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THE EFFICIENCY OF TRAINING PLANNING IN AMPHIBIOUS CROSS-COUNTRY RACE

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Abstract
The efficiency of training planning for students' naval pentathlon team (mens) during a macro cycle is a very important factor for the sportive training in the amphibious cross-country race.
There was a lot of scientific and public discussion during the International Naval Championships annual edition on upper performance of amphibious cross-country race results. In this respect, the goal of this research is to analyses the team competition amphibious cross-country race participation results in 2012 International Military Naval Pentathlon Championships, Tusla, Turkey, after the macro cycle implementation model and before the 48th World Military Naval Pentathlon Championship, Berga, Sweden. The proposal of our study was to identify the dynamic statistic results after applied our macro cycle program (6 month). The subjects of this study were top-level 6 swimmers (20 years old) in Naval Academy "Mircea cel Batran", Constanta, Romania. After the statistic treatment we can determined the group average that shows significant difference between initial and final test. Highly significant differences were found between initial test and final test for each study parameters (all $p< 0.01$, n-1, Student Test, Fischer table). The statistical results of the experimental study led to a new coaching conception for the Navy Romanian team in amphibious cross country race. In our research the statistical treatment has demonstrated the significantly different between initial and final test. In that respect the comparative analyses in the amphibious cross-country event (start and run, shooting, running before water passage, water passage with rubber boat, and running before grenade throwing, finish) confirm the efficiency of training planning.
Key words: amphibious cross country, efficiency, training planning

Introduction

Naval Pentathlon is a military sport, wish started in Italy in the year of 1949 by the Italian Navy (www.forsvarsmakten.se). It was originally the Italian assault divers who started to train the different sports that today are included in the Naval Pentathlon. At the time, the sports creator conceived the idea of organizing a sport competition (Kirwan, J.P., Costill, D.L., Flynn, et al., 1988) for the navy to train and test the physical fitness and improves the general condition of the naval recruits.
The sport today is international and open equally for men and woman athletes.
Naval Pentathlon has five disciplines:
Obstacle race (305 meters) with 10 obstacles
Lifesaving swimming race (75meters) with 5 separate features with working dress
Utility swimming race (125 meters) with 6 separate features with swim-fins
Seamanship race (270 meters) with 7 separate features

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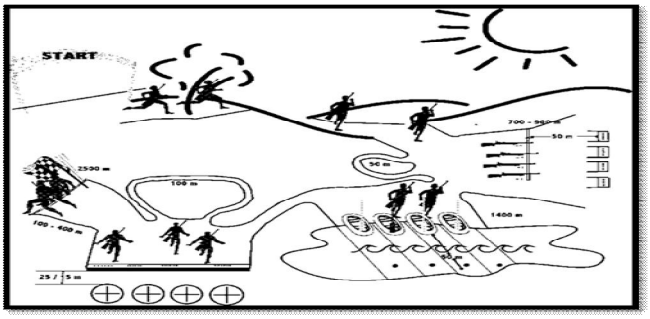
with land work and slalom rowing around buoys
Amphibious cross-country race (2500 meters) with 5 separate features with 50 meters shooting, 100 meters water passage paddling, 25 meters grenade throwing
Each competitor has to compete in all five disciplines wish demands an all-around physical training. Naval Pentathlon is considered as the ultimate fitness test for naval personal (Flyn, M. G., Pizza, F.X., Boone, J.B., 1994).
Naval Pentathlon is an individual, male and female, competition consisting of the following five events: obstacle race; lifesaving swimming race; utility swimming race; seamanship race; amphibious cross-country race. An "Individual champion" is determined by the overall result in the five events (Maglissho, E.W., 1993). The team champion is determined by adding the individual results of a country's team. The regulations prescribe the way a CISM (International Council of Military Sports) military world championship shall be conducted (CISM Regulations, 2009). I'm present in the next principal characters about 5nd event in naval pentathlon: amphibious cross-country. In this race (Appendices 1) the competitor shall perform in five (5) different features *(start and run, shooting, running before water passage, water passage with rubber boat, and running before grenade throwing, finish)*.
The race shall take place in a location with suitable topographic conditions near a shooting range, bay, river or basin (Appendices 5.). The distance shall be 2500 m, including the paddling (without considering the distance of the penalty-run). In our research we want to present in the first step some general rules of the amphibious cross-country race (table 1).
Course markers shall properly mark the track at least every 100 m. Left and right turns should be clearly indicated. The track shall be placed on easily run ground e.g. hard earth/sand, grass, concrete or asphalt. No sharp (distinct) curves (>90°) or climbing hills (30%) are allowed (Appendices 2).
The dress for male competitors is optional competition dress and working dress (See sketch). The competitor's clothing shall be given to him just prior to his turn in this race. The use of a web belt shall be optional. The dress and equipment a competitor starts with must be worn/carried until the race is completed (e.g. if a competitor starts with shoes, he must complete the race with shoes).
Each male competitor shall carry a dummy-rifle during the race. It shall weigh about 3 kg and will be supplied to all the competitors by the sponsoring nation (Appendix 3). The rifle carried by the competitor shall not be used for the shooting feature of the race. The rifle can be carried by hand or slung over the shoulder without additional lashings to the body. No additional lashings also mean no additional padding may be added to the rifle. If the rifle provided to the competitor has a sling break, the competitor may accept no additional help from anyone (Appendices 4).

Table 1. Amphibious cross-country race



Amphibious cross-country race included 5 features (Naval Pentathlon Regulation, 2009) [1]:
Feature No. 1 - *Start*
Characteristics - Starting line drawn on the ground. Competitors shall receive the (dummy) rifle before the start of the race in ordered.
Conditions - Start and run.
Feature No. 2 - *Shooting.* Distance from the start at least 700 m, maximum 900 m. A flat platform for shooting, without support for the rifle.
Characteristics - A rifle (secured and not prepared for shooting), one magazine loaded with five cartridges, checked by the responsible of the rifle range (not loaded in the rifle) and three extra magazine with one cartridge in each magazine. All prepared (by a team-member) at the shooting range. There will be five targets per competitor. The targets are made of metal and functions as those used in the "Olympic Biathlon Competition". The diameters of the targets are 11.5 cm. The coach or team-member may prepare the rifle and make test shots but must not disturb any competitor. No assistance to the competitor shall be permitted during shooting.
No physical support (e.g. sandbags, boxes, bars) may be used other than provided by the sponsoring nation.

The sponsoring nation or team-member shall make a stand-by rifle available. The rifle must be secured and without a magazine/cartridge.

Condition - Shooting shall be performed from the prone position. All targets must be hit. Load the rifle with the magazine. Unsecured the rifle and shoot at the targets. If needed, reload the spare rounds one by one. Secure the rifle after completing the shooting.

If a competitor expends all his cartridges (1 magazine with 5 cartridges and three extra ones) and has not hit all the targets there will be a penalty of 50 m running per each target not hit. A judge will control the number of penalty rounds.

Feature No. 3 - *Water passage with rubber boat.* Distance from the start - at least 1500 m, maximum 1700 m.

Characteristics - Rubber inflatable boat of standard (not a one man rescue boat) type for one or two man with a single paddle. Length of course is a total of 100 m (female and male).

Condition - The boat shall be beached approximately 1 m from the water line and must be put in the water by the competitor. The competitor must take the passage with his rifle. Free-style rowing is allowed, as long as the paddle is used.

The start and finish of the water passage are marked. The boat and paddle shall be pulled up completely onto the beach or platform by the competitor after the paddling. The paddle may be left inside the boat. No assistance shall be permitted.

Feature No. 4 - *Grenade throwing* (Appendices 4). Distance from the start is at least 2100 m, not more than 2400 m.

Characteristics - Circular ring made of metal 5 cm in height and with a diameter of 2.00 m. The ring shall be placed on the ground with 25.00/15.00 m from the throwing barrier. The ring must be filled with a material (e.g. sand) which indicates a hit. The number of grenades a competitor can throw is up to six (6). The throwing barrier is approximately 200 x 10 x 10 cm. The grenades are placed on that barrier, in a fixed way, by the organizer (see sketch Obstacle Race No. 5).

Condition - The competitor throws the grenades so as to hit within the target ring. Hitting the ring does not constitute a hit, unless the grenade falls into the target area. Grenades shall be thrown over the shoulder one after another. For male competitors the rifle shall be kept by the competitor, either in his hand or slung over his shoulder. At no time shall it be placed, dropped or thrown on the ground.

The competitor will throw grenades from the barrier. Touching the barrier with the foot is permitted, but the competitor must not step on the barrier during grenade throwing (see sketch to Obstacle No. 5).

After hitting inside the ring the competitor continues running to the finish line.

If the competitor fails to hit inside the target with one of the six (6) grenades there will be a penalty of 100 m running. A judge will control the penalty rounds.

Feature No. 5 – Finish. Distance from the start is 2500 m. The finish line will be placed at least 100 m and not more than 400 m from the hand grenade throwing.

Characteristics - A finish marked with two posts and a finish line.

Condition - Pass the finish line. The final time shall be taken the moment the competitor crosses the finish line.

The description of components of experimental design:

Organization:

Research purposes: if we followed the preparation of amphibious cross country race becomes effective at all times proof by applying specific methods and training.

Hypothesis: it is assumed that the composition and the application of specific algorithmic system for the amphibious cross country, during a macro cycle will be efficiently into the planning for the training process

Objectives:

1. Study of theoretical concepts and practical experience of specialists in addressing the issue of streamlining the process
2. Study the parameters who give us the level of training for each stage of amphibious cross-country
3. Develop a training macro cycle to efficiently the training process
4. Theoretical considerations and experimental methods and means to streamline the process of preparing
5. based on the analysis and statistical processing model of research results confirm the efficiency of the training preparation

Experimental design used in practical design research

Research subjects, venue and stages of research:

Stage I includes bibliographic study of all authors in the literature of the field. This phase lasted from 15 March to 15 June 2011.

Stage II of lasted from 20 June to 20 October 2011 in which we chose research subjects. The subjects of this study were top-level 6 swimmers (20 years old) in Naval Academy "Mircea cel Batran", Constanta, Romania.

They were selected (after the commission selection process) from 250 students. Also at this stage we applied initial testing.

Stage III corresponded to period 25 October 2011 - 20 April 2012 which was designed and implemented new program designed to increase the efficiency of training process in amphibious cross-country. Also during this period, in the end they were applied again batteries of tests (final testing).

Experimental study approach

Methods

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The subjects of this study were top-level 6 swimmers (20 years old) in Naval Academy "Mircea cel Batran", Constanta, Romania.
They were selected (after the commission selection process) from 250 students. The method of developing a theoretical training macro cycle is as started below:
1. The technical elements of the 5th future amphibious cross-country race were analyzed based on an advanced swimmers technique.
2. Propose the coaching theory of the lifesaving race in coaching theory, the goal of coaching, coaching contents for every mezzo cycle, coaching materials and coaching program which was described in the process of coaching.
3. Make the coaching program which was described in the process of coaching.
4. Coaching program implementation in the macro cycle period.
Our study has 2 stage of testing (the first one – initial testing applied before the macro cycle implementation in the training program – and the second- final testing – after the experimental study and before the 48th World Military Naval Pentathlon Championship, Berga, Sweden. We made the final testing in according with five (5) different features *(start and run, shooting, running before water passage, water passage with rubber boat, and running before grenade throwing, finish)*.
For naval pentathlon we have allocate preparation and competition models specific all features. From this idea we propose a scientific program allocated in macro cycle. This macro cycle included five mezzo cycles: *Introductive mezzo cycles*: 01 October – 29 October - 4 weeks; *Remaking introductive mezzo cycles*: 30 October – 11 December - 6 weeks; *Base mezzo cycles*: 12 December – 12 March - 14 weeks; *Below contest mezzo cycles*: 13 March – 3 April – 3 weeks; *Contest mezzo cycles:* 4 April – 13 April - 2 weeks (table 2).
A coaching program [4], in fact a amphibious cross-country macro cycle training for 6 months, that subjects were able to learn a systematic technique tactics for the 5 features amphibious cross-country race was made. Table 2 shows the quantitative characteristic of the students' activities before and after applied the proposal program, in fact 105 hours for 5 mezzo cycle that: *Introductive mezzo* cycles - 12 hours; *Remaking introductive mezzo cycles* – 24 hours; *Base mezzo cycles* – 56 hours; *Below contest mezzo cycles* – 9 hours; *Contest mezzo cycles* – 4 hours.

Table 2. Coaching program for the Romanian naval student's team for amphibious cross-country race in the macro cycles period

Mezzo cycles		Introductive mezzo cycle	Remaking introductive mezzo cycle	Base mezzo cycle	Below contest mezzo cycle	Contest mezzo cycle	Total
Weeks		4	6	14	3	2	**29**
Nr. training /week.		8	8	10	8	5	
Total training/mezzo cycle (hour)		32 (64)	48 (96)	140 (280)	24 (48)	10 (20)	**254 (508)**
Start and run	Nr. our total obstacle race (weeks).	4	3	5	4	2	
	Total hour/ mezzo cycle	**16**	**18**	**70**	**12**	**4**	**120**
Shooting	Nr. our total lifesaving race (weeks).	3	4	4	3	2	
	Total hour/ mezzo cycle	**12**	**24**	**56**	**9**	**4**	**105**
Running before water passage	Nr. our total utility swimming race (weeks).	3	2	3	4	1	
	Total hour/ mezzo cycle	**12**	**12**	**42**	**12**	**2**	**80**
Water passage with rubber boat	Nr. our total seamanship race (weeks).	4	4	5	4	2	
	Total hour/ mezzo cycle	**16**	**24**	**70**	**12**	**4**	**126**
Running before grenade throwing	Nr. our total amphibious cross-country race (weeks).	3	4	2	3	2	
	Total hour/ mezzo cycle	**12**	**24**	**28**	**9**	**4**	**77**

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In table number 3 we shows the results comparative analyses in the amphibious cross-country event between the students team member in the initial and the final test. After the registration we made the statistic treatment (table 4) on the following statistical parameters: average, coefficient of variation and significantly different. Concerning the results obtained we develop the interpretation of our results.

In start and run, for initial testing average was 185 sec., and the final of 175sec. Mean difference between final and initial testing of 10 sec., and coefficient of variation for both tests is homogeneous. Calculating the significance of the average on final test there was a significant difference t = 17,321 p <0,01.

In shooting, for initial testing the average was 34 sec., and 26sec. on final testing at the mean difference between final and initial testing is 8sec., and the coefficient of variability of both tests is homogeneous. Calculating significance of difference between the average experimental group there was a significant difference t = 18,891 to p <0,01.

In running before water passage for initial testing average was 160sec., and the final of 152sec. Mean difference between final and initial testing of 8sec., and coefficient of variation for both tests is relatively homogeneous. Calculating significance of difference between the average there was a significant difference t = 7,171 p <0.025, from initial testing to final testing.

For our team **water passage with rubber boat,** initial testing average was 72sec., and 58sec., final at the mean difference between final and initial testing of 14sec., and the coefficient of variation in initial testing is homogeneous and the final is not homogeneous. Calculating the significance of the average there was a significant difference t = 29,493 to p <0,01.

As shown in table 4**, running before grenade throwing** for initial testing group average was 120sec., and at the end of event the average was 102sec. Mean difference between final and initial testing was 18sec., and the coefficient of variation is inhomogeneous on the initial test, and the final is relatively homogeneous. Calculating the significance of the average there was a significant difference t = 16,195 to p <0,01.

Grenade throwing for initial testing group average was 35sec., and at the end of was 28sec. Mean difference between final and initial testing of 7sec., and coefficient of variation for both tests is inhomogeneous. Calculating the significance of the average results group there was a significant difference t = 15,038 to p <0,01.

For our subjects **finish event** has 96sec., the average on initial test and 87sec., on final test. The coefficient of variation in initial testing is inhomogeneous, and the final is relatively homogeneous. Calculating the significance of the average on the final test there was a significant difference t = 22,407 to p <0,01.

Table 3. Comparative analyses results in the amphibious cross-country event

Nr.	Name	Parametric	Initial test	Final test
1	A	**Start and run (sec.)**	**179.0**	**168.0**
	B		**181.5**	**173.5**
	C		**185.0**	**175.0**
	D		**186.0**	**177.0**
	E		**184.5**	**172.5**
	F		**194.0**	**184.0**
2	A	**Shooting (sec.)**	**31.5**	**24.2**
	B		**33.2**	**25.7**
	C		**34.0**	**26.0**
	D		**36.1**	**26.5**
	E		**35.8**	**27.0**
	F		**33.4**	**26.6**
3	A	**Running before water passage (sec.)**	**158.3**	**149.7**
	B		**159.5**	**150.2**
	C		**160.0**	**152.0**
	D		**163.5**	**153.7**
	E		**164.9**	**155.2**
	F		**153.8**	**151.2**
4	A	**Water passage with rubber boat (sec.)**	**70.3**	**56.8**
	B		**71.1**	**57.0**
	C		**72.0**	**58.0**
	D		**73.4**	**58.6**
	E		**74.5**	**59.0**
	F		**70.7**	**58.6**

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5	A	**Running before grenade throwing (sec.)**	**117.9**	**100.1**
	B		**119.6**	**101.2**
	C		**120.0**	**102.0**
	D		**122.3**	**102.9**
	E		**124.6**	**103.3**
	F		**115.6**	**102.5**
6	A	**Grenade throwing (sec.)**	**33.9**	**26.5**
	B		**32.8**	**24.7**
	C		**35.0**	**28.0**
	D		**35.7**	**28.2**
	E		**36.6**	**29.4**
	F		**36.0**	**31.2**
7	A	**Finish (sec.)**	**93.2**	**85.0**
	B		**95.6**	**86.1**
	C		**96.0**	**87.0**
	D		**97.7**	**88.0**
	E		**98.2**	**88.1**
	F		**95.3**	**87.8**

Grenade throwing for initial testing group average was 35sec., and at the end of was 28sec. Mean difference between final and initial testing of 7sec., and coefficient of variation for both tests is inhomogeneous. Calculating the significance of the average results group there was a significant difference $t = 15{,}038$ to $p < 0{,}01$.

For our subjects **finish event** has 96sec., the average on initial test and 87sec., on final test, like in the Maglissho, E.W., (1993) study.

The coefficient of variation in initial testing is inhomogeneous, and the final is relatively homogeneous. Calculating the significance of the average on the final test there was a significant difference $t = 22{,}407$ to $p < 0{,}01$.

Finally the comparative analyses results in the amphibious cross-country event evidence in the end of testing a significantly different then total, $t = 19{,}339$ to $p < 0{,}01$. In our study we have applied the same psychological methods in succesive days for obtaining the intensive training like Kirwan, J.P., Costill, D.L., Flynn, M. G., Mitchel, J. B., Fink, W. J., Neufer, P.D., in 1988.

Figure nr. 1 illustrates a highly significant influence of training macro cycle on balance performance. The group average shows significant difference between initial and final test like follow: 10 sec. recovered for start and run feature; 14 sec. recovered for water passage with rubber boat on feature; 7 sec. recovered for grenade throwing; 9 sec. recovered for the finish recovery. Highly significant differences were found between initial test and final test for all study parameters (all $p < 0.01$, n-1, Student Test, Fischer table).

Table 4. Amphibious cross-country

		Start and run (SR) (s.)	Shooting (S) (s.)	Running before water passage (RBWP) (s.)	Water passage with rubber boat (WPRB) (s.)	Running before grenade throwing (RBGT) (s.)	Rrenade throwing (GT) (s.)	Finish (F) (s.)	Totals (T) (s.)
Initial testing (IT)	M±SD	185±5,109	34±1,726	160±3,946	72±1,649	120±3,174	35±1,421	96±1,801	702±13,115
	CV (%)	2.762	5.076	2.466	2.29	2.645	4.06	1.876	1,868
Final testing (FT)	M±SD	175±5,339 †	26±0,994 ‡	152±2,112 ▲	58±0,912 ▼	102±1,183 ◄	28±2,253 ►	87±1,238 ↑	628±11,735 ■
	CV (%)	3.051	3.823	1.389	1.572	1.16	8.046	1.423	1,869

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† significantly different then SR, initial testing, t=17,321, p<0,01;
‡ significantly different then S, initial testing, t=18,891, p<0,01;
▲ significantly different then RBWP, initial testing, t=7,171, p<0,01;
▼ significantly different then WPRB, initial testing, t=29,493, p<0,01;
◄ significantly different then RBGT, initial testing, t=16,195, p<0,01;
► significantly different then GT, initial testing, t=15,038, p<0,01;
↑ significantly different then F, initial testing, t=22,407, p<0,01;
▪ significantly different then T, initial testing, t=19,339, p<0,01;
s, seconds.

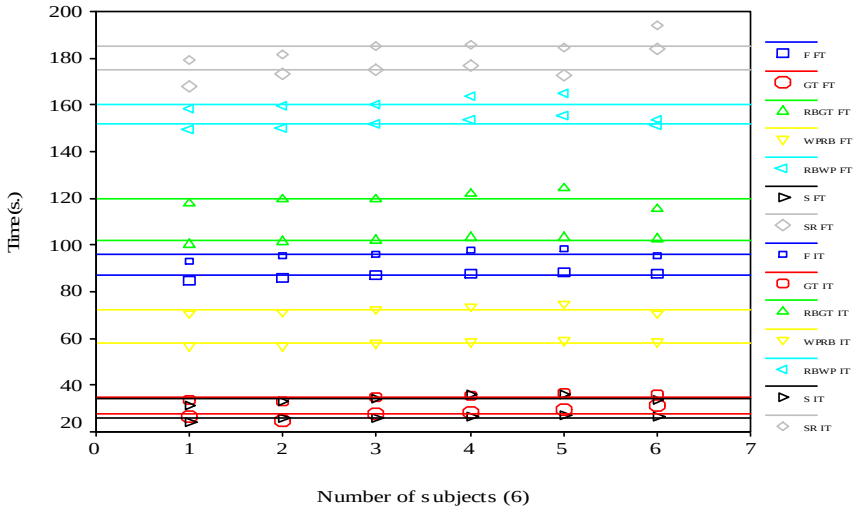

Figure 1. Individual values and mean times for each segment of Amphibious Cross-Country in final testing (FT) and initial testing (IT). Legend: SR, start and run; S, shooting; RBWP, running before water passage; WPRB, water passage with rubber boat; RBGT, running before grenade throwing; GT, grenade throwing; F, finish; s, seconds.

Conclusions

The present study provides the new data to reinforce the conceptual distinction between the naval pentathlon events. Obtained data suggest that the macro-cycle model in the amphibious cross-country race was used rational in the optimal weeks and hours/weeks for training in two directions (technical and tactical ways). The statistical results of the experimental study led to a new coaching conception for the Navy Romanian team. We can appreciate in this case the training program because in 2012 of the International Military Naval Pentathlon Championships, Tusla, Turkey (before the 48th World Military Naval Pentathlon Championship, Berga, Sweden), our team has occupied 3rd place in the general race classifications system.

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