

## MANAGING THE FORMATION OF NAVAL PENTATHLON TEAM OF THE “MIRCEA CEL BĂTRÂN” NAVAL ACADEMY

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**Abstract.** *The research addresses the selection process for the naval pentathlon team of the Naval Academy. Hypothesis: The motor performance criterion in the selection of athletes is not enough, and the performance in training and competitions can be improved if athletes' attitude towards and motivation for performance are added to the selection. Subjects: The basis for selecting the research subjects were military students who had already passed a first stage of selection when being admitted to the military institution. Methods: Bibliographical study, pedagogical observation, experiment, questionnaire survey, mathematical and statistical method, graphical method. The first stage was oriented towards the selection of a group of 30 subjects (out of 200) using psychomotor performance as a criterion, and the second stage was focused on selecting the representative team of the Naval Academy by means of two opinion questionnaires meant to reveal the subjects' attitude towards and motivation for performance and competition. Results: We identified the group of 15 athletes who met the conditions of having good motor skills and an optimal attitude towards the preparation for performance within a rigorously planned training system, with coaching sessions designed to facilitate the maximisation of their performance. Conclusion: The selection process will be oriented towards the subjects with specific motor skills in swimming, running and utilitarian routes, but also with real potential for training – improvement of these skills and development of good exercise capacity, all this facilitated by a proper attitude and motivation.*

**Keywords:** *naval pentathlon, selection, management.*

### Introduction

Physical training of the military is an integral part of their combat preparation and requires complex organization and targeting, involving intense physical and mental effort, bearing in mind that the objective is victory, as in the case of sport, but the risks of getting it in real combat are far superior compared to those in the sports competition (Kamaiev et al., 2018).

By paying particular attention to the combat training of the military, it is highlighted the need for multidisciplinary training through theoretical, technical and tactical elements, the training of skills in various fields specific to combat actions, such as shooting with different categories or types of armaments, first aid, life-saving, underwater swimming, solving technical and tactical situations in different environments, travelling over different distances or crossing watercourses with improvised means. All this can be done and verified during specific training or applicative sports competitions, on the stable foundation of a well-trained fighter (Vaara, 2017). The basis of this preparation can only be a high level of physical and mental ability (Taylor et al., 2008)

Naval pentathlon is a multidisciplinary sport practiced by the military of armies affiliated to the International Military Sports Council (Kyröläynen & Urbansq, 2017) and consists of

the following tests: life-saving, utility swimming, seamanship, amphibious cross-country, obstacle race. All these tests are inspired by the combat actions for which the military in the naval forces are preparing, and the results obtained highlight their level of military and sports training (Blacker, 2017).

In terms of effort, the tests take an average of 1 minute for “life-saving” and “utility swimming”, 1 minute and 50 seconds for “obstacle race”, 4 minutes for “seamanship” and 11 minutes for the “amphibious cross-country” race, with a heart rate recording values between 160 and 190 beats per minute. The tests as a whole have a rich content of specific motor actions used in swimming, throwing, running, jumping, climbing, shooting, rowing, and require complex athletic training. (Abramiuc et al., 2018b)

The efficiency of movements (technique) achieved through specific training is dependent on both the athlete’s high level of fitness that should be constantly monitored (Gebhardt, 2017) and careful analysis of the biomechanics of movements and adaptation of the technique to the morphological characteristics of athletes (Baptista et al., 2017).

Achieving good and very good results in naval pentathlon competitions requires compliance with international performance criteria, which are the starting point in the formation of the representative team of the “Mircea cel Bătrân” Naval Academy (Abramiuc et al., 2018a).

The Naval Academy of Constanța participates annually in international competitions organized in the Naval Academies of Italy, Spain, Poland, and Turkey, which involve competitions between 6-8 countries, up to 30 countries.

Based on the premise that “management is the process of designing and maintaining an environment in which individuals, working together in groups, efficiently accomplish selected aims” (Koontz et al., 1984, p. 4), the purpose of our research is to establish an optimal framework for the selection and preparation of the representative naval pentathlon team of the “Mircea cel Bătrân” Naval Academy.

To analyse the selection in naval pentathlon, some related aspects need to be clarified. The basis for selecting the naval pentathlon team of the Naval Academy is made up of students from different backgrounds but who have passed the sports selection for admission to higher military education, which involved the following tests:

- applicative route – arranged in the gym, having 90 m in length. Over this distance, obstacles are placed requiring the execution of standing long jump, running, throwing balls (handball, basketball, volleyball) into the handball goal, traction, crawling, jumping over obstacles, rolling, carrying weights between markers, walking in balance on a beam and speed run;
- endurance run over a distance of 2000 metres.

Meeting the rating scales for these tests brings to the selection base individuals with good motor skills for the requirements of the army but low for the level of performance in naval pentathlon. This offers limited opportunities to harmonise individual performance with the performance required in international naval pentathlon championships, in relation to the training period available to us.

The objectivity in selecting the representative naval pentathlon team depends on the knowledge and careful analysis of all the characteristics of the effort specific to each test, the knowledge of athletes’ capabilities and the degree of transferring motor skills from the sports

practiced by each subject participating in the selection. Thus, a small group of individuals who have practiced a performance sport that offers them the possibility of reaching an appropriate level of motor skills and transferring motor skills to naval pentathlon tests remains important in the selection. In this case, the selection will be oriented towards soldiers with motor skills specific to swimming and running, with real capabilities to train and improve these skills and to develop good exercise capacity. The lack of a swimming test in the selection for admission makes it difficult to select subjects for naval pentathlon and form a team with multilateral training. The complexity of naval pentathlon tests and the difficulty of identifying multilaterally trained subjects in the selection of motor skills make individualisation indispensable in the sports training of pentathletes, with the aim of optimising it and maximising the level of motor skills of athletes.

## **Methodology**

### *Subjects*

The basis for selecting the research subjects were military students who had already passed a first stage of selection when being admitted to the military institution. The tests consisted in completing an applicative route and endurance run over a distance of 2000 m. By testing motor skills at admission, together with the standards imposed by these tests, we are given the opportunity to organize a new selection shortly after the beginning of the academic year and thus train a large number of athletes who will be prepared for participation in national and international naval pentathlon competitions (Ene-Voiculescu et al., 2017) .

### *Methods*

The methods used were: bibliographical study, pedagogical observation, experiment, questionnaire survey, mathematical and statistical method, graphical method.

Through the method of studying the specialised bibliography, we developed the theoretical and methodological foundation in order to identify the sources of information necessary to approach the research. The studied materials contributed to both the understanding of how the selection process can be directed and the knowledge of all aspects that characterise the specific effort in naval pentathlon. The observation method was used to track the obvious characteristics of the psychomotor behaviour of athletes. The questionnaire survey method aimed to establish the criteria used in the selection of athletes for the pentathlon group by the other foreign naval academies participating in the competition. Through the survey method, we selected the representative team on the basis of an opinion questionnaire. Opinion questionnaires were designed with 3 response choices or more, through which we tracked the subjects' reasons and attitudes regarding the practice of naval pentathlon at the level of sports performance. Questionnaires were also needed to identify problems and issue solutions for training optimisation. The mathematical and statistical method used the statistical program for processing the recorded results. The graphical method was used to show the data and allow a quick and obvious view of the variation in the results obtained by the tested subjects.

### *Tests used*

- a. 2000-m flat run. It was performed in the Naval Academy stadium as part of physical education classes. The test consisted in running the set distance in groups of ten subjects, the time being recorded in seconds.
- b. Obstacle race. The challenge took place on the obstacle course of the Naval Academy. The route had a length of 300 m with 10 obstacles. The time from start to finish was recorded in minutes and seconds, the subject having to clear all 10 obstacles.
  - Obstacle 1 – Hurdle: located 15 m from the start. A jump similar to the hurdling technique in athletics is required for clearance.
  - Obstacle 2 – Balance bar: located 30 m from the start. The obstacle can be approached in a freely chosen style, with the help of the arms, by mounting on the beam, crossing it, walking or running on it, jumping over it and landing 1 m away from the end of the beam, beyond the white line marked on the ground.
  - Obstacle 3 – Barrel: located 45 m from the start. The obstacle can be freely approached with the help of the arms and legs.
  - Obstacle 4 – Irish table: located 75 m from the start. Approaching the obstacle is free, but it is forbidden to use support poles for climbing the Irish table. The penalty for incorrect passage is 20 seconds.
  - Obstacle 5 – Pillars: at a distance of 120 m from the start, 6 metal pillars with a height of 2 m are rigidly fixed to the ground and arranged in a column at intervals of 2 m. After the end of the pillars, a support for six grenades is arranged and, 10 m away from the alignment of the grenades, there is an airtight ship door. The athlete must execute a 360<sup>0</sup> rotation around each pole, throw the grenades through the open door at a distance of 10 m, pass through the door space and close the door. It is mandatory to throw grenades until one of them hits through the door space. The athlete will be penalised by 15 seconds for each of the following mistakes: incorrect performance of rotations, failure to throw the grenade, failure to enter the door or close the door with the handle.
  - Obstacle 6 – Climbing: located 160 m from the start. The athlete must climb a mesh with 25 cm meshes, fixed with one end to the ground and the other to a metal gate at a height of 5 m. It follows the crossing of a 5-m long area on a rope fixed horizontally, in the direction of running between two metal gates, at the height of 5 m. After crossing and touching the second gate, the lowering will be done with the help of a rope fixed with one end to the gate and the other hanging freely. Landing must be performed beyond the mark drawn with a white line at a distance of not less than 3 m from the area crossed. The athlete will be penalised by 10 seconds for failure to touch the bar at the second gate and 20 seconds for landing before the marked line.
  - Obstacle 7 – Long jump: located 200 m from the start and 30 m from the previous obstacle. The athlete must jump a sand pit 4 m long. The penalty for incorrect passage is 20 seconds.
  - Obstacle 8 – Tunnel: located 240 m from the start, it has a length of 8 m and is arranged on a sandy surface. The exit from the tunnel will be through a vertical

cylinder with a diameter of 0.8 m and a height of 1.5 m. The technique of crossing the tunnel and exiting through the cylinder is free.

Obstacle 9 – Combined obstacle: placed 260 m from the start. It consists in crossing a sandy area on a rope arranged horizontally and fixed at both ends at a height of 80 cm, running around the right of the obstacle, climbing to a height of 3.5 m on a sloping plane 15 cm wide, crossing on a second rope arranged horizontally and stretched at the height of 2.5 m, jumping and landing. When crossing on the first rope, the athlete can use the arm support on the rope positioned above, and on the second crossing, the athlete will use the longitudinal bar that forms the obstacle arranged at a height of 3.5 m above the rope.

Obstacle 10 – Platform: located 293 m from the start. The obstacle consists of two metal pillars, the first with a height of 2 m, and the second with a height of 4 m. Between the pillars, there is a rope with both ends fixed to them. The athlete must move along the rope, climb the platform, jump, and run to the finish. The technique of approaching the obstacle is free. For incorrect crossing, there is a penalty of 20 seconds. The finish line is marked at the distance of 305 m from the start.

- c. The 100-m freestyle swim event was held in a 50-m pool with 8 lanes. The start was taken from the starting block at the sound signal. The time was recorded in seconds.

## Results

The performance assessment scale is shown in Table 1.

Table 1. *Performance assessment scale*

Tests	Performance	Scoring equivalence
Obstacle course	240 sec	100 points
	± 1 sec	5 points
Free swimming - 100 m	120 sec	100 points
	± 1 sec	5 points
Endurance run - 2000 m	540 sec	100 points
	± 1 sec	2 points

To test motor skills, we used the tests provided in the physical education subject description: crossing the obstacle course, endurance run - 2000 m (Table 2), freestyle swimming - 100 m (Table 3).

Table 2. Statistical indicators of scores obtained in stage 1 of the selection per test – Obstacle course and Endurance run - 2000 m

Statistical indicator	Obstacle course				Endurance run - 2000 m			
	Time/Sec Experiment	Points Control	Time/Sec Experiment	Points Control	Time/Sec Experiment	Points Control	Time/Sec Experiment	Points Control
M ± DS –								
Experiment/ Control	194.6 ± 12.414	198.467 ± 19.508	327 ± 62.071	307.667 ± 97.539	460.333 ± 21.009	467.333 ± 24.4	259.333 ± 42.018	245.333 ± 48.801
Coefficient of variation (CV)	6.379 H	9.821 H	18.982 medium	31.703 IH	4.564 H	5.221 H	16.202 H	19.892 H
Median	193	198	335	310	463	468	254	244
Maximum	227	231	420	460	425	510	200	350
Minimum	176	168	165	145	490	415	200	160
Independent t-test	0.648		0.648		0.842		0.842	
Significance threshold	p < 0.05		p < 0.05		p > 0.05		p > 0.05	
Standard deviation	16.35		81.752		22.768		45.536	
Effect value - ES	-0.237 / medium ES		0.236 / medium ES		-0.307 / medium ES		0.307 / medium ES	

Note: H – homogeneous, IH - inhomogeneous

Given that the selection tests were carried out shortly after the start of the academic year, the training of skills necessary for an effective approach to obstacles in the “obstacle course” reached the minimum required to safely complete the challenge. The results were compared with those of athletes at the World Naval Pentathlon Championships held in Wuhan, China, in 2019, and the conclusion was that effective training management could bring the results of the representative team of the Naval Academy to a competitive level.

Table 3. Statistical indicators of scores obtained in stage 1 of the selection – Freestyle swimming

Statistical indicators	Freestyle swimming			
	Time / Sec Experiment	Points Control	Time / Sec Experiment	Points Control
M ± DS – Experiment/ Control	92.4 ± 14.267 15.44	98.2 ± 12.353 12.579	238 ± 71.334 29.992	209 ± 61.766 29.553
Coefficient of variation (CV)	average homogeneity	average homogeneity	inhomogeneous	inhomogeneous
Median	90	100	250	200
Maximum	110	123	375	325
Minimum	65	75	150	85
Independent t-test	1.19		1.19	
Significance threshold	p > 0.05		p > 0.05	
Standard deviation	13.344		66.722	
Effect value – ES	-0.435 / medium ES		0.435 / medium ES	

For swimming, the results obtained by the academy’s cadets were compared with the literature data on the performance achieved by young people (Unterwege et al., 2016; Kollarz et al., 2013).

The statistical indicators of scores for the motor skill testing are shown in Table 4.

Table 4. *Statistical indicators of total scores obtained in stage 1 of the selection – Motor skill testing*

Statistical indicators	Representative team 15 subjects	Control group 15 subjects
M1 ± DS1 - Exp.	824.333 ± 100.473	762 ± 10.313
Median	839	714
Coefficient of variation (CV)	12.188 (average homogeneity)	13.164 (average homogeneity)
Independent t-test		1.7
Significance threshold		p > 0.5
Standard deviation		100.393
Effect value – ES		0.621 – medium ES

The collected data were summarised, and we developed an assessment system similar to the one used in naval pentathlon competitions but having as a benchmark the performance necessary to obtain the maximum grade in school evaluations (see Table 1). Then, we selected 30 subjects with the best results in terms of motor skills.

As a basis for the development of opinion questionnaires identifying the athletes’ main reasons and attitudes (Keegan et al., 2013; Clancy et al., 2016) regarding the preparation and participation in naval pentathlon competitions, we used the results of a questionnaire developed and applied in 2019 to 62 athletes from different countries, participants in the International Nautical Championship.

The second stage concerned the selection of the representative team made up of 15 subjects. In this regard, we developed and applied two questionnaires focusing on individual opinions related to the perception of school climate in the context of sports practice, but also to the subjects’ motivation for (Spray et al., 2006) and attitude towards performance.

The questionnaire survey was applied to the 30 subjects selected in the first stage, and the results obtained were the separation criterion to form the representative pentathlon team of the Naval Academy (Table 5).

Table 5. *Statistical indicators of scores obtained in stage 2 of the selection – Opinion questionnaire*

Statistical indicators			
Experiment group		Control group	
M1 ± DS1	95.533 ± 3.998	M2 ± DS2	86.8 ± 3.385
Median 1	94	Median 2	87
	4.185		3.9
CV 1	Homogeneous	CV 2	homogeneous
Independent t-test			6.457
Significance threshold			p < 0.0005 / p < 0.001
Standard deviation			3.704
Effect value – ES			2.358 – high ES

The content of the questionnaires tracks the subjects’ readiness for effort in order to maximise their own performance in the training process and competition, under the available conditions and resources.

The conclusions drawn from the analysis of the results provided by the summarised data of the two questionnaires were the criterion for dividing the tested subjects into four categories with specific readiness for effort (Table 6).

Table 6. *Summary table – Analysis of athletes’ opinions*

No.	Category	Score	Percentage
1	Performance	96-106 points	20%
2	Extended team	86-95 points	60%
3	Grassroots sport	75-85 points	20%
4	Leisure	< 75 points	0

Subjects in the “Performance” category are suitable for group training, have the ability to self-motivate to reach their objectives, are less sensitive to the training conditions, are determined to provide sustained effort to achieve performance, follow the safety rules and take no unnecessary risks. They have an appropriate attitude towards achieving performance (Slijper et al., 2016), which makes them favourites to form both the experimental group within the study and the group participating in competitions. They need coaching to maximise their performance (Witmore, 2017).

Individuals falling into the “Extended team” category need attention and training advice because they allow their fears to intervene in achieving success. They also need coaching in setting goals and identifying their problems, as well as coordination in their training activity.

Athletes falling into the “Grassroots sport” category have an acceptable motivation and can be included in the pentathlon group but need special attention from the coach and carefully planned coaching. They can only be part of the group if they go beyond their limits, possess a very good level of motor skills required for naval pentathlon and record an increase in their self-motivation ability. We consider that subjects in this category cannot be part of the naval pentathlon group even if their motor level is high. Their very low interest in performance brings the group’s sport activity to the level of a leisure activity, with no interest in achieving performance.

Statistical processing of the data resulting from the selection (see Table 4 and Table 5) gave us the opportunity to make a concrete comparison of the performance recorded by the two groups. It has also confirmed the research hypothesis that selecting the representative team on the basis of athletes’ motor performance, attitude towards and motivation for performance is necessary and efficient.

## Conclusion

As a result of the selection process, we identified the group of 15 athletes who met the conditions of having good motor skills and an optimal attitude towards the preparation for performance within a rigorously planned training system, with coaching sessions designed to facilitate the maximisation of their performance. The research hypothesis, according to which the selection process for the naval pentathlon team requires tests that aim at the motor skills of athletes but also their motivation for and attitude towards performance, will be confirmed



in a study conducted over a period of 5 months, having as subjects the athletes resulting from this selection.

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