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Original Article

Dynamic aspects of the training effort of canoe kayak

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Abstract
Identify the main objective dimensions of effort dynamics (volume, intensity, complexity, density, hardness) and their programming conscious during training cycles to achieve a fit and maximum performance capacity growth. Dynamic monitoring effort during training cycles to achieve a fit and maximum performance continued growth in capacity. We conclude that the evolution of performance plays a major effort dynamics. The novelty, the originality of the thesis is at the level of applied research, just implement the principles of programming and control athletes performance training and prove the effectiveness of this approach, the purpose of impact on the effort and default parameters on the growth dynamics of sport performance.
Keywords: controlled driving, dynamics effort, monitoring, telemetry.

Introduction

Management and control of dynamics are high effort activities that require professional competence of deep understanding of the phenomena and especially the precision and rigor of the whole process of preparation and competition took place.

First of all it is necessary to define and delineate the concept of dynamic effort. For this purpose we note that very few works presents and develops this concept. However, lately many authors (T. Bompa, A. Nicu, D. Colibaba, A. Dragnea, S.Teodorescu, ş.a) define and delimit this concept, in their work these authors put out the following aspects:

Dynamic effort means "proportion of volume, intensity and complexity", this proportion should be understood as a manifestation of qualitative and quantitative factors training (physical training, technical training, tactical training, theoretical training and psychological training).

Another definition of somewhat similar effort, growth is "the ratio between permanent variable volume, intensity and parameters complexity requests (physical, physiological, mental, power, etc.) provided by sportsmen during some period shorter or longer training and competition" (D.Colibaba, I.Bota 1998, pag.252).

The same authors state that "these request body parameters (volume, intensity, complexity, denistate, hardness) are challenged, schedule and route the unaware on the route and indestructible: cyclic gearing in effort-effort itself-fatigue-recovery, which propagates in the form of small waves at microctructural scale that turn into large waves at macrostructural scale".

Scientific management is the main reserve of the progress and the process of sports preparing and with the following requirements:

use the computer as a tool for objectification and programming of dynamics effort

mathematical data processing, computer simulations, analysis of a large number of indicators-interdisciplinary task in the team of technicians

storage and interpretation of scientific data

Research purpose

Identify the main dimensions of the growth effort (volume, intensity, complexity, density, hardness) and conscious during their programming cycles of training in order to achieve maximum growth and form sporting performance capacity.

Monitoring effort during the growth cycle of training in order to obtain maximum growth shape and sports ability of continuous performance.

Objectives of the research

To establish the current status of knowledge of the theme reflected in the literature and in the work of scientific research.

Identification of the dimensions of the model contest: total duration, heating, prestart moods, intensity, frequency, the effort of paddling, performance, recovery, environmental conditions.

The documents and instruments for assessing the dynamics of effort (quantitative indicators, qualitative tests, samples)

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Evaluation of initial stage of preparation of the athletes selected in the national squad
Drafting and preparation of documents on programming cycles (Olympic, annual, macro-meso-micro-cycles, lessons, training units).
Monitoring (monitoring and control) the dynamics of the scheduled effort for the national tour.

Premise of the research

The interdisciplinary nature of research effort involves the dynamics of teamwork and unmistakable in all decisions made in terms of volume, intensity and timing of the density have been taken in the light of the information received from the doctor, psychologist, nutritionist, IT expert, which were part of the technical team of the process of preparation of athletes linked in research.

Training process monitoring and control involves applications through exercises for volume, intensity, complexity, designed and implemented to produce changes in the body (controllable by operational feed back control, medical, mental capacity request) increase technical skills permanently and to conduct tactical psychic who together lead to increase capacity.

In conclusion the process of training and competition must become a mechanism headed towards maximizing capacity and performance of athletes. In this context, the act of driving requires continued correction or intervention (decision) which corrects a process that causes permanent changes of instructional objectives. Objective management involves the preparation of orientation to goals established and permanent trade levels to higher levels of training.

Research hypotheses

1. There is a balance and optimal combination of volume, intensity, complexity, density and intensity of effort which are scheduled in accordance with the requirements and principles of training, then the dynamics of the effort is directed towards achieving the shape certainly sports and maximum capacities increasing performance. At the same time, for the achievement of this aim requires objective means and techniques to monitor the dynamics of the effort during training cycles.
2. If the schedule and conduct to controlled growth effort can be achieved, then the operational strategy and training can be rationalized by handling independent variables: setting the priority of instructional objectives, programme content, the training time necessary training, incentives, apply the optimum density and toughness, the effort applied to forms of instruction used, the style of driving, training process to believe all these variable will lead to increasing quality and efficient training process took place.
3. Increase the intensity of the effort (one of the ways to maximise performance capacity) without increasing the volume of work may be carried out if:
    - Benefit from training exercises in the lessons of maximum speed, with rapid changes of situations, with the increase in the difficulties of coordination, with the introduction of additional psychological stresses, but maintain the gain of performance indicators;
    - Rational use of ranges and adequate recovery depending on the character and types of physical and mental stresses;
    - The introduction of objective assessment tools able to correct and to regulate, control and management effort to correct the dynamics of increasing performance capacity.

Organization and management of research

MONITORING EFFORT DYNAMICS DURING A YEAR OF TRAINING
Quantitative and qualitative annual summary
Indicators of quantity

INDICATORS / STEP	I	II	III	IV	V
No. calendar days:	36	41	28	36	28
No. weekly cycles	5	6	4	5	4
No. day training	29	25	20	30	23
No. competition day:	-	-	-	-	-
No. days of travel:	1	-	2	-	-
No. days off:	6	16	6	6	5
No. training:	127	100	73	114	95
Specific:	75	50	20	56	58
water:	75	25	-	34	54
Simulator:	-	25	20	22	4
nonspecific:	52	50	53	58	37
force:	26	25	20	30	22
running:	21	21	9	24	15

Skiing:	-	-	20	-	-
game:	5	4	4	-	-
No. training hours:	163,45	110,45	87	145,30	126,15
Specific:	91,30	57,30	20	73	72,45
water	91,30	37,30	-	51	68,45
Simulator:	-	25	20	22	4
nonspecific:	72,15	53,15	67	72,30	53,30
force	22,30	10,30	15	22,30	16,30
running	18,45	18,45	9	12	7,30
Skiing:	-	-	20	-	-
game	5	4	4	-	-
Different hours:	26	22	17	38	29,30
Hours directed recovery**:**	28	25	20	30	22
Control samples: Specific **:**	2	4	3	4	4
Test 6000 m -	2	1	1	1	1
Medical examination --	1	-	-	-	-
Competition verification **-**	-	-	-	-	-

Group of kayak mens

Stage	**I**	**II**	**III**	**IV**	**V**
Group of kayak mens					
No.of paddleing Km	924	570	220	656	707
water	924	426	-	480	698
Simulator	-	144	220	176	32
Force resistance tons displaced	500.24	693,6	601,6	940	752
Force speed– tons displaced	119,4	128	224	360,6	288
running – **Km**	126	126	72	144	90

Stage indicators

INDICATORS / STEP	**VI**	**VII**	**VII**	**IX**
No. calendar days:	25	27	28	28
No. weekly cycles	4	4	4	4
No. day training	12	16	23	19
No. competition day:	8	6	-	4
No. days of travel:	-	2	-	2
No. days off:	5	3	5	3
No. training:	64	60	83	74
Specific:	35	34	49	42
water:	35	34	49	42
Simulator:	-	-	-	-
nonspecific:	29	26	34	32
force:	18	16	22	20
running:	11	10	12	12
Skiing:	-	-	-	-
game:	-	-	-	-
No. training hours:	82	75	108,30	95,15
Specific:	42,45	40,40	57	51,15
water	42,45	40,40	57	51,15
Simulator:	-	-	-	-
nonspecific:	39,15	34,15	51,30	44
force	13,30	12	16,30	15
running	5,30	5	6	6
Skiing:	-	-	-	-
game	-	-	-	-
Different hours:	20,15	17,15	29	23
Hours directed recovery**:**	22	15	22	24
Control samples: Specific **:**	2	2	4	6
Test 6000 m -	1	1	-	-
Medical examination --	1	-	-	
Competition verification **-**	2	2	-	Obiect.

Stage	VI	VII	VII	IX
Group of kayak mens				
No.of paddleing Km	392	424	528	432
water	392	424	528	432
Simulator	-	-	-	-
Force resistance tons displaced	285,6	189,6	331,8	165,9
Force speed– tons displaced	96	64	128	64
running – **Km**	55	50	60	60

Quality-Indicators

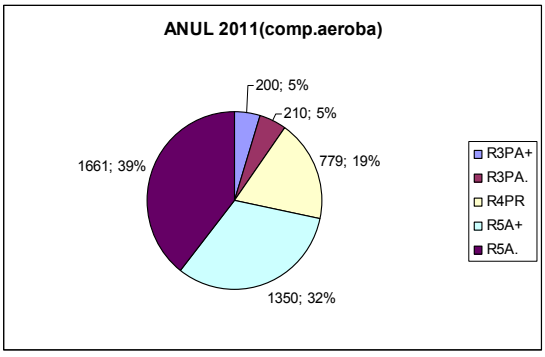
Stage	I		II		III		IV		V	
Intensity Gr.KayakB	**Km**	**%**	***Km***	**%**	**Km**	**%**	**Km**	**%**	**Km**	**%**
R 5	728,5	78,8	185,5	43,5	112,5	51,1	336	70	503,5	72,1
R 4	128	13,8	122	28,6	56	25,4	90	18,7	120	17,9
R 3	65	7,03	114	26,7	48	21,8	54	11,2	55	7,87
R 2	2,5	0,27	4,5	1,05	3,5	1,59	-	-	19,5	2,93
R 1	-	-	-	-	-	-	-	-	-	-

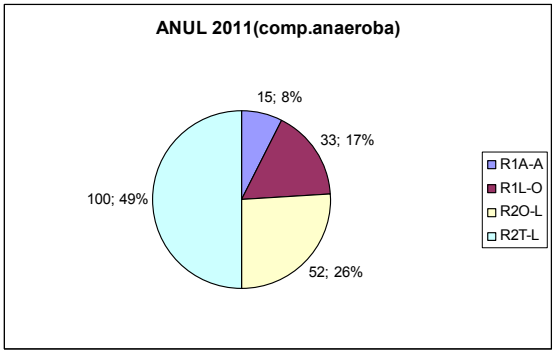
Stage	VI		VII		VIII		IX	
Intensity Gr.KayakB	**Km**	**%**	***Km***	**%**	**Km**	**%**	**Km**	**%**
R 5	268,5	68,4	76,55	82,1	399	75,5	337	78,0
R 4	58	14,7	52	12,2	56	10,6	54	12,5
R 3	53	13,5	33	7,78	44	8,33	22	5,09
R 2	8,5	2,16	7,9	1,86	17	3,21	10,5	2,43
R 1	4	1,02	6,5	1,53	12	2,27	8,5	1,96

Name intensities and their code

Level întensty.	Code	way the intensity (fizio- biochemical)
R1	R1A-A	Anaerob-alactacid
R1	R1L-O	anaerb-lactate oxygen
R2	R2O-L	anaerobic lactate oxygen
R2	R2TL	lactate tolerance
R3	R3PA+	aerobic power +
R3	R3PA	aerobic power
R4	R4PR	aerobic anaerobic skirts
R5	A+	aerobic resistance +
R5	A	aerobic resistance

Graphic distribution of intensities





The objective of this research was to capture the evolution over time of the dynamics of the effort (time, paddle frequency, heart rate), under different conditions (successive phases of training, non-specific tests, sample/1000 m/2000 m/6000 m) at athletes.

Evaluation of comparative test for the two groups: *the experimental group* and a *eyewitness group* or control. Both groups have been set up in six subjects, performance athletes involved in the National Tour of

Kayak. The control group was trained by traditional training program; in the case of experimental group was used in the preparation of programming and management strategy of controlled growth efforts, on the basis of overall operational projects and learning units.

Subjects were tested on vehicles a year in nine separate stages. At each stage the subjects have travelled a minimum of three samples: sample of 1000 m, 2000 m and the sample of 6000 m. Performance parameters were obtained under *specific training (water)* and *non-specific (simulator)*. Nonspecific tests were completed in stages II and III of the preparation of athletes. Have been obtained from more than one record for each topic in the same experimental stage or in distinct experimental stages. Also, records were obtained for the subjects belonging to different groups (experimental/witness). Therefore, the design was one of the joint research, both intrasubject and intersubject. In view of the very small volume of samples and deviation from normality for many distributions, we analyze the values of the parameters applied in the analysis of parametric tests for the values of rank (*Mann-Whitney*, *Friedman*). They have also been applied to statistical tests with multiple variants.

The results of the research

I pursued in research implemented highlighting the evolution of dynamics performance effort at understanding the athletes „dynamic effort "report established between parameters of volume, intensity and complexity of the applications provided by athletes during exercises/tests and I live by several *parameters*.

Time/ 1000 m and *paddling frequency/minute* represented a measure of the intensity of the growth effort. It was recorded also a physiological parameter with relevance for dynamic effort, namely *the heart rate*. Each stage of preparing the different *steps of the effortless* assumed and the flow dynamics has varied depending on the effort of these *steps*. Design research has been mixed, one for each parameter of the dynamics of the broadest effort both variation intrasubject (*repeated measurements*) and variance intersubject (*experimental group – group of control*). With the help of statistical tests for *repeated measures Friedman and Mann-Whitney for two independent* samples analyzed the evolution of each parameter of the growth effort within each stage of preparation and compared the two groups; he also studied the evolution both of these parameters on the stages of the preparation.

1. Parameter „time/1000 m"

1.1 Sample of 1000 m (steps of the effortless : : II, III, V, VI, VII, VIII, IX)

Analysis on the steps of the effortless

For both groups, the evolution of the values of the parameter was curved-line, with a progressive increase and reaching a peak at 600-800 tests m and subsequently decreasing. Within each group, the peak values were significantly different from the rest of the values in the range (Friedman, 0.05, p < for each step of effort). The two groups have differents between them in terms of the values of the parameter being analyzed, statistically significant differences (Mann-Whitney test; $p < 0.05$) for most substages (substages for all steps of the effortless II, III, V, VI, VII; most of the substages for the steps effort VIII and IX and to medium and total values (for all steps of the effortless). Descriptive statistics analysis (substages/medium/long "total") showed lower values for the experimental group, which equals better performance.

Analysis of the parameters development from the initial stage and final stage.

The distribution of the parameter "time" (total/average time) had a descending form (the upside performance) and similar for the two groups. In the early stages, the decrease was steeper for smooth control group and experimental group; from V, the two curves are parallel. For all steps of the effortless, registered by the experimental group were significantly lower than those recorded by the control group.

Exemplified by the evolution of the first and last stage of evidence supporting
The evolution parameter "time" in stage II (specific test – water 1000m)

Race	**Small stage**	**I** Descriptive statistical indicators				**Mann –Whitney U**	
		GE		**GC**		statistics **U**	**p**
		x	**std.**	**x**	**std.**		
K1 B 1000 m	100m	03:38	00:07	04:00	00:02	0,000	0,004
	200m	03:47	00:04	04:08	00:06	0,000	0,004
	300m	03:51	00:05	04:17	00:03	0,000	0,004
	400m	03:55	00:05	04:24	00:03	0,000	0,004
	500m	04:00	00:05	04:25	00:04	0,000	0,004
	600m	04:02	00:05	04:21	00:03	0,000	0,004
	700m	04:03	000:04	04:21	00:07	0,000	0,004
	800m	04:00	00:05	04:21	00:05	0,000	0,004
	900m	03:57	00:06	04:26	00:05	0,000	0,004
	1000m	03:52	00:04	04:16	00:05	0,000	0,004

The evolution parameter "time" in stage IX (specific test – water 1000m)

Race	Small stage	I Descriptive statistical indicators				Mann –Whitney U	
		GE		GC		statistics U	p
		x	std.	x	std.		
K1 B 1000 m	100m	03:31	00:01	03:46	00:01	0,000	0,004
	200m	03:34	00:01	03:47	00:01	0000	0,004
	300m	03:39	00:02	03:50	00:01	0,000	0,004
	400m	03:41	00:02	03:52	00:02	0,000	0,004
	500m	03:42	00:01	03:47	00:02	40,000	0,024
	600m	03:42	00:00	03:51	00:09	60,000	0,053
	700m	03:42	00:00	03:55	00:03	0,000	0,003
	800m	03:41	00:01	03:51	00:02	0,000	0,004
	900m	03:40	00:00	03:48	00:05	6,000	0,050
	1000m	03:37	00:00	03:47	00:01	0,000	0,004

1.2 Sample of 2000 m (steps of the effortless: I, II, III, IV, V, VI, VII, VIII, experimental group).

Analysis on the steps of the effortless

It was observed the same evolutionary line. Within the group, peak values were significantly different from the rest of the values in the range (Friedman, 0.05, p < for each step of effort). Descriptive statistics analysis ("lead time") showed lower values for the experimental group, which equals better performance (Mann-Whitney test, p 705 < for all steps of the effortless).

Analysis of the parameters development from the initial stage and final stage.

The distribution of the parameter "time" had a descending (values have increased slightly from stage I to stage II, but then fell gradually). Comparing the two groups in terms of "lead time" for the sample was noted a parallelism to all steps of the effortless. Constantly, medium values recorded by experimental group were significantly lower compared to those recorded by the control group.

1.3 Sample of 6000 m (steps of the effortless : I, II, III, IV, V, VI)

Analysis on the steps of the effortless

For both groups, the evolution of the values of the parameter was curved-line, with a progressive increase and reaching a peak at the tests of 3000-4500 m and subsequently decreasing. Within each group, the peak values were significantly different from the rest of the values in the range (Friedman, 0.05, p < for each step of effort). The two groups have different between them in terms of the values of the parameter being analyzed, statistically significant differences (Mann-Whitney test; p < 0.05) for most substages and average values and total (for all steps of the effortless). Descriptive statistics analysis (substages/medium/long "total") showed lower values for the experimental group, which equals better performance.

Exemplified by the evolution of the first and last stage of evidence supporting

The evolution parameter "time" in stage I (specific test – water 6000m)

Race	Small stage	I Descriptive statistical indicators				Mann –Whitney U	
		GE		GC		statistics U	p
		x	std.	x	std.		
K1 B 6000 m	500 m	03:59	00:03	04:12	00:06	0,500	0,005
	1000 m	04:06	00:05	04:19	00:02	0,500	0,005
	1500 m	04:14	00:06	04:29	00:05	1,500	0,008
	2000 m	04:21	00:05	04:33	00:08	4,500	0,029
	2500 m	04:26	00:05	04:39	00:06	2,000	0,010
	3000 m	04:27	00:08	04:43	00:05	1,500	0,008
	3500 m	04:27	00:06	04:40	00:06	2,000	0,010
	4000 m	04:27	00:08	04:47	00:04	0,500	0,005
	4500 m	04:28	00:08	04:41	00:09	5,000	0,037
	5000 m	04:25	00:08	04:35	00:06	5,500	0,045
	5500 m	04:22	00:09	04:26	00:07	14,000	0,519
	6000 m	04:17	00:06	04:17	00:04	16,500	0,809

The evolution parameter "time" in stage VI (specific test – water 6000m)

Race	Small stage	I Descriptive statistical indicators				Mann –Whitney U	
		GE		GC		statistics U	p
		x	std.	x	std.		
K1 B 6000 m	500 m	03:56	00:04	04:00	00:00	13,000	0,403
	1000 m	04:01	00:05	04:13	00:00	0,000	0,004
	1500 m	04:05	00:04	04:21	00:01	0,000	0,003
	2000 m	04:08	00:04	04:28	00:03	0,000	0,004
	2500 m	04:09	00:03	04:31	00:01	0,000	0,004
	3000 m	04:09	00:04	04:33	00:02	0,000	0,004
	3500 m	04:07	00:03	04:34	00:02	0,000	0,004
	4000 m	04:07	00:02	04:33	00:02	0,000	0,004
	4500 m	04:07	00:02	04:33	00:02	0,000	0,004
	5000 m	04:06	00:02	04:29	00:05	0,000	0,004
	5500 m	04:05	00:02	04:21	00:03	0,000	0,004
	6000 m	04:03	00:02	04:12	00:01	0,000	0,004

Analysis of the parameters development from the initial stage and final stage.

The distribution of the parameter "time" had a descending form. Parameter values have increased slightly from stage I to stage II, they met a plateau between the stages II and III, and then decreased gradually. Curve of distribution of values was parallel to the two groups, the only difference being that the transition from stage III to stage IV was more marked in the case of experimental group. The average registered by the experimental group were significantly lower compared to those recorded by the control group. Within each step, the effort has noticed an increase in time, reaching a peak and then decline. *Growth can be explained by the intervention of fatigue, exhaustion of energy resources. The decrease is due to the advent of incentives motivating factors and mobilization of resources in order to complete the proof, or switch from aerobic to anaerobic effort.*

Comparing the distribution of values for the three tests, we note the fluctuation of values between phases I-II (2000m) and III (6000m) and, in the latter case with a platter. As regards consistency between the time foreseen, and in all cases the accuracy calculated recorded very high values (between 0,96 and 1). The average time was achieved but constantly over international limits imposed in kayak-canoe.

Conclusions

From the analysis of the statistical data obtained, it can be concluded the following:

Customizing for each of the three parameters of the measure, the following observations can be made:

- as regards the time of realization of the samples: the average time for both groups of samples recorded a downward trend, which is tantamount to an improvement in performance; improving performance was significantly more pronounced for the experimental group;
- in terms of frequency of padling: the average time for both groups of samples has been an upward trend, which is tantamount to an improvement in performance; improving performance was significantly more pronounced for the experimental group;
- in terms of heart rate: in the case of experimental group noted a lower jitter values of this indicator within the same physical evidence (that were small variations in physiological limits). For the experimental group, have tended to follow the distribution of a linear form purporting to dynamics -a constant effort; the evolution of values has been declining gradually. For the control group, the cast had a sinusoidal oscillations with the sudden and sometimes declining growth. The variations in heart rate are lower, the effort is better (a variation of heart rate requires the body and central nervous system adjustment costs, energy consumption). The short sample (1000m), differences in heart rate between the two groups are not large, due to the characteristics of the physiological effort physically. Long samples (6000m), significant differences appear between the two groups, the higher values being recorded for the control group; This is because the sample involves anaerobic effort, and subjects in the experimental group is present a larger anaerobic effort.
- Dynamics parameters variation is explained in the effort by the effect of the independent variable at the same time. Thus, the evolution parameter "time/100m" is best explained by the effect of the interaction of the variables (sample * group * stage); the evolution of the parameter "padling frequency" is best explained by the effect of variables simultaneously (group * stage); the evolution of the parameter "heart rate" is best explained by the independent effects of main factors "test" (the type of effort that it requires: aerobic versus anaerobic) and "group".

- Interaction effects were statistically significant for time and padling frequency parameters; for heart rate, were considered the main factors effects (individual variables). In all cases, the coefficients were calculated by size of effect, yielding the high values, as well as low or average values. However, these results should be interpreted in the light of numerous factors, of which mention contextual variables, more difficult to control experimentally (physical, psychical conditions of samples) and primarily low volume of samples, which lowers the power of statistical tests (their ability to detect a real relationship between variables).
- We can conclude that in the performance, a major role it has dynamic effort. The element of novelty, originality of work is at the level of applied research, programming and implementation principles just control in training athletes performance and prove the effectiveness of this approach in the sense of the impact had on growth parameters and default effort on the growth of sports performance.

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