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THE MOST COMMON ERRORS IN ORIENTEERING AND THEIR RELATION TO GENDER, AGE AND COMPETITION EXPERIENCE

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Abstract. *Decision-making in orienteering takes place under extremely complex conditions: new and unfamiliar terrain, high physical and emotional load, numerous distractions, unfavorable weather conditions, short time intervals, no help from others. All that makes errors unavoidable. The aim of this exploratory field study was to establish the most frequent errors made by athletes, as well as their possible connection with gender, age and competitive experience. The research was performed on a sample of 130 orienteers of both sexes (79 men and 51 women), aged from 12 to 66, with competitive experience from 1 year to 42 years. To collect data, the UOG/2013 Questionnaire was used, and specially designed for that purpose. According to the obtained results, typical orienteering errors could be divided into two categories: technical (related to lack of orienteering techniques) and psychological (related to lack and implementation of psychological skills). On the basis of mean frequency level, five most typical errors were classified: "parallel or similar terrain errors", "wasting a lot of time near the control despite of coming quickly into the control area","losing contact with the map and the terrain", "running too fast which does not provide good map reading", and "missing the first control point". The research results confirm the existence of statistically significant differences in profiles of typical errors of orienteers of different sex, age and competition experience. As it turned out, the type of errors made by competitors was primarily influenced by their age, this information being of great importance to the trainer, enabling him to design the most effective training process for young orienteers, in order to reduce or eliminate errors.*

Key words: *orienteering, errors, gender, age, sport experience*

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INTRODUCTION

Athletes of all ages and competing levels want to achieve a high level of performance, and fully demonstrate their current sports knowledge, as well as physical, technical and tactical skills. To achieve this goal, the orienteers have to continually improve their physical abilities, orienteering techniques, but also their psychological abilities (first of all cognitive abilities) and skills providing the maintenance of optimal activation, motivation, emotional control, proper focus, concentration and attention.

Since the cognitive skills of competitors, which are at the heart of orienteering techniques, have equal influence on success in orienteering as physical skills, or even more, it proves to be a mentally very demanding sport (Bačanac, 2003; Bačanac, Kozoderović, Juhas, & Milojković, 2013; Johansen, 1997b; Kozoderović, 2013; Ottosson, 1996). Studies emphasize the importance of the cognitive skills of competitors, as well as psychological factors that contribute to or disrupt its optimal use. Johansen (1997a), who has introduced the technique *"think out loud"* for the study of cognitive processes of orienteers, says: "While orienteering is definitely a physically demanding sport, to the extent that a comparison is meaningful, the cognitive demands may be even more demanding". Finding the optimal and the safest path through unfamiliar terrain, with maximum speed, only with the help of a map and compass, involves a number of cognitive processes, such as: perception, planning, thinking, remembering, recognition, assessment, reasoning, etc (Bačanac, 2003; Kozoderović, 2013). Problem solving in orienteering takes place under extremely complex conditions: under great physical strain, with numerous distractions, short time intervals, always in a new and typical situation, without help from the others, and under great emotional strain (Kozoderović, 2013; Ottosson, 1996). Taking that into consideration, competitors' errors are inevitable. The role of errors in orienteering and the importance of their recognition is best illustrated by the following words: "Orienteering is not easy. You will make mistakes. Some will be big and some will be small. The best way to deal with this is to be able to recognise these mistakes before they happen or as they happen, rather than after they have happened." (Errington, 1994). The goal of every orienteer is to minimize errors, i.e. to run the race without mistakes. This is also the goal of every trainer working with orienteers, knowing the elimination of errors to be the key of success in this sport.

Boga (1997) considers the most common errors in orienteering to be: missing the first control point (CP), parallel and similar terrain error, running too fast that does not provide good map reading, wasting a lot of time near the CP, losing contact with the map and the terrain, not checking the direction, moving too fast after the checked CP in the wrong direction, poor distance judgment, poor or no attack point, loss of concentration, distractions.

Taking into consideration the origin or cause of errors, Stevanović (1999) divides them into: a) technical errors of the orienteering performance, b) tactical errors related to route choice and selection of orienteering mode, c) psychological errors, caused by nervousness, haste, indecisiveness in solving important tasks, improper reaction to rivals, etc., d) mistakes in setting controls (CP in the wrong place) and misinformation, e) organizational errors due to late start, poor equipment, etc. In his opinion, the most common mistakes made by orienteers are: poor distance judgment, insufficient map tracking, "blind" moving, usually in a group, parallel situations, wrong choice of similar feature, mispunch, poor route choice, incorrect landmarks, wrong attack point; rushing to make up the lost time, panic in complicated situations, faulty reasoning; psychological tension at the start, fear, making

the decisions too quickly, haste on the last controls; lack of concentration and attention, being too relaxed and confident, noticeable satisfaction after a few controls successfully found.

According to a recently conducted internet survey (Los Angeles Orienteering Club, 2013), in which only 16 orienteers participated, their most common mistakes were: not connecting the features on the map with the features in the terrain (31%); getting too tired to think properly (31%); not knowing how far to go (25%); losing the location on the map (6%), not checking the control numbers (6%).

Bačanac (2003) indicates the lack of attention as one of the main causes for the occurrence of errors, the attention of an orienteer being most frequently distracted: before the start or at the start; while moving to the first control point; when he reaches the competitor of his category who started before him; when he is outrun by competitor who started after him; when there are a lot of competitors on the terrain; immediately after a refreshment point; when he is stopped by someone to show him/her "where he/she is"; when approaching the second last CP; after checking the wrong CP, or missing a CP, being unable to relocate; when he chooses one direction and then suddenly decides to change it.

Based on his own experience, and in addition to basic skills of map reading, use of compass, and orienteering techniques related to the choice of the most economical route, Mamia (2008) claims the concentration and management of mistakes to be important for success in orienteering. In his opinion, every orienteer should first ask himself: Where on the course and legs did I make mistakes? Was it on the first or on the last controls, by leaving the CP, on the leg, taking the CP? After that, it is necessary to define the reasons for mistakes, and to determine if they occur due to problems in interpreting the map, unsuccessful route choice, weak or incomplete planning, poor concentration, insufficient map reading, insufficient observation of the terrain, problems in maintaining compass bearing etc.? And last, but not least, is mistake management: What did I do after I realized I had made a mistake? Was I able to correct it and minimize the time loss?

It could be concluded that there exist a large number of empirical studies dealing with various psychological aspects of orienteering, such as mental activities of orienteers, cognitive behavioral strategies used by them (Gal–Or, Tennbaum & Shimrony, 1986), cognition in orienteering (Ottosson, 1996), characteristics of orienteer thinking (Johansen, 1997), relationship between cognitive processes and orienteering running speed (Sheshikhina, 1993), role of orienteering in healthy aging (Östlund-Lagerström et al., 2015), personality characteristics of elite orienteers and styles of coping with stress (Zsheliaskova-Koynova, 1993), stress situations in orienteering (Bačanac, Milojkovic, & Dopsaj, 2004), relation of competitive state anxiety and success in orienteering (Juhas, & Bačanac, 2010; Juhas, Bačanac, & Kozoderović, 2012), characteristics of motivation in orienteering (Ottosson, 1997), psychological orienteering skills (Bačanac et al., 2013), etc.

Although the experts dealing with improvement of orienteering have long ago noticed the importance of early detection and elimination of errors most frequently made by orienteers, this review undoubtedly confirms the existence of a small number of empirically based studies dedicated to this subject. The collected data are mostly based on experience, observations and opinions transferred by experienced orienteers and trainers to younger competitors, with a desire to help them to minimize their errors, to correct them and learn something from their mistakes. In these provisional analyses, classifications and recommendations, errors are frequently mixed with the reasons leading to them, thus

complicating the correct understanding, as well as the more successful elimination of mistakes.

Having all this in mind, this research had two goals. The first was to define the type and frequency of typical orienteering errors, and the second was to investigate the existence of typical errors profile difference between orienteers of different sex, age and competition experience.

METHOD

Participants

In this research**,** 130 national and foreign orienteers participated, in the 6-day international orienteering competition *"Kopaonik Open"*. Characteristics of the participants regarding gender, age and competition experience in orienteering are shown in Table 1. The sample included competitors from the following age/competition categories: M/W 14, 16, 18-20, 21E, 21A, 21B, 35, 40, 45, 50, 55, 60 and 65.

Table 1 Participant sample structure

		N	Age (yrs)		Competition Experience (yrs)	
			M	SD	M	SD
Gender	Male	79	33.84	13.65	13.54	10.28
	Female	51	30.36	15.15	10.49	8.03
	Total	130	32.48	14.30	12.35	9.55
Age (yrs)	Younger: 12-30 years	65	20.91	5.13	7.74	4.33
	Older: 30.3- 66 years	65	44.04	10.68	16.95	11.04
	Total	130	32.48	14.30	12.34	9.55
Competition experience (yrs)	Less experienced: 1-10	69	27.18	12.60	5.64	2.54
	More experienced: 11-42	61	38.47	13.82	19.93	8.85
	Total	130	32.48	14.30	12.34	9.55

Variables and instruments

Gender, age and sport experience were used as independent or controlled variables. The orienteers were divided into two groups, according to age: younger and older. The mean age of the "younger" group of orienteers, that included orienteers between 12 and 30 years of age, was 20.91±5.13 years. The mean age of the "older" group of orienteers, that included orienteers between 30.3 and 66 years, was 44.04±10.68 years. The participants were also divided into two groups on the basis of competition experience: less experienced, with 1 year to 10 years of experience (5.64±2.54 years), and more experienced, with 11 to 14 years of experience (19.93±8.85 years). Although the research results of Bačanac and Juhas (2004), on the relation of competitive trait of anxiety with age, gender and years of sport practice, indicated the age of 16 years and competition experience of 6 years to be the key moment, or the milestone for the further development of young athletes' sports careers, we classified the competitors between 12 and 30 years, competing in the M/W 14 to 21 E, A and B categories, as younger orienteers. Orienteering is the sport with pronounced cognitive

component, and the athlete should participate in it for at least 10 years, in order to acquire the status of an "experienced" competitor.

Dependent variables - 14 errors in orienteering, were estimated by the *UOG/2013 Questionnaire*, specially designed by Bačanac and Kozoderović for the purpose of this research, on the basis of scientific literature and own sport experience in this sport. The Questionnaire contains 14 errors most usually occurring during sport performance. First, the orienteers had to read it carefully, and then to rank every error (No 1 to 14), according to frequency in their performance. The authors tried to use terms and expressions recognizable and common in orienteering.

Procedures

The research was carried out during the "*Kopaonik Open 2013*" competition, held on Kopaonik, from July 15 to 21, 2013. The participants were informed on the nature and goals of the research via a web site, bulletin, posters in the competition center and flyers, provided with a starting number, and were asked to take part in it. The volunteers were given the Questionnaire and additional instructions. Each participant was once again informed about the anonymous character of the survey, its purpose, and the importance of sincere and authentic answers. Completion of the UOG/2013 Questionnaire was not time-limited, and the researcher was at any time available for additional explanations.

Data were processed using the statistic program SPSS 17.0. Basic parameters of descriptive statistics (frequencies, percentage), as well as the measures of central tendency and variability (arithmetic means, standard deviations) were included, while the groups of participants were compared using the One-way ANOVA method.

RESULTS

Occurrence frequency of individual errors of all orienteers (regardless of gender, age and competition experience), based on several criteria, is shown in Table 2. Column 1 shows the total number of participants who put a certain error on the list, column 2 shows the error rank, and column 3 the percentage of orienteers that chose to put that error as No 1 on the individual list, according to frequency of this error during own competition performance. The last column shows the percentage of orienteers ranking that error as No 1, 2, 3, 4, and 5 by estimating its occurrence in own competition performance.

Data from Table 2 could be analyzed in different ways. Based on the percentage of subjects ranking an error from 1 to 5, five most frequent errors were: "*Wasting a lot of time near the CP, after coming quickly into the control area"* (66.7%), "*Parallel or similar terrain error"* (64.5%), "*Losing contact with the map and the terrain - a turn (veering) from the chosen routes"* (61.9%), "*Running too fast that does not provide a good map reading" (55.3%)* and *"Missing the first control, a lot of wasted time in finding it"* (55%).

When the evaluation criterion for the most frequent errors was the average height of an error rank (column 3), the "*Parallel or similar terrain error"* took first place (mean rank 4.56), followed by "*Wasting a lot of time near the CP, after coming quickly into the control area"* (4.87), third, fourth and fifth place being the same as in „percentage of subjects ranking an error from 1 to 5". On the basis of total number of quotes for an error (disregarding its ranking), errors "*Poor or no attack point"* and "*Poor distance judgment*

- *the feeling that CP should be much closer or further away"* were in top five/six errors. When the importance and frequency of errors was estimated by the number of orienteers ranking an error as No 1, top five errors were:

1. Parallel or similar terrain error;
2. Running too fast that does not provide good map reading;
3. Missing the first control point, a lot of wasted time in finding it;
4. Wasting a lot of time near the control point, after coming quickly into the control area;
5. Poor or no attack point.

Table 2 Assessment of importance, i.e. occurrence frequency of individual errors

Errors	Total number of quotes (freq)	Mean rank	Rank 1 (%)	Rank 1 – 5 (%)
1. Wasting a lot of time near the control, after coming quickly into the control area	126	4.87	11.1	66.7
2. Parallel or similar terrain errors	121	4.56	19.8	64.5
3. Losing contact with the map and the terrain - a turn (veering) from the chosen routes	118	5.21	7.6	61.9
4. Running too fast that does not provide good map reading	123	5.46	19.5	55.3
5. Missing the first control (CP), a lot of wasted time in finding it	116	5.55	15.5	50.0
6. Poor or no attack point	120	5.88	10.0	46,7
7. "Rushing", without paying attention to the next control which is not far from just checked control	117	6.81	1.7	37.6
8. Poor distance judgment - the feeling that control should be much closer or further away	120	6.54	5.00	37.5
9. Moving too fast after the checked control in the wrong direction.	117	6.77	6.0	36.8
10. Wrong map orientation at the start or during the race	113	9.06	1.8	23.9
11. Checking wrong control which is close to the "right one"	105	9.48	1.9	15.2
12. Following your category competitor, you stop looking at map	108	9.77	2.8	12.0
13. Forgetting to check (skipping) a control point	108	11.11	0.0	8.3
14. Taking the wrong map (from other category) on the start*	102	12.66	0.0	2.0

Note. *This error was not ranked as No 1, 2, 3, and 5 by any orienteer.

Careful "reading" of Table 2 enables orienteering instructors and trainers to gain real insight into the most typical errors for all competitors in this sport, in order to start to develop the orienteering and psychological skills necessary for their elimination without delay.

Table 3 shows the occurrence of errors in orienteering related to the competitors' gender.

Table 3 Occurrence of errors in orienteering related to competitors' gender

Variables	Gender	N	M	SD	ANOVA	
					F	Sig.
Running too fast that does not provide good map reading	M	75	4.15	3.23	22.94	**.000**
	F	48	7.50	4.05		
Parallel or similar terrain errors	M	75	5.12	3.73	7.258	**.008**
	F	46	3.65	2.64		
Taking the wrong map (from other category) on the start	M	60	12.80	2.52	3.637	.060
	F	42	12.45	2.08		
Missing the first control (CP), a lot of wasted time in finding it	M	71	5.92	3.55	.034	.853
	F	45	4.98	3.47		
Wasting a lot of time near the control, after coming quickly into the control area.	M	76	5.17	3.17	.279	.598
	F	50	4.42	2.91		
Losing contact with the map and the terrain - a turn (veering) from the chosen routes	M	71	5.11	3.13	.228	.634
	F	47	5.36	2.92		
Moving too fast after the checked control in the wrong direction	M	71	6.92	3.27	.344	.559
	F	46	6.54	3.40		
Poor distance judgment - the feeling that control should be much closer or further away	M	72	6.92	3.40	.502	.480
	F	48	5.98	3.17		
Poor or no attack point	M	72	6.06	3.00	.001	.978
	F	48	5.63	3.29		
Following your category competitor, you stop looking at map	M	64	9.63	3.81	.023	.879
	F	44	9.99	3.00		
"Rushing", without paying attention to the next control which is not far from just checked control	M	70	6.80	3.06	.905	.344
	F	47	6.83	2.91		
Checking wrong control which is close to the "right one"	M	65	9.31	3.17	.068	.795
	F	40	9.75	3.54		
Wrong map orientation at the start or during the race	M	68	9.18	3.91	.022	.882
	F	45	8.89	3.51		
Forgetting to check (skipping) a control point	M	63	11.16	3.23	2.058	.155
	F	43	11.04	2.83		

We can see that *"Running too fast that does not provide a good map reading"* is the predominant error of male athletes (M=4.15), the *"Parallel or similar terrain error"* being predominant for female competitors (M=3.65). At the same time, these two errors contribute the most to differences in profiles of most common errors for male and female orienteers. "*Running too fast that does not provide a good map reading"* is statistically more significant error for male than for female orienteers (F=22.45; Sig=.000), and the "*Parallel or similar terrain error"* for female orienteers (F=7.258; Sig=.008).

Data show that the error *"Taking the wrong map (other category) on the start"* is not very common (M=12.80 in men and 12.45 in women), but with a tendency to be much more frequent in case of female orienteers (F=3.637; Sig.=.060). It seems that the female competitors are less attentive at the start, reaching more often for the wrong map, presumably as a consequence of great excitement, undeveloped competition culture or the habit to carefully follow the start procedure, without taking notice of numerous unimportant and distracting factors. Lack of concentration of female orienteers is evident not only at the start, but also

during the race, being manifested by the tendency to skip a control point much more often than men (just "forget" to check it, although they have found it, or just skip it and go to the next one).

Table 4 shows the mean values of ranks awarded to individual errors in accordance with the assessment of their occurrence, and the data on significance of the differences between orienteers of different ages.

Table 4 Occurrence of errors in orienteering related to age of competitors

Variables	Age	N	M	SD	ANOVA	
					F	Sig.
Parallel or similar terrain errors	Younger	61	5.31	3.43	6.152	**.015**
	Older	60	3.80	3.27		
Wasting a lot of time near the control point, after coming quickly into the control area	Younger	63	5.44	3.38	4.456	**.037**
	Older	63	4.30	2.65		
Forgetting to check (skipping) a control point	Younger	55	11.55	2.78	2.283	.134
	Older	53	10.66	3.29		
Running too fast that does not provide good map reading	Younger	63	4.95	3.98	2.151	.145
	Older	60	5.98	3.80		
Poor distance judgment - the feeling that control should be much closer or further away	Younger	59	6.98	3.31	2.060	.154
	Older	61	6.11	3.31		
Missing the first control point, a lot of wasted time in finding it	Younger	59	5.31	3.65	.582	.447
	Older	57	5.81	3.42		
Losing contact with the map and the terrain - a turn (veering) from the chosen routes	Younger	61	5.44	3.06	.727	.396
	Older	57	4.96	3.02		
Moving too fast after the checked control in the wrong direction	Younger	60	6.78	3.44	.002	.963
	Older	57	6.75	3.19		
Poor or no attack point	Younger	60	6.18	3.21	1.114	.293
	Older	60	5.58	3.01		
Following your category competitor, you stop looking at map	Younger	55	9.58	3.57	.319	.574
	Older	53	9.96	3.43		
"Rushing", without paying attention to the next control which is not far from just checked control	Younger	60	6.80	3.38	.002	.965
	Older	57	6.82	2.53		
Checking wrong control which is close to the "right one"	Younger	56	9.59	3.39	.139	.710
	Older	49	9.35	3.24		
Taking the wrong map (from other category) on the start	Younger	54	12.65	2.47	.002	.969
	Older	48	12.67	2.22		
Wrong map orientation at the start or during the race	Younger	57	9.02	4.00	.016	.899
	Older	56	9.11	3.50		

Data presented in Table 4 show the "*Parallel or similar terrain error"* to be the dominant error of older competitors, having the highest rank with respect to occurrence frequency (M=3.80). It is followed by: "*Wasting a lot of time near the CP, after coming quickly into the control area"* (M=4.30), "*Losing contact with the map and the terrain"* (M=4.96), "*Poor or no attack point"* (M=5.58), "*Missing the first CP, a lot of wasted time in finding it"* (M=5.81) and "*Running too fast that does not provide a good map reading"* (M=5.98). The profile of top six errors of younger competitors is apparently similar to that of older competitors, for it contains five common errors, but their frequency ranking is quite different. For younger orienteers (mean age: 21 years) top six errors are ranked as follows: "*Running too fast that does not provide a*

good map reading" (M=4.95), "*Parallel or similar terrain error"* (M=5.31), "*Missing the first CP, a lot of wasted time in finding it"* (M=5.31), "*Wasting a lot of time near the CP, after coming quickly into the control area"* (M=5.44), "*Losing contact with the map and the terrain"* (M=5.44) and "*Poor or no attack point"* (M=6.18).

According to the ANOVA method results, older orienteers make the mistake of "*Parallel or similar terrain"* significantly more frequently (F=6.15; sig=.015), "*Wasting more time near the CP, in spite of coming quickly to the control area"* (F=4.46, sig=.037). This is perhaps an unexpected result, for the older and more experienced competitors are expected to be more skilled in identifying and avoiding these errors. This is undoubtedly so, but it should be kept in mind that they are, in comparison to younger orienteers, much more aware of the possibility of this error, ranking it for this reason at the top of the typical errors list. It is certain that younger orienteers make this mistake as often as older orienteers, but they do not recognize it, and are not aware of its negative influence on their competition performance.

Table 5 shows the ranking of most frequent errors of experienced (mean orienteering experience: 19.9 years) and less experienced orienteers (mean orienteering experience: 5.6 years).

Table 5 Occurrence of errors in orienteering related to competition experience

Variables	Sport experience	N	M	SD	ANOVA	
					F	Sig.
Following your category competitor, you stop looking at map	Less	59	9.08	3.74	5.187	**.025**
	More	49	10.59	3.00		
Poor distance judgment - the feeling that control should be much closer or further away	Less	64	5.92	3.20	4.914	**.029**
	More	56	7.25	3.36		
Wasting a lot of time near the control, although you have come quickly into the control area	Less	66	5.32	3.40	2.940	.089
	More	60	4.38	2.63		
Parallel or similar terrain errors	Less	62	5.06	3.62	2.782	.098
	More	59	4.03	3.14		
Checking wrong control which is near to the "right one"	Less	56	9.96	2.96	2.654	.106
	More	49	8.92	3.61		
"Rushing", without paying attention to the next control which is not far from just checked control	Less	60	7.18	2.95	1.917	.169
	More	57	6.42	3.00		
Missing the first control point, a lot of wasted time in finding it	Less	63	5.16	3.48	1.713	.193
	More	53	6.02	3.57		
Running too fast which does not provide good map reading	Less	66	5.82	4.17	1.226	.270
	More	57	5.04	3.59		
Poor or no attack point	Less	64	6.14	3.02	.935	.335
	More	56	5.59	3.22		
Forgetting to check (skipping) a control point	Less	55	11.35	3.13	.655	.420
	More	53	10.87	2.99		
Wrong map orientation at the start or during the race	Less	61	8.93	4.00	.153	.697
	More	52	9.21	3.45		
Moving too fast after the checked control in the wrong direction	Less	63	6.83	3.38	.039	.844
	More	54	6.70	3.26		
Taking the wrong map (from other category) on the start	Less	55	12.69	2.16	.025	.875
	More	47	12.62	2.57		
Losing contact with the map and the terrain - a turn (veering) from the chosen routes	Less	62	5.23	3.02	.003	.958
	More	56	5.20	3.08		

Two statistically significant differences exist between experienced orienteers (with competition experience of more than 10 years), and less experienced orienteers (with competition experience 1-10 years): the frequency of error which is the consequence of "*not looking at the map, but following the better competitor in your category"* (F=5.187; Sig=.025), and the frequency of error related to "*poor distance judgment between two control points"* (F=4.914; Sig=.029).

DISCUSSION

The list of errors most frequently made by "our" orienteers almost fully corresponds to errors stated out by Boga (1997), together with advices for their prevention and correction. Of the five most frequent errors of "our" orienteers, three correspond to errors to which Boga attaches the most attention, and these are: "*Missing the first CP", "Parallel error"* and *"Running too fast"*. Top 4 and top 5 on the list are: "*Wasting a lot of time near the CP, after coming quickly into the control area"* and "*Poor or no attack point"* (Table 2). The most important result of this research is the "*parallel error"* being "error number one", dominant for almost all orienteers, regardless of competition experience in this sport, and specially characteristic for older orienteers and female competitors. Our data on the most frequent errors conform to the Top Ten Mistakes list (Errington, 2006), and to the results of an internet survey, with 16 orienteers stating their most frequent mistakes (Los Angeles Orienteering Club, 2013).

For the trainers working with orienteers, the information on the most frequent errors made by their athletes is of special importance – it is a guideline on orienteering techniques or psychological skills that should have to be developed. But it is also important for them to identify the errors most frequently made by orienteers, in order to teach their athletes to eliminate errors completely. The analysis of Table 2 identifies the five errors with the least frequency to be: "*Taking the wrong map at the start"* (mean rank: M=12.66), "*Forgetting to check (skipping) a control point"* (M=11.11), "*Following the competitor of the same category, without looking at the map"* (M=9.77), "*Checking wrong CP which is close to the "right one"* (M=9.48) and "*Wrong map orientation at the start or during the race"* (M=9.06). Despite these errors being not so frequent, the consequences are fatal: both the great and irrecoverable time loss, or disqualification (if not discovered on time by the orienteer). For that reason, the trainers should at the start always warn beginners and younger competitors to focus on all the steps of start procedures, to check which map they take, and during the race always to confirm the CP number before checking it, and to compare the control number with a number on their map.

Data presented in Tables 3, 4 and 5 provide the answer to the research question: could the profile structure of most frequent errors be related to gender, age and competitive experience. The ANOVA method results reveal that ***gender of orienteers*** has a significant impact on the nature and frequency of the errors they make. The profile of most frequent errors of men is dominated by the error "*Running too fast"*, the profile of women being dominated by "*Parallel or similar terrain error"*. These two errors, combined with the higher tendency of women to take the wrong map at the start (the difference is close to statistical significance) contribute to the biggest differences in behavior of orienteers of different sex, at the start as well as during the race (Table 3).

The error defined as "*Running too fast that does not provide good map reading"* refers to the competitors running too fast, unable to read the map. When running too fast, it is easy to lose contact with the map and the terrain, errors are inevitable, greatly influencing the placement, especially in the sprint competitions. Such wrong behavior, i.e. running too fast, is more frequent for male orienteers than for female orienteers (Table 3; F=22.94, Sig=.000), as well as for younger orienteers compared to older competitors, that difference not being on the statistically significant level (Table 4; F=2.15, Sig=.145). They are generally faster than women, and the speed "gives them a pull", preventing them to synchronize it with a parallel activity, which is map reading. In order to be successful, i.e. to see all the relevant parameters for making a decision, the map should be read with great attention, and that requires the lowering of running speed. The beginners even stop running, reading the map while walking, to be able to devote their full attention to it, and to be sure to "collect" all the important information. The map read and the decisions made, the orienteers may continue with higher running pace, till they reach the last landmark stored in working memory. There they stop again, or reduce running pace, in order to memorize the features of the next leg from the map. Matching running speed with the speed and precision of map reading constitutes the essence of golden rule: Only go as fast as you can read the map. Davidson (1991) considers the keeping in contact with the map to be very important, enabling the orienteer in every moment of the race to know *where he is* and *where is he going* (Know where you *are* and Know where you are *going*). Running too fast is a typical syndrome of younger orienteers, believing the running speed to be the key factor of the total competition result. The trainers should always keep in mind this tendency of male orienteers, especially young ones, reminding them constantly to apply the golden rule. Experienced trainers know it is best to raise the running speed of young orienteers by promoting three aspects of their orienteering technique: (1) Being able to relate map symbols to terrain quickly; (2) Deciding how much information you need to take from the map to navigate effectively; and (3) Being able to read the map on the run (Davidson, 1991).

Second error with a statistically significant difference between male and female orienteers is the "*Parallel or similar terrain error"* (F=7.258; Sig=.008). Unlike the male orienteers, female orienteers take the wrong map at the start by mistake more often, and during the race more often make the mistake of parallel terrain. It happens to women more often than to men to come to a terrain which is only similar to a terrain with a control point, for a long time being unable to perceive fine differences and characteristic details differing this terrain from the "right"one, and therefore wasting a lot of time convincing themselves to be in the right place, wondering why the control is not there. As shown in Table 3, this error is by far the most dominant for the female orienteers, having the highest rank (the least mean rank value), we could conclude this to be their No 1 error. Trainers working with female orienteers should always bear this fact in mind, trying to suggest them to be cautious when moving through a demanding terrain, in order not to mix up that area of the terrain with a similar one.

The "*Parallel or similar terrain error"* error, referring to the replacement of one terrain with a similar one, deserves special attention, being generally the most frequent error of all orienteers. It is difficult to correct, because it is difficult for athletes to detect it, i.e. they realize this to be the parallel terrain, only "looking like" the one from the map, where the CP is placed. The prevention of this error consists of the careful reading of the

map, especially of the parts where the potential error could occur. Constant analysis of already passed routes (where we were and which was the error) contribute to the practice with the aim to reduce the error, and not to repeat it.

Orienteers are well aware that one error during the race usually leads to a series of new, seemingly absurd and inexplicable errors, such as: missing of a CP, wrong map orientation (the 180^{o} error), overlooking of very visible and useful landmarks on the map, etc. For example, if a young orienteer runs too fast, he/she will not be able to read the map correctly, the result being disregard of the fine terrain features and inability to recognize them, the situation ending up with a parallel or similar terrain error. Provided that the trainers worked more with younger orienteers and women on identifying the error of parallel terrain, they would be more careful, wasting less time trying to convince themselves they were in the right place, the control point not being there because the organizer had made a mistake in placing it.

The age of the orienteers contributes significantly to differences in behavior, and consequently to the type of errors made by orienteers (Table 4). Younger and older competitors differ significantly on the frequency of "*Parallel or similar terrain error"* occurrence (F=6.152, sig=.015) and *"Wasting a lot of time near the control, after coming quickly into the control area"* (F= 4.456; Sig=.037). Both mistakes are significantly more present in case of competitors older than 30 than in case of younger competitors, which, as mentioned above, may seem unexpected and illogical. This finding cannot be attributed only to their greater awareness, and willingness to recognize such mistakes. It has also to do with a fact that many older orienteers have joined this sport relatively late, in their mature age. Therefore, they lack competition experience, as well as developed orienteering skills. Being an older orienteer does not mean being an experienced competitor. When older competitors identify these mistakes in their own performance, they should necessarily pay more attention to the precise CP description, and the finding of a better attack point for this CP.

The error *"Wasting a lot of time near the control"* is also typical for younger athletes (ranking as No 4 on their list), as a consequence of loss of attention and concentration (relaxation after reaching the control area), hasty reading of the control description, undetermined attack point or inadequate selection of the attack point. This is a frequent error among young athletes, but also of beginners and inexperienced orienteers, not mastering the orienteering techniques well, searching for a control flag instead of typical feature, believing it should be "there somewhere". The trainers should prepare every young orienteer to be well acquainted with all symbols used for typical features on the map and with their interpretation (runability, water features, land forms, terrain configuration, etc.), to master the skill of choosing the attack points, as well as the psychological skill of concentration "rising" in control zone, in order to prevent mental relaxation and spreading of attention to unnecessary details withdrawing them from reaching the desired goal, instead of approaching it.

Orienteering experience, as a specific situation feature, was confirmed to be the factor contributing to significant differences between less experienced and more experienced athletes (Table 5). Less experienced orienteers, significantly more frequent than experienced orienteers, tend to "*follow the competitors from the same category, and stop looking at the map"* (F=5.187, sig=.025), that behavior being rare among experienced

competitors. They also significantly more often than the older competitors make the error of "*poor distance judgment"* (F=4.914, sig=.029), indicating the lack of basic technical skills. More subtle differences in error profiles of these two groups of orienteers could be estimated by defining their five most frequent mistakes, on the basis of data in Table 5 (1-5 rank). Top five errors of less experienced orienteers are the following: "*Parallel or similar terrain error"* (M=5.06), "*Missing the first CP"* (M=5.16), "*losing contact with the map and the terrain"* (M=5.23), "*Wasting a lot of time near the CP"* (M=5.32) and *"running too fast which does not provide good map reading"* (M=5.82). Among the top five errors of experienced orienteers, four are also characteristic of less experienced orienteers, but with a different ranking. Instead of *"a lot of wasted time in finding the first CP"*, an error so frequent among less experienced competitors, the experienced competitors more often make the "*poor or no attack point"* error. Dominant error in both groups of orienteers is '*parallel or similar terrain error"*, proving the risk of making this mistake to be the highest, and independent of experience. "*Losing contact with the map and the terrain"* is the high ranked error both for less experienced (No 3) and for more experienced orienteers (No 4), that also being the case with "*running too fast"*, which is ranked as No 5 for the less experienced orienteers, and even as No 3 for the experienced orienteers. "*Wasting a lot of time near the CP, after coming quickly into the control area"*, is also a very typical error for all the orienteers, regardless of their competition experience (No 4 for less experienced, No 2 for the experienced orienteers).

By summarizing the results presented in Table 5, a conclusion could be made that the typical errors of all orienteers, regardless of their competitive experience in this sport, are primarily related to undeveloped or inadequate orienteering techniques, reflecting at orienteering events in "*parallel or similar terrain error", "incorrect map reading and interpretation", "losing contact with the map and the terrain", "inadequate action in the CP area", "poor or no attack point", "poor distance judgment"* and *"wrong map orientation at the start or during the race".* The second group of errors is due to poor psychological preparation or undeveloped psychological skills for the control of own behavior (emotions and attention), manifesting as: "*missing the first CP, or difficulty in finding it"*, "*running too fast not adapted to map reading"," rushing to the next CP usually in wrong direction", „rushing to a CP which is not far from just checked CP", "following the better competitors* and "*checking the wrong CP",* without verifying its numerical symbol.

These data confirm that orienteering trainers should work on the development and improvement of psychological skills along with improvement of orienteering skills, which will allow each competitor, regardless of age and competitive experience, to maintain the optimum level of physiological and psychological distractors, to maintain an optimistic attitude, self-confidence, positive thoughts, success orientation, to be able to apply different self-motivating techniques, and to enjoy every moment of his/her performance related to different technical or physical challenges.

CONCLUSION

The research performed on a sample of 130 orienteers of both sexes had a goal to answer the following questions: which were the most frequent mistakes of competitors in this sport, and could they be related to gender, age and competitive experience of orienteers. The obtained results fully confirm that gender, age and competitive experience of orienteers influence the frequency profile of their typical errors. Of 14 errors that should be ranked by frequency of their occurrence by the orienteers, five of the most typical were singled out, bearing in mind the average ranking, calculated for the total sample.

The research results have shown that the orienteers of different sex differ greatly by the frequency of individual errors made during the competitive performance. The profile of top most frequent errors made by male orienteers is dominated by "*running too fast which does not provide a good map reading*", the "*parallel or similar terrain error"* having the same status for female competitors.

Age proved to be the factor contributing significantly to differences in the profile of most frequent errors of younger and older orienteers. *"Running too fast which does not provide good map reading"* is the most frequent, and at the same time the typical error of younger orienteers (between the ages of 12 and 30), the "*parallel or similar terrain error"* being dominant for older competitors (older than 30). Compared to older orienteers, the younger orienteers are far more likely (close to statistical significance) to err by "*Running too fast which does not provide good map reading"*. At the same time, the "*parallel or similar terrain error"* is significantly more frequently made by older than the younger orienteers, who also waste more time in control area, in spite of coming there relatively quickly.

The error related to failure to recognize "*parallel or similar terrain error"* is No 1 on the list of most frequent mistakes, of all orienteers regardless of competitive experience. But the tendency of its more frequent presence on the experienced orienteers list does not imply its more frequent occurrence during performance, but indicate the greater awareness of more experienced orienteers of this error. Undeveloped orienteering technique demonstrated in "*poor distance judgment"* and a bad habit or unfair behavior related to "*following the better competitors"*, are more common among less experienced orienteers.

In addition to the theoretical contribution referring to the improvement of knowledge about typical errors in orienteering, the research results provide useful information for trainers and competitors, helping them to minimize errors by improving orienteering techniques and psychological skills of competition stress management, thus raising the quality of competitive performance, sport and expert achievement, satisfaction and personal achievement.

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NAJČEŠĆE GREŠKE U ORIJENTIRINGU U ODNOSU NA POL, STAROST I TAKMIČARSKO ISKUSTVO

Donošenje odluka u orijentiringu odvija se u veoma složenim uslovima: novom i nepoznatom terenu, pri visokom fizičkom i emocionalnom opterećenju, brojnim ometajućim faktorima pažnje, nepovoljnim vremenskim uslovima, kratkim vremenskim intervalima, bez pomoći drugih. Zato je neminovno da se dešavaju greške. Cilj ove eksploratorne studije bio je da se utvrdi koje greške orijentirci najčešće prave i da li su one povezane sa polom, starošću i takmičarskim iskustvom. Istraživanje je sprovedeno na uzorku od 130 orijentiraca oba pola (79 muškaraca i 51 žena) uzrasta od 12 do 66 godina i takmičarskog iskustva od 1do 42 godine. Za prikupljanje podataka korišćen je Upitnik UOG/2013 namenski konstruisan za potrebe istraživanja. Dobijeni rezultati pokazuju da se tipične greške orijentiraca mogu podeliti u dve grupe: tehničke (vezane za nedostatak tehnika

orijentisanja) i psihološke (vezane za nedostatak i primenu psiholoških veština). Na osnovu prosečnog ranga učestalosti javljanja izdvojilo se pet najtipičnijih grešaka: „greška sličnog ili paralelnog terena“, „gubljenje puno vremena u zoni kontrole iako se u zonu brzo stiglo“, „gubitak kontakta sa mapom i terenom“, „suviše brzo trčanje koje ne omogućuje dobro čitanje mape“ i „promašivanje prve kontrolne tačke“. Rezultati istraživanja potvrđuju postojanje statistički značajnih razlika u profilima tipičnih grešaka orijentiraca različitog pola, starosti i takmičarskog iskustva. Pokazalo se da starost najviše doprinosi razlikama u vrsti grešaka koje takmičari najčešće prave, što je za trenere važna informacija za programiranje trenažnog procesa za mlade orijentirce, koji će biti najefikasniji u njihovom redukovanju i/ili potpunom eliminisanju.

Ključne reči: *orijentiring, greške, pol, uzrast, takmičarskoiskustvo*