on beam is a dynamic acrobatic element, classified in salto group, which is found in most integral exercises to balance beam and/or floor exercise and can be presented in many forms. Depending on the gymnast’s skills, the coach can choose the basic variant (the one shown by us), with landing on one foot, or landing on both feet. According to the *Code of Points* (2008), the element has the D value, which means a score of 0.40 points.

Rational training at this apparatus requires learning the technique as right from the beginning and to educate the sense of balance. Competition exercises must contain combinations of elements of static and dynamic strength that achieve a reasonable balance of forces in time and space, but also elements of suppleness, flexibility and balance, resulting from the effect of conjugate plasticity, expressiveness and harmony of movement (Vieru, 1997). From the beginning, we are always dealing with three kinds of exercises (Čuk & Karácsony, 2004):

- Preparatory exercises - to develop the motor abilities;
- Pre-elements - to train the movement structures entirely or partially similar to our chosen element;
- The element as a whole (in easier and normal conditions).

For progress in gymnastics, good conditioning is a prerequisite, but to prepare a good conditioning program, it is important to know how a muscle works, what motor abilities are important for learning the elements and with what means we can measure and develop important motor abilities.

Evaluation of the content elements specific to sports training is presented as a system of structured assessment types with internal logic (Dragnea, 1996). To find the start level, the quality and quantity of knowledge already acquired by the experiment group, we applied test selection and objectification of motor skills.

*Motor skills tests* that we have applied are the following:

*Balance rail* (Cordun, 2011) is represented by a piece of wood with 4.5 cm in thickness and 10 cm in width (high beam). From standing position on one leg, with the other leg bent forward to passe, hands on hips and eyes closed, the gymnast must maintain balance as long as possible. With this test, we check the balance of the gymnast.

*Bass test* is best used in motor activity. A total of 10 rounds are marked on the ground at certain distances. From standing position on one leg, the gymnast must perform successive jumping from one foot to the other to keep balance for at least 5 seconds. We use this test to check the gymnast's balance.

*Fukuda test* assesses the gymnast's deviations from the imaginary line, while traveling with alternative knee lifting 50 times, the eyes being closed. We followed the gymnasts who managed to keep as much direction during the movement.

*Miron Georgescu test* is aimed to determine the defining elements of neuromotor qualities, power and control in the triple extension, in a maximum strength-velocity effort. It includes three series of 15 rebounds on both legs, right leg and left leg, with about a 30-second break between series. The trial is maximal, assuming in each rebound to achieve maximum flight time and minimum contact with the ground" (Stroescu, 2014).

After obtaining results from these tests, we selected the 6 gymnasts from a total of 12.

### 3. Results

In the selection of gymnasts for applying the experiment variable, namely the algorithmic learning program for the "Forward Danilova" on balance beam, four motor skills tests were applied in order to assess the motor potential of the gymnasts. The first test we have applied is Balance rail (Table 1).

**Table 1.** Results obtained at Balance rail test

No.	Name	Result (time)
1.	C. B.	1"15
2.	<b>M. A.</b>	<b>25"32</b>
3.	<b>C. I.</b>	<b>17"25</b>
4.	D. D.	3"46
5.	T. D.	6"24
6.	T. P.	9"34
7.	<b>Z. S.</b>	<b>30"18</b>
8.	B. A.	14"19
9.	<b>S. A.</b>	<b>27"35</b>
10.	<b>R. M.</b>	<b>29"30</b>
11.	<b>P. A.</b>	<b>25"15</b>
12.	O. A.	11"23

	<b>Arithmetic mean</b>	<b>16"68</b>
Statistical indicators	Minimum	1"15
	Maximum	30"18

The 6 gymnasts who have exceeded the average of 16"68 are: **M.A.** 25"32, **C.I.** 17"25, **Z.S.** 30"18, **S.A.** 27"35, **R.M.** 29"30, **P.A.** 25"15 (Fig. 1).

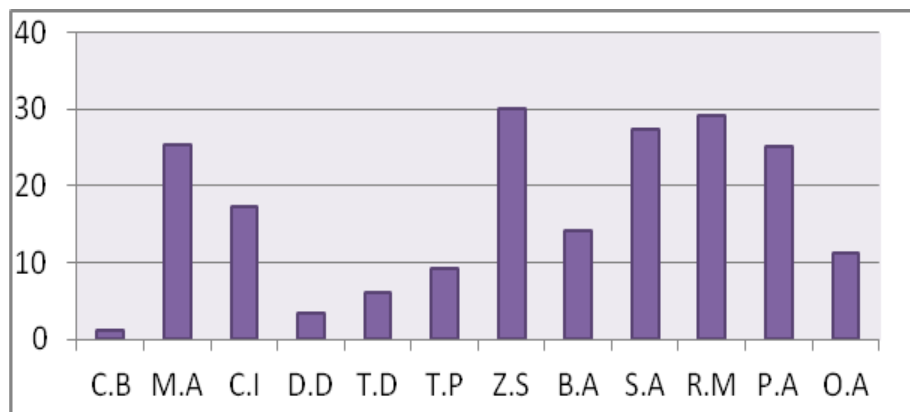


Fig. 1. Comparison of results at Balance rail test

The time maintained in each circle at the dynamic balance test - Bass test is specified in Table 2.

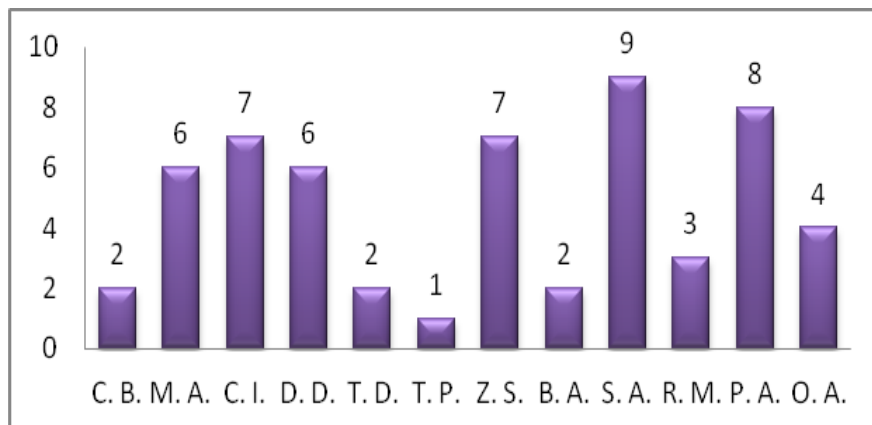
Table 2. Results obtained at dynamic balance test - Bass test

No.	Name	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	
1.	C. B.	1"	1"25	3"	3"54	4"5	2"34	4"12	5"	4"52	5"14	
2.	<b>M. A.</b>	4"	4"35	<b>5"23</b>	<b>6"</b>	4"58	<b>5"</b>	<b>5"23</b>	3"21	<b>5"</b>	<b>6"</b>	
3.	<b>C. I.</b>	3"	<b>5"</b>	<b>5"47</b>	4"35	<b>6"21</b>	<b>5"</b>	4"	<b>5"12</b>	<b>5"</b>	<b>5"41</b>	
4.	<b>D. D.</b>	2"2	3"56	4"71	<b>5"</b>	4"83	<b>5"2</b>	<b>6"</b>	<b>5"43</b>	<b>6"12</b>	<b>5"32</b>	
5.	T. D.	4"32	3"54	2"43	<b>5"</b>	4"76	<b>5"56</b>	3"45	4"	4"67	3"89	
6.	T. P.	<b>5"</b>	4"67	3"29	3"45	2"78	4"34	<b>5"</b>	2"43	4"21	3"78	
7.	<b>Z. S.</b>	<b>5"12</b>	<b>6"</b>	<b>5"45</b>	4"34	4"83	<b>5"45</b>	<b>6"12</b>	<b>5"61</b>	4"24	<b>5"45</b>	
8.	B. A.	3"	3"45	4"23	4"76	<b>5"21</b>	3"89	4"12	<b>5"</b>	4"65	3"71	
9.	<b>S. A.</b>	<b>5"2</b>	<b>5"12</b>	<b>5"43</b>	<b>6"</b>	4"71	<b>5"32</b>	<b>5"67</b>	<b>6"2</b>	<b>5"52</b>	<b>6"12</b>	
10.	R. M.	3"21	4"54	4"13	<b>5"</b>	<b>5"31</b>	4"76	<b>5"54</b>	2"45	3"75	4"21	
11.	<b>P. A.</b>	<b>5"34</b>	<b>6"12</b>	4"85	<b>5"65</b>	<b>5"21</b>	4"72	<b>6"23</b>	<b>5"52</b>	<b>5"61</b>	<b>5"3</b>	
12.	O. A.	4"32	<b>5"12</b>	4"67	<b>5"42</b>	3"21	<b>5"71</b>	<b>5"13</b>	4"62	4"24	4"52	
Statistical indicators	<b>Arithmetic mean</b>					4"62						
	Minimum					1"						
	Maximum					<b>6"23</b>						

Gymnasts who have achieved the requirements are presented in Table 3 and Figure 2.

**Table 3.** The number of jumps into the circles holding at least 5"

No.	Name	Nb. of circles
1.	C. B.	2
2.	<b>M. A.</b>	<b>6</b>
3.	<b>C. I.</b>	<b>7</b>
4.	<b>D. D.</b>	<b>6</b>
5.	T. D.	2
6.	T. P.	1
7.	<b>Z. S.</b>	<b>7</b>
8.	B. A.	2
9.	<b>S. A.</b>	<b>9</b>
10.	R. M.	3
11.	<b>P. A.</b>	<b>8</b>
12.	O. A.	4
	<b>Arithmetic mean</b>	<b>4.75</b>
Statistical indicators	Maximum	9
	Minimum	1



**Fig. 2.** The number of jumps into the circles holding at least 5"

Fukuda test results are shown in Table 4.

**Table 4.** Results obtained at Fukuda test

No.	Name	Nb. of steps
1.	C. B.	32
2.	<b>M. A.</b>	<b>45</b>
3.	<b>C. I.</b>	<b>42</b>
4.	D. D.	27
5.	T. D.	38
6.	T. P.	24

7.	<b>Z. S.</b>	<b>47</b>
8.	<b>B. A.</b>	<b>39</b>
9.	<b>S. A.</b>	<b>43</b>
10.	<b>R. M.</b>	<b>48</b>
11.	P. A.	31
12.	O. A.	24
	<b>Arithmetic mean</b>	<b>36.66</b>
Statistical indicators	Minimum	24
	Maximum	48

M.A., C.I., Z.S., B.A., S.A. and R.M. recorded the highest number of steps at Fukuda test (Fig. 3).

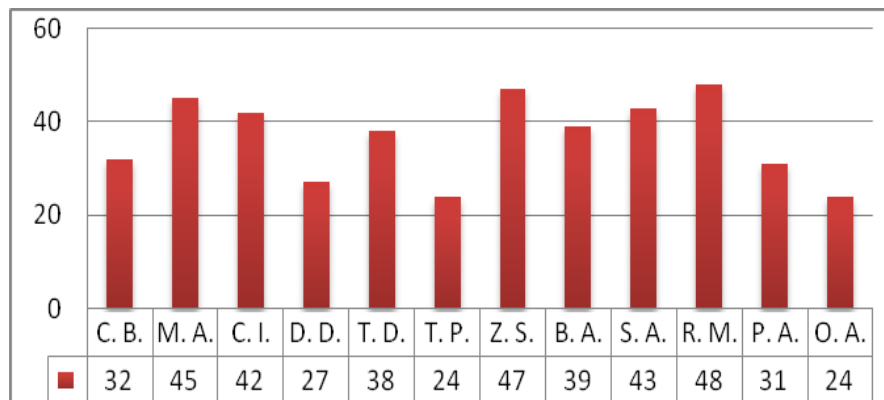


Fig. 3. The number of steps at Fukuda test

Miron Georgescu results are shown in Tables 5 and 6.

Table 5. Results obtained at Miron Georgescu

No.	Name	Maximum height (cm)			Contact time (s)		
		S1	S2	S3	S1	S2	S3
1.	C. B.	28	25	25	0.21	0.23	0.24
2.	<b>M. A.</b>	<b>31</b>	<b>30</b>	<b>28</b>	<b>0.14</b>	<b>0.15</b>	<b>0.15</b>
3.	<b>C. I.</b>	<b>33</b>	<b>33</b>	<b>30</b>	<b>0.16</b>	<b>0.18</b>	<b>0.18</b>
4.	D. D.	29	28	29	0.21	0.20	0.22
5.	T. D.	27	27	25	0.18	0.20	0.20
6.	T. P.	26	24	23	0.20	0.19	0.19
7.	<b>Z. S.</b>	<b>34</b>	<b>34</b>	<b>32</b>	<b>0.14</b>	<b>0.15</b>	<b>0.17</b>
8.	<b>B. A.</b>	<b>32</b>	<b>30</b>	<b>30</b>	<b>0.18</b>	<b>0.19</b>	<b>0.19</b>
9.	<b>S. A.</b>	<b>36</b>	<b>33</b>	<b>32</b>	<b>0.17</b>	<b>0.17</b>	<b>0.19</b>
10.	<b>R. M.</b>	<b>31</b>	<b>31</b>	<b>30</b>	<b>0.16</b>	<b>0.18</b>	<b>0.18</b>
11.	P. A.	27	26	27	0.20	0.19	0.20
12.	O. A.	28	28	26	0.19	0.21	0.21

**Table 6.** Average of the three series of repetitions

No.	Name	Average maximum height (3s)	Average contact time
1.	C. B.	26	0.226
2.	<b>M. A.</b>	<b>29.6</b>	<b>0.146</b>
3.	<b>C. I.</b>	<b>32</b>	<b>0.173</b>
4.	D. D.	28.6	0.21
5.	T. D.	26.3	0.193
6.	T. P.	24.3	0.193
7.	<b>Z. S.</b>	<b>33.3</b>	<b>0.153</b>
8.	<b>B. A.</b>	<b>30.6</b>	<b>0.186</b>
9.	<b>S. A.</b>	<b>33.6</b>	<b>0.176</b>
10.	<b>R. M.</b>	<b>30.6</b>	<b>0.173</b>
11.	P. A.	26.6	0.196
12.	O. A.	27.3	0.203
	<b>Arithmetic mean</b>	<b>29.06</b>	<b>0.185</b>
Statistical indicators	Minimum	24.3	0.146
	Maximum	33.6	0.21

Gymnasts who had the best height during stripping and the best time contact with the ground are: M.A., C.I., Z.S., B.A., S.A. and R.M.

To verify the usefulness of the chosen tests and the influence of the main motor skills during the learning process of the element studied, we divided the gymnasts into two groups of 6 and submitted them to a test which consisted in inclusion of the Forward Danilova in the execution of the full exercise. The differences and the score achieved in the 4 tests are shown in Table 7.

**Table 7.** The final results and the final ranking

No.	Gymnasts' name	RANKS (points)					Total	First group	Second group
		P1	P2	P3	P4	Execution penalty		Execution penalty	
1	<b>Z. S.</b>	12	10	11.0	2.0	11.0	<b>46</b>	0.05	
1	<b>M. A.</b>	9	9	10.0	6.0	12.0	<b>46</b>	0.15	
3	<b>R. M.</b>	11	5	12.0	4.5	9.5	<b>42</b>	0.20	
4	<b>S. A.</b>	10	12	9.0	1.0	8.0	<b>40</b>	0.25	
5	<b>P. A.</b>	8	11	4.0	9.0	4.0	<b>36</b>	0.30	
6	<b>C. I.</b>	7	8	8.0	3.0	9.5	<b>36</b>	0.35	
7	B. A.	6	4	7.0	4.5	7.0	29		0.40
8	T. D.	3	3	6.0	10.0	5.5	28		0.40
9	T. P.	4	2	1.5	12.0	5.5	25		0.50
10	O. A.	5	6	1.5	8.0	3.0	24		0.55
11	D. D.	2	7	3.0	7.0	2.0	21		0.60
12	C. B.	1	1	5.0	11.0	1.0	19		0.65

The first group consisted of gymnasts who, after testing, occupied positions 1-6, and the execution penalties were between 0.05-0.35 points. The second group had the gymnasts from positions 6-12, and the execution penalties were between 0.40-0.65 points.

**Table 8.** Mathematical indices

No.	The Calculated Indicator	First group	Second group
1	Arithmetic mean	0.22	0.52
2	Standard deviation	0.11	0.10
3	Coefficient of variation	0.05	0.19
4.	Correlation coefficient	-0.94	-0.96

#### 4. Conclusions

The results of motor skills tests intended to evaluate certain components of coordination ability: Balance rail, Bass test, Fukuda test, Miron Georgescu test, considered fundamental in learning, demonstrated that the different levels of motor skills in women gymnasts put their mark on the learning of “Free (aerial) forward walkover, landing on one foot” (Forward Danilova) on beam.

Analysing results in Table 7 and through the correlation coefficient (Table 8) presented above, we find that M.A., C.I., Z.S., S.A., R.M. and P.A. are gymnasts who have achieved the best six scores in at least three tests applied. These gymnasts showed a high motor potential and recorded the best results in the tests designed to assess the quality of execution of the element we have studied.

#### References

- Code of Points* (2008). Retrived from <http://www.codeofpoints.com/>
- Cordun, M. (2011). *Bioenergetică și ergometrie în sport*. București: CD Press.
- Čuk, I., & Karácsony, I. (2004). *Vault-Methods, Ideas, Curiosities, History*. Sangvincki.
- Dragnea, A. (1996). *Antrenamentul sportiv*. București: EDP.
- Stroescu, S. (2014). *Valorificarea factorilor interni ai capacității de performanță prin algoritimizarea învățării unor elemente tehnice cu rotație în ax transversal din Gimnastica Artistică feminină* (Teză de doctorat). UNEFS, București.
- Tudor, V. (2005). *Măsurare și evaluare în cultură fizică și sport*. București: Alpha.
- Vieru, N. (1997). *Manual de gimnastică sportivă*. București: Driada.