THE RELATIONSHIP BETWEEN TRAIL RUNNING , RUNNING IN THE FOREST, THEMATIC ROUTES AND ORIENTEERING PERFORMANCES

Veronica MINOIU [1*]

[1] *Faculty of Physical Education and Sport,University of Craiova,156, Brestei Street, Craiova, 200207, Romania*

** Corresponding address: vminoiu@yahoo.com*

Abstract:**Objective**: In orienteering, elite athletes must run on different terrains at the highest tempo allowing them a race without mistakes that would lead to loss of time. This paper aims the correlation between athletic performance of athletes in orienteering and contest split time fluctuations against opponents in different areas of a competition aiming to keep or change the volume of training means according to results.

Methods: The analysis was conducted on statistical information in relation to 56 athletes components of Romania national team, in 2005-2006 season (to optimize physical training) and peculiarities of competitive training in July-August 2015 for eight athletes components of national teams. In the second period we analyzed the effects of using a group of training means in different areas during the competition period.

Results: The use, by the most representative athletes of the national seniors team, of a training program using similar means of training with those of their team colleagues but running mainly on paths led to half failures in competitions by technical errors and reducing the moving speed on most sections. In antithesis, athletes with lower experience obtained noticeable results using most of training means with a reduced percentage of jogging on paths.

Conclusions: Regardless of the elite athletes orienteering experience, around major competitions, the volume of training means used in the forest should not be reduced under certain limits. Predominant use of certain running on trails means, even assuming higher tempo than in the forest, reduces the competition running economy and does not necessarily lead to increasing of athletes performance regardless of the athletes competition experience.

Keywords: *Performance in orienteering, running on trails, running through the woods;*

1. Introduction

We may say that the results of an orienteering competition are given by the sequence of chess moves of the athletes in this sport, having their own body as a sole piece. Moving is guided by the way of thinking of each competitor on routes and it is a free choice but they have to mandatory pass through checkpoints set by the organizers on a board formed by the nature symbolized on the map. The travel time on a route is given by the athletic performance of each competitor.

For medium and long distance trials in orienteering competitions, elite athletes speed depends on the training of each competitor but running biomechanics is very important . Kevin C. Phillips, Matt A. Kilgas, Randall L. Jensen [1] demonstrate that the mere passage from road running to trail running (road running to trail running) produce changes in stride length by shortening it and developing agility and lateral movement. The difference between running biomechanics of elite orienteering people and amateurs was highlighted recently by Kim He´Bert-Losier, Laurent Mourot and Hans-Christer Holmberg in the research work Elite and Amateur Orienteers' Running Biomechanics on Three Surfaces at Three Speeds [2]. But what happens if elite athletes are preparing in the same way until the competition period and here they are changing dramatically the type of training ground?

In this paper we focus on the competition result of the athletes who have used the same running volume by the same type of training means but, during competition period, they have used two different environments: trails and woods. Until the last stage of the experiment, the athletes had a joint training. Many authors have studied the relationship between running speed and cognitive processes of orienteering - Cheshikhina V. V. [3], but athletes who have confirmed that they know when to change the tempo according to the technical difficulty of the area when they were passing through checkpoints, two months of reducing extra paths running can influence the result?

For the first period was achieved, for the combination of independent variables, coupled with dependent variables, a graphical analysis continued with regression method which involved the construction of regression linear models for each of the two dependent variables (the speed of trials completion) in combination with the group of independent variables and a free term.

All models have been tested in terms of validity by variation analysis (ANOVA) using the F-test and the result was that we are dealing with valid models.

2 Methods and data source

The source of the analyzed data set is represented by the measurements made by the coach and author Minoiu V. [4] which were done using the national sports teams of 2005-2006 of different ages and sex.

From the point of view of the age of sportsmen from the group analyzed, are mostly very young sportsmen (almost three quarters of them have at most 20 years old). From this point of view, the statistical detail can be followed in figure 1.

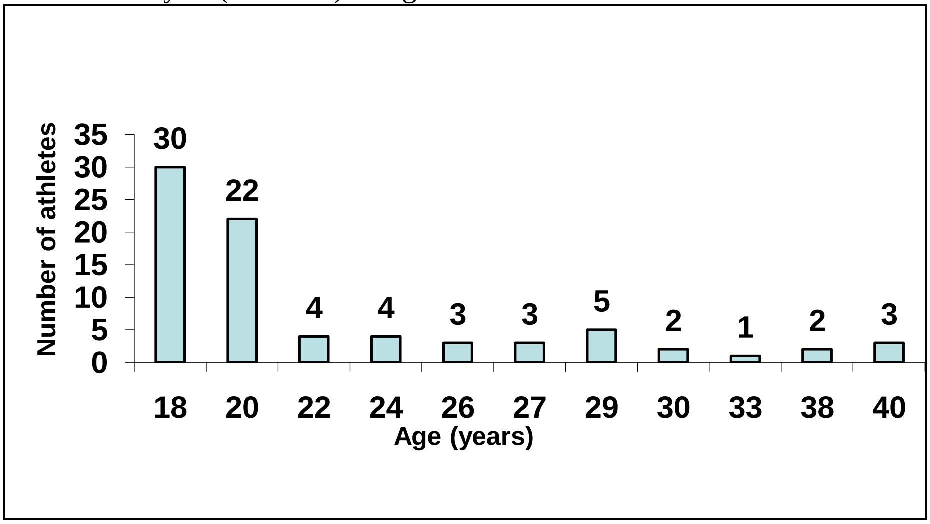


Figure1. Sportsmen structure according to their age

Relatively to the gender distribution of the group of sportsmen, that the group is mostly composed of boys (70,4%) and the rest of 29,6% is obviously represented by girls.

This resulted in a 40-record data base. The recorded independent variables were sex, trial (in kilometers), peak heart rate, mean heart rate, as well as 25 means of training from which we selected the following:

- Endurance running (Long-distance running) Km (X3) (in the forest)
- Tempo run (repeats of 1000m...5000m) Km (X4) (in the forest)
- Running with intervals (repeats of 200m…800m) (X5) (in the forest)
- Variable running (variable tempo / variable slope / variable coverage) Km (X6) (in the forest)
- Uphill running (km) (X7) (in the forest)
- Downhill running (km) (X8) (in the forest)
- Contest routes (home, verification or official competitions) (Km)(X9);
- Orienteering thematic trails, for perfecting various techniques (Km)(X10);

Some derivatives were added to these initial variables, specifically the trial speed measured in meters per second. This method was used in order to somewhat standardize the obtained information. This study will commence by presenting the correlation matrix of the analyzed variables. The following section will deal with building regression models which would demonstrate the influence of various means of training on performance, or lack thereof. All the statistical analyses were done using the SPSS software pack.

Data analysis

Descriptive elements. This section deals with the main characteristics of the sportsmen that were used to build the data base. From the perspective of distance raced, we find that the overwhelming majority (over 90% of cases) ran on lesser distances of at most 8 km (4 km – 6,1%, 6 km - 30,6% and 8 km – 54,1%).

Correlation method. In a preliminary stage, for dependent variables coupled with independent variables, a graphical analysis was performed.

In order to test the way in which analyzed variables interact, we used the correlation method at first. Due to the fact that the respective variables were mainly quantitative it was best to use Pearson's simple linear correlation coefficient (r). The respective statistical significance thresholds were set to 1 and 5%. We can clearly see that dependent variables are strongly correlated and therefore, in order to avoid the effect of multicollinearity in the regression models we will build, each dependent variable will be dealt with separately. The correlation table is only meant to draw attention to the way performance variables (trial speed 1 – X11,X12) are correlated (or not) to the means of training. This information is available in the two bottom rows of the correlation table (X1 – race 1,X2 – race2).

Table 1. Correlations between the variables of performance and the means of training.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12
X1	1	0,86**	0,89**	0,64**	0,8**	0,69**	0,55**	0,66**	0,67**	0,61**	-0,6**	-0,69**
X2	0,86**	1	0,95**	0,83**	0,95**	0,91**	0,81**	0,61**	0,67**	0,61**	-0,82**	-0,84**
X3	0,89**	0,95**	1	0,74**	0,92**	0,88**	0,75**	0,61**	0,76**	0,74**	-0,8**	-0,78**
X4	0,64**	0,83**	0,74**	1	0,85**	0,89**	0,9**	0,66**	0,85**	0,71**	-0,69**	-0,77**
X5	0,8**	0,95**	0,92**	0,85**	1	0,94**	0,87**	0,63**	0,77**	0,52**	-0,79**	-0,83**
X6	0,69**	0,91**	0,88**	0,89**	0,94**	1	0,93**	0,68**	0,75**	0,74**	-0,86**	-0,87**
X7	0,55**	0,81**	0,75**	0,9**	0,87**	0,93**	1	0,65**	0,58**	0,71**	-0,83**	-0,84**
X8	0,66**	0,61**	0,61**	0,66**	0,63**	0,68**	0,65**	1	0,78**	0,77**	-0,56**	-0,63**
X9	0,67**	0,67**	0,76**	0,85**	0,77**	0,75**	0,58**	0,78**	1	0,89**	0,87**	0,83**
X10	0,61**	0,61**	0,74**	0,71**	0,52**	0,74**	0,71**	0,77**	0,89**	1	-0,77**	0,77**
X11	-0,6**	-0,82**	-0,8**	-0,69**	-0,79**	-0,86**	-0,83**	-0,56**	0,87**	-0,77**	1	0,91**
X12	-0,69**	-0,84**	-0,78**	-0,77**	-0,83**	-0,87**	-0,84**	-0,63**	0,83**	0,77**	0,91**	1

*** Correlation is significant at the 0.01 level (2-tailed).*

** Correlation is significant at the 0.05 level (2-tailed)*

Regression method. This stage consisted in building linear regression models for each of the two dependent variables (trial speeds) in combination with groups of independent variables and an independent term. The significance threshold was set to 5% (in very few situations we also maintained as relevant the variables that had a maximum significance threshold of 8%).

A. Applying the regression method for the 'total trial speed' dependent variable

For each of the two trials, two steps were necessary for eliminating variables that were statistically insignificant. The models were as follows:

Table 2. Model 1: Trial speed the 1st test during orienteering thematic trails, for perfecting various techniques(km) . Regression coefficients: value, standard error, t test, significance threshold. Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	600,224	23,155		25,922	,000
	Orienteering thematic trails, for perfecting various techniques(km)	-,371	-,053	-,790	-6,938	,000

a. Dependent Variable: speed of completing the 1st test distance (sec/km)

Table 3. Model 1: The speed of completing the 2nd test according to the orienteering thematic trails, for perfecting various techniques(km) , running with intervals (repeats of 200m…800m) in the forest. Regression coefficients: values, standard errors, t test, significance thresholds:. Coefficients [a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	643,554	26,552		24,238	,000
	Orienteering thematic trails, for perfecting various techniques(km)	-,285	-,070	-,524	-4,073	,000
	Running with intervals (repeats of 200m…800m) (in the forest)	-1,663	,479	-447	-3,474	-,002

a. Dependent Variable: speed of completing the 2nd test distance (sec/km)

For the test:

- *Orienteering thematic trails, for perfecting various techniques (*each additional kilometer of such training leads to the covering of one kilometer in contests, faster with 37 hundredths of a second);
- *Contest routes (home, verification or official competitions) (Km)* (each additional kilometer of such running within trainings enhances the completing time of one kilometer in contests with 29 hundredths of a second).

After optimizing the training process during 2007 at National Championships and Latin Countries Cup, in average distance trial, athletes who undergo this experiment had exceptional behaviors, their time being identified as „ superman time". The blue line in the Figure 2 is an ideal time, composed of the best times on sections of the other athletes. As can be seen, this time is not ideal (VM athlete times were exempted) it is not close to the time achieved by the athlete included in the case study. In the Latin Countries Cup competition, 2007 the athlete dominated authoritatively, as the Figure 3 shows

Figure 2. VM Athlete time at NC 2007, MD trial -„superman" time

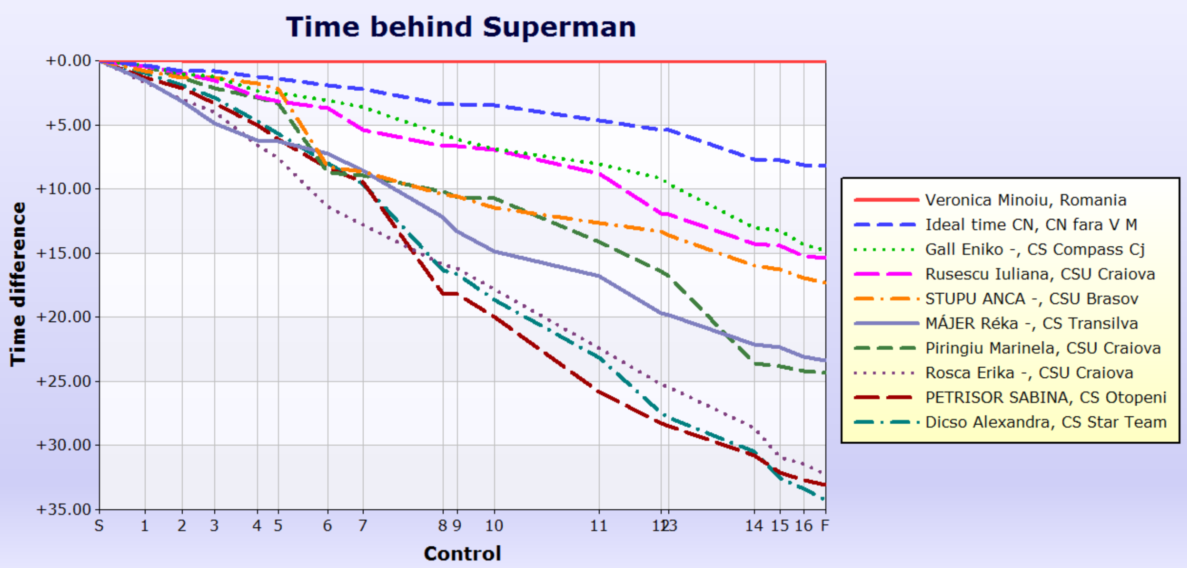
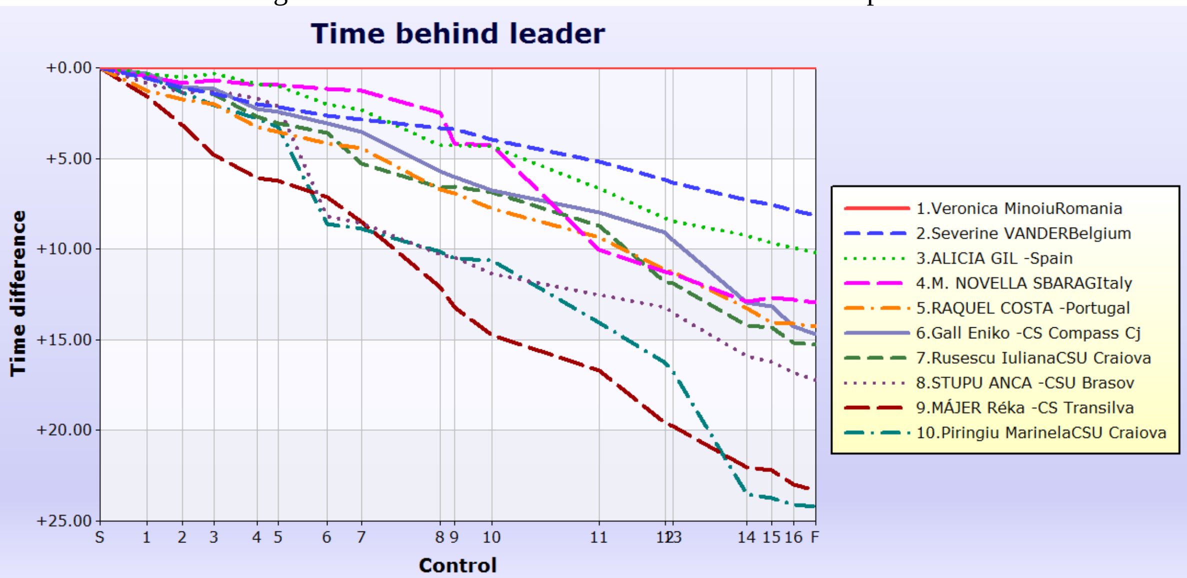


Figure 3. VM Athlete time at the Latin Countries Cup 2007



3.Results

After this experience VM continued with a sequence of successes (until present time she lost only few races) and this year, in every physical training session, she achieved higher performances compared to her co-trainees (which are also members of the national team). Two months of training during the competition season, when the orienteer used trail running for 82% of her running training, lead to semi-failures in competitions. On the contrary, her club teammate AA, who used running on various terrains for 86% of her training and some extra trail running training, achieved, at the MD trial during South-East European Orienteering Championships, a performance index of 101.1%. The performance index for VM in the same trial was of 78.1 %.

Figure 4. Athletes evolution after the experiment at South East European Orienteering Championships 2015 – middle distance

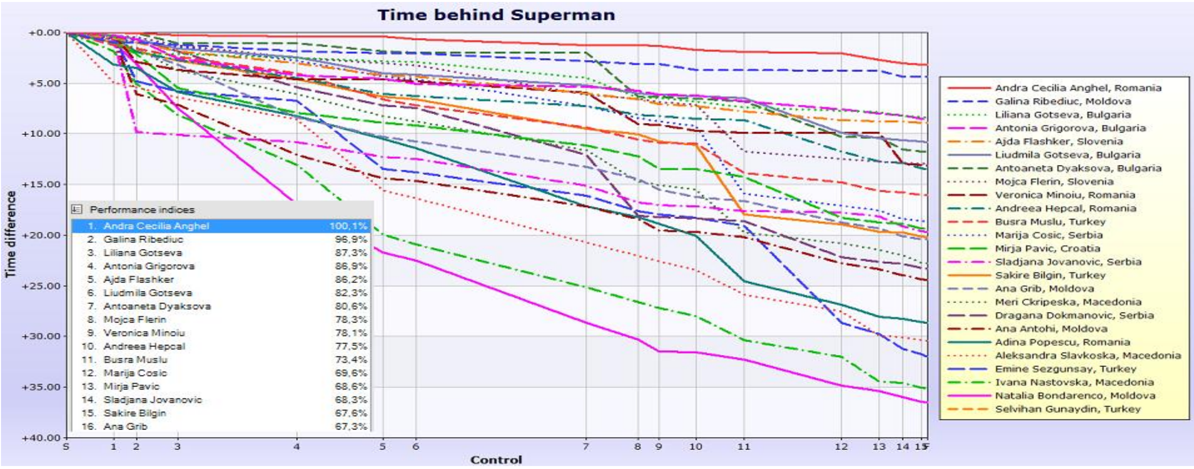
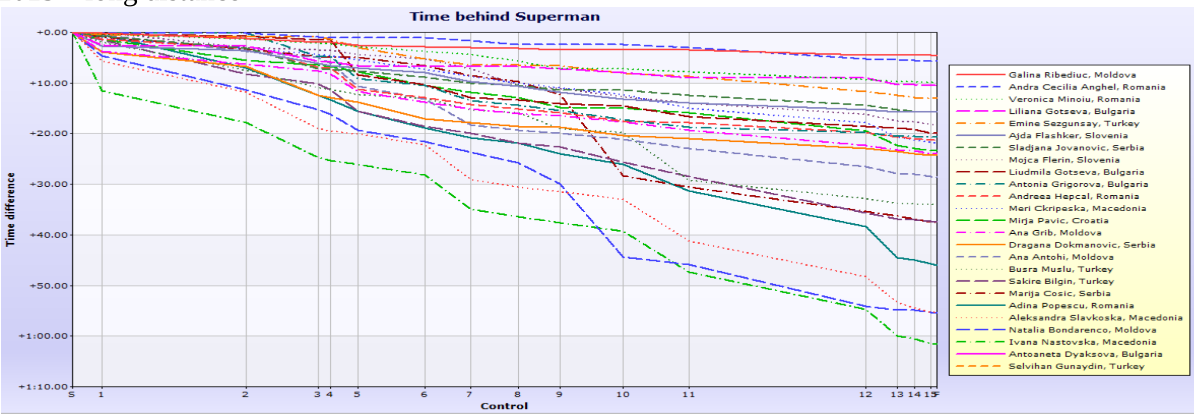


Figure 5. Athletes evolution after the experiment at South East European Orienteering Championships 2015 – long distance



Forced by circumstances (sprained ankle) the most titled athlete of the orienteering national team, South East European quadruple champion in 2014, multiple national champion on track and mountain running trial and Balkan champion at this trial - August 15, 2015 had a training program during competition period, almost identical to the previous case (88% of running volume carried on trails). Athlete's results in the orienteering competitions at the South East European Championships and National Championships were far from expectations.

4. Conclusions

The analysis on improving physical training, using specific means for orienteering at an appropriate standard of performance, highlighted the remarkable progress of the results value, both nationally and internationally.

This study comes to support professionals and athletes in orienteering, to convince them that good results and very good results obtained in the past can not guarantee the success in future competitions if during competition period they do not allocate enough time for running in the forest and thematic and verification competitions must be consistent with the contest area of competition for objective.

References

[1] Kevin C. Phillips, Matt A. Kilgas, Randall L. Jensen, *Transitioning from road running to trail running*, http://isbs2015.sciencesconf.org/56054, 2015

[2] Herbert-Losier, K., Mourot, L., & Holmberg, H-C., *Elite and Amateur Orienteers' Running Biomechanics on Three Surfaces at Three Speeds*, Med. Sci. Sports Exerc., Vol. 47, No. 2, pp. 381–389, 2015

[3] Cheshikhina V. V., *Relationship between running speed and cognitive process in orienteering*, Scientific Journal of Orienteering. v. 9, n. 1, p. 49-59, 1993.

[4] Minoiu, V., *Optimizarea pregătirii fizice în disciplina orientare sportivă prin raționalizarea şi standardizarea mijloacelor*, PhD Thesis, pp 150-183, 2011