

## CLASSIFICATION OF THE TRAINING METHODS IN MOUNTAIN RUNNING

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(Original scientific paper)

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### Abstract

The current article analyses the methods for preparation in Mountain Running event in Athletics. A classification is proposed, based on the approach of the principles for specialized diversity in sports training by prof. Michail Buchvarov. The established methods are divided in three main groups – special, diversely-specialized and auxiliary. They are then arranged by their use in accordance with the complex factors of the sport achievement in Mountain Running and by sub-factors on three levels. The result is a classification that takes in consideration the sport-pedagogic factors and gives the opportunity to build models of the training of Mountain Runners.

**Key words:** mountain running, athletics, classification of training means, training models

### Introduction

In the methodic literature concerning the preparation for mountain running there is a wide variety of training means and methods that are recommended for the training of the athletes in these events (Завъляков К.В., Коновалов В.Н., 2014 [3]). According to us one of the ways to create an order in this diversity is the training methods to be interconnected with the factors that predefine the result in mountain running. In this aspect in a previous publication we have established that the sport achievement of the athletes in mountain running depends on three complex sport-pedagogic factors (Славчев, Ап., К. Кисъов, 2016 [8]). As it is shown in figure 1 the stage of development of the complex factors is defined from the level of hierarchically structured sub-factors of first, second and third level.

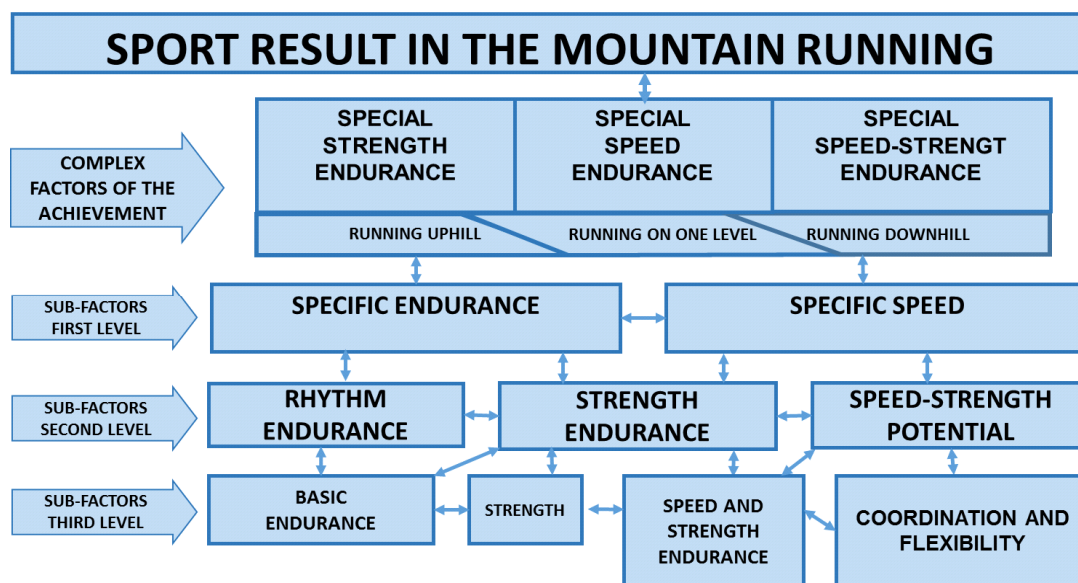


Figure 1. Hierarchical structure of the factors of the sport results in mountain running.

The approach in establishing this model of the achievement is based on the principles of the theory for specialized diversity in sports, created by prof. Michail Buchvarov (Бъчваров, М., 1982 [2]). Again from

that theory, the methods of training, according to their resemblance to the nature of the competitive movement activity in the performance of the different complex factors, are divided to special methods, diversely-specialized and auxiliary. They are arranged hierarchically to the criteria for similarity and difference by form and contents, to the main competitive movement.

The special training methods are analogical to the movement and activities in the manifestation of the select factor during the competitive run of the athletic event or part of it.

The diversely-specialized training methods are close to the special methods, but in their execution, considering the methodic task, they differ in tempo, amplitude, accent, acceleration, effort of execution of the movement, and the last can even be performed in different psychological or physiological conditions. This group also includes exercises that are performed in eased or hardened conditions, causing deviations relatively near the main motion habit and widening the mechanisms of motor control and the manifestation of the technique.

The auxiliary training methods are most different from the special methods. In their contents they model different separate moments, elements of the main exercise or affect specifically on the build of a base level of needed motor prerequisites for mountain running. Practically this group can include all the exercises for development of the motor abilities in local or regional aspect, as well as the organism as a sport system.

Our aim with the current research is to classify and differentiate the training methods in the preparation of mountain running athletes in the groups of special, specialized and auxiliary, according to the aim and effect of their application, regarding the factors of the sport achievement.

#### *Methods of research*

The object and the subject of the research are respectively the training activities for mountain running and the training methods, used by the athletes in mountain running.

To achieve our goal, a research was carried out which included:

1. Analysis of the scientific – methodical literature, related to the topic.
2. Analysis of training records of mountain runners, in order to reveal the nature of the training methods, used in their preparation.
3. Discussions with specialists, coaches and athletes in mountain running on the topics of diversity of training methods used in the preparation.
4. Defining the place of the training methods and the criteria for similarity and difference by form and contents to the main competitive exercise during the manifestation of a given factor.

#### **Analysis of the results**

Our study has confirmed the preliminary stated suggestion that there is a wide variety of training methods for the preparation of mountain running athletes. It also reveals the characteristics of the presented factors and sub-factors in the model of sport achievement opportunities created for that diversity to be classified in accordance with the effect of their purpose of application in the sport practice. In this way the training methods, depending to the parity of their nature and the effect of the motor activity to the competition manifestation of the different complex factors, were classified as special, diversely-specialized and auxiliary (table 1).

The special training methods, developing the complex factors of the achievement – special strength endurance (A), Special speed endurance (B) and special speed-strength endurance (C) are applied in conditions similar to the competitive motor activities. These are runs in conditions that correspond to the competition course with intensity close to the competitive, as the length and the number of runs are tailored to the profile of the competition course, for which the preparation is being aimed.

It is characteristic for those runs that they are conducted on slopes with different steepness in which the three forms of special endurance are manifesting. In another study of ours we have differentiated a total of 9 stages of these slopes (Кисъов К., 2013, 2014 [6, 7]). Four of them are about the complex factor Special strength endurance (A), depending on the steepness of the slope that the athlete runs against:

- 1<sup>st</sup> stage – running uphill a low steepness slope of about 4 degrees
- 2<sup>nd</sup> stage – running uphill a medium steepness slope of about 8 degrees
- 3<sup>rd</sup> stage – running uphill a high steepness slope of about 12 degrees
- 4<sup>th</sup> stage – running uphill an extreme steepness slope of about 16 degrees

There are three stages for the manifestation of the complex factor Special speed endurance (B) :

- 1<sup>st</sup> stage – running on a relatively level terrain
- 2<sup>nd</sup> stage – running downhill on a medium steepness slope of about -8 degrees

- 3<sup>rd</sup> stage – running downhill on a low steepness slope of about -4 degrees

There are two stages of steepness for manifesting the complex factor of special speed-strength endurance (C):

- 1<sup>st</sup> stage – running downhill on a high steepness slope of about -12 degrees
- 2<sup>nd</sup> stage – running downhill on an extreme steepness slope of about -16 degrees

In the sport practice there are 6 main training methods established to develop the special endurance in the long distance runs (Бонов, П., Бонова, И., Шаламанова, Д., 2013 [1]). When these methods are applied in the conditions of the aforementioned 9 stages of competitive slopes it is easy to define their purposeful effectiveness.

1. Aerobic developing running – running on 91-100% to the anaerobic threshold, with pulse rate of 140-160 bpm and lactate levels of 2-4 mmol. This workload stimulates the deployment of breathing processes and has an underlined effect of developing the aerobic abilities and improves the economy of running (Бонов, П., Бонова, И., Шаламанова, Д., 2013 [1]). The duration of such run is from 1 to 2-3 hours, as it may be applied as by the uninterrupted continuous method, as well as by the interval method, where the number of repetitions is up to 3-4.

Table 1. Distribution of the training means in accordance with the purpose of the effect of their application by factors and sub-factors of the achievement in the mountain running.

<b>Complex Factors</b>	<b>Conditions</b>	<b>Regime</b>	<b>Special Means</b>
A. Special Strength Endurance (SSE)	1. First stage – running uphill a low steepness slope of about 4 degrees	3.AAn – Mixed regime	1. Control competitive run 2. Rhythmic extensive (interval) running 3. Continuous variative running (Fartlek). 4. Intensive continuous run  5. Extensive continuous run 6. Aerobic developing running
	2. Second stage - running uphill a medium steepness slope of about 8 degrees		
	3. Third stage – running uphill a high steepness slope of about 12 degrees		
	4. 4th stage – running uphill an extreme steepness slope of about 16 degrees	2.A2 – Aerobic regime-2	
B. Special Speed Endurance (SSpE)	5. 1st stage – running on a relatively level terrain	2.A2 – Aerobic regime-2	
	6. 2nd stage - running downhill on a medium steepness slope of about -8 degrees		
	7. 3rd stage – running downhill on a low steepness slope of about -4 degrees		
B. Special Speed-Strength Endurance (SSpSE)	8. 1st stage – running downhill on a high steepness slope of about -12 degrees		
	9. 2nd stage – running downhill on an extreme steepness slope of about -16 degrees		
<b>Sub-factors 1st level</b>	<b>Conditions</b>	<b>Regime</b>	<b>Specialized means</b>
I.1. Specific endurance	10. Cross or mountain ground, similar to the competitive conditions (alleviated or burdened conditions)	3.AAn – Mixed regime	1. Control competitive run 2. Rhythmic extensive (interval) running 3. Continuous variative running (Fartlek). 4. Intensive continuous run
		2.A2 – Aerobic regime-2	5. Extensive continuous run 6. Aerobic developing running
I.2. Specific speed	10. Cross or mountain ground, similar to the competitive conditions (alleviated or burdened conditions)	3.AAn – Mixed regime	7. Interval – rhythmic intensive running 8. Repetitive running
<b>Sub-factors 2nd level</b>	<b>Conditions</b>	<b>Regime</b>	<b>Auxiliary means</b>
II.1. Rhythmic endurance	11. Leveled terrain	3.AAn – Mixed regime	1. Control competitive run 2. Rhythmic extensive (interval) running 3. Continuous variative running (Fartlek).

			4. Intensive continuous run
		2.A2 – Aerobic regime-2	5. Extensive continuous run 6. Aerobic developing running
II.2. Strength endurance	12. Diverse motor activity with burdening or in burdened conditions	3.AAn – Mixed regime	9. Running in burdened conditions (strength running) 10. Jumps and multiple jumps in burdened conditions 11. Exercises with weights and strength complex
II.3. Speed-strength potential	11. Leveled terrain	4.AnGl – Anaerobic glycolytic regime	7. Interval – rhythmic intensive running 8. Repetitive running 12. Speed-strength jumps and multiple jumps 13. Special running exercises
<b>Sub-factors 3rd level</b>	<b>Conditions</b>	<b>Regime</b>	<b>Auxiliary means</b>
III.1. Base endurance	13. Diverse conditions	1.A1 – Aerobic regime 1	14. Aerobic compensatory running 15. Aerobic supporting running 16. Other sports and games
III.2. Strength	13. Diverse conditions	5.An/Al – Anaerobic Alactate regime	11. Exercises with weights and strength complex 17. Short horizontal and vertical jumps 18. Throws with medicine balls, shot puts, etc.
III.3. Speed and sprint endurance	13. Diverse conditions	5.An/Al – Anaerobic Alactate regime	13. Special running exercises 19. Sprint runs 20. Reaction exercises
III.4. Coordination and flexibility	13. Diverse conditions	5.An/Al – Anaerobic Alactate regime	21. Running between cones 22. Walking and running on narrow railings 23. Walking on bands. 24. Balance exercises 25. Stretching exercises

2. Extensive continuous running – it is performed at the upper boundaries of the aforementioned aerobic development running, with pulse rate of 150-165 bpm (*Завьялков К.В., Коновалов В.Н. 2014 [3]*). These methods are part of the most effective for developing the aerobic abilities. It is accepted as a main building training in the basic mesocycles of the preparation stage.

3. Intensive continuous running – with intensity of workload of 101-110% of the anaerobic threshold and close to the level of maximal oxygen consumption. The pulse rate is 160-180 bpm and the lactate in the capillary blood is 4.5 – 7 mmol. The duration of the effort is 5 to 70 minutes with 1 to 6 repetitions and passive rest periods of 1 to 10 minutes. In such running with duration of over 1 hour probably the most important physiological index for the level of specific workability is manifested – the lactate steady state – sustainability in a high concentration of the lactate. It is used mainly in the special preparatory period, in the specialized mesocycles and in the stressful microcycles.

4. Continuous variative running (Fartlek). The intensity of the workload is periodically passing the anaerobic threshold, and this provokes the anaerobic processes and the increase of lactate concentration. As a result the compensatory mechanisms are deploying fully in the zones with low intensity (under the anaerobic threshold) in order to remove the currently accumulated lactate. This continuous alternation of work regimes increases the mobility of the aerobic processes. Despite the often crossing of the anaerobic threshold, the organism is in a relatively stable state and the workload of high qualified competitors can last to over 2 hours. On the other hand, this frequent change of the speed of running improves the intermuscular and inner muscular coordination. This is probably the most effective method for developing and improving the special endurance and the technique of mountain running.

5. Rhythmic extensive (interval) running. The pulse rate of each running distance is 170-180 bpm, and in the beginning of the new running distance it is 120-130 bpm. The lactate concentration levels are between 4.5 to 9 mmol. The duration of the separate runs is up to 10 minutes. The rest intervals are relatively short

– 45 seconds to 3 minutes – easy running with relaxed walking. In this workload the aerobic processes are deployed fully and the aerobic capacity is developed along with the capability to sustain maximal oxygen consumption for longer periods. It is used in the second half of the special preparation stage.

6. Control competitive run. It is characterized with the running of a single course with maximal intensity. The duration and length can, of the course, fluctuate from 1/3 up to the whole competitive model of the workload. The main purpose of this method is to introduce the athlete in a high sport condition.

The same runs, but performed in relatively relieved conditions of a cross-country or mountain field, simulating the competitive course, can be used as special training methods for developing the first level sub-factor Specific endurance.

To develop the other first level sub-factor Specific speed, two other types of running can be used as training means.

7. Interval – rhythmic intensive running. It is performed with a pulse rate of over 180 bpm and lactate of 8 – 12 mmol. The pulse rate in the beginning of the run should be under 120 bpm. The duration of each running is from 1 to 4-5 minutes, and the repetitions are between 3 and 15, combined with rest intervals of 3 to 5 minutes. The purpose of this method is to develop the anaerobic effectiveness of the running.

8. Repetitive running. The workload is maximal or close to the maximum intensity for the corresponding course. It is performed in 2 – 4 repetitions with 10-30 minutes rest. The duration of each of each running is from 3 up to 15-20 minutes. The pulse rate reaches maximum values, and the lactate concentration is over 12 mmol. This type of running sets high requirements to the main systems, that back the locomotor activity, setting the organism in extreme conditions of high oxygen deficiency. These methods are used mainly in the second half of the special preparation stage.

When the first 6 types of training runs are performed on leveled area, the effect of their application is related to the development of the second level sub-factor Rhythmic endurance, and the training methods are of auxiliary nature in the preparation for mountain running. The auxiliary methods for developing the second level sub-factor Strength endurance are characterized as follows:

9. Running in burdened conditions (strength running). It is characteristic for this type to run distances in sand, water or deep snow, to pull on a tire, sled or a partner, running with weights, etc. The pulse rate is above 170 bpm, and the lactate is around 7 mmol. It is used with the interval method in 3 to 10 runs with duration of 1 to 4-5 minutes and rest periods of 1 to 8 minutes.

10. Jumps and multiple jumps in burdened conditions and with intensity of over 60 second or until failure.

11. Exercises with weights and strength complex with duration of over 60 seconds or until failure.

The auxiliary methods for the development of the second level sub-factor speed-strength potential include the aforementioned interval-rhythmic intensive running and the repetitive running, but performed on a level terrain. To improve the same sub-factor, auxiliary methods can be used with duration of 4-5 minutes such as:

12. Speed-strength jumps and multiple jumps

13. Special running exercises

It is known that the combination of running and jump exercises are of great importance, because they affect the two main components of speed – the length of the step and the frequency (*Карабиџеров, Ю., Лазаров, Г., 1991 [4]*).

The auxiliary training methods, or developing the sub-factors of third level, are runs with low intensity, sprint runs, resistance runs, variety of jumps and multiple jumps, strength complex and exercises, different from those of the competitive mountain running, but supporting the achievement of the main goals of the training process.

The auxiliary training methods for developing common endurance are:

14. Aerobic compensatory running – it is performed with intensity of 75 to 80% of the individual anaerobic threshold. The pulse rate is between 100-120 bpm and is performed usually through distance methods on level terrain.

15. Aerobic supporting running – with speed that is at 80 – 91% of the anaerobic threshold, with pulse rate 120-140 bpm, as on a leveled terrain, as well as on cross country and mountain terrains.

16. Other sports and games – cycling, ski running, ski rally and other functional sports performed in aerobic state.

For developing the level of the sub-factor Strength the so called “general development” exercises with weights and strength complex – executing strength complex with significant resistance, engaging mainly

the leg muscles and the waist-hip area of the body. These are exercises with body weight, with weight bars (crouch, half-crouch, clean and jerk, etc.), springs, elastic bands, training apparatus, and other equipment with duration up to 30 sec. Also horizontal and vertical jumps, swing motions, bends and leans with the body and the extremities, throwing medicine balls, shot puts, etc.

The speed and the sprint endurance of the competitors of mountain running are developed with auxiliary training means – special running exercises and distance runs on different slopes and surfaces with submaximal or maximal effort and with the 20-25 seconds anaerobic-alactate state. This can be achieved by repetitive, interval, diverse and combined methods (Жалов, К., Бъчваров, Д., Лазаров, Г., 1978 [5]).

The perfection of coordination abilities and flexibility is achieved through a large variety of auxiliary training means, actively affecting the proprioception and the amplitude of movement. These are mainly stretching exercises and exercises for developing the dynamic stability. Running between cones, trechingxs, walking on bands, exercises with Pilates balls, games, etc.

### Conclusions

1. In the specialized literature the classification of the methods for preparation in the mountain running is missing.
2. The diversity of the possible training means in the mountain running is very extensive.
3. The suggested classification scheme of methods is taking in consideration all sport-pedagogic factors that affect the sport result of mountain running.
4. A prerequisite for developing a single term vocabulary is established, which is needed in the theory of the sport preparation in mountain running.
5. The established classification grants the opportunity to create models of distribution of the training methods for preparation in mountain running, related to the priorities in the development of the complex factors, defining the sport achievement in the competitive event.

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