PECULIARITIES OF DISTANCE PACING OF LITHUANIAN ROWERS AT THE EUROPEAN CHAMPIONSHIP 2012

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ABSTRACT

Research background and hypothesis. In rowing, not enough attention is paid to the peculiarities of distance pacing and race tactics. At the same time the annually increasing boat speeds and closeness among the results of the world and the European championship winners, the race tactics can be of decisive importance. Although many scientific articles on Lithuanian rowing have already been published, there are not enough scientific studies on the peculiarities of distance pacing of Lithuanian rowers.

Research aim was to determine the peculiarities of distance pacing of Lithuanian rowers at the European championship 2012.

Research methods. The following study methods were used: literature review and competition records analysis. In accordance with the technical records of the European championship 2012 (http://www.worldrowing.com/results/), the average speed in the distance and speed changes in different sections of 84 crews were analysed. The peculiarities of distance pacing and tactics variants of the Lithuanian men single scull, double scull and women single scull and the best European rowers were compared.

Research results. Lithuanian rowers were the fastest in the first 500 m section of the distance and applied 1–3 and 1–4 tactical variants. The speed changes at the European championship 2012 were 1.70–2.69%. At the European championship 2012, the crews who took 4–6th places were more likely to exceed their average distance speed in the first section of the distance than the crews who took places 1–3 ($p < 0.05$).

Discussion and conclusions. Speed changes in the distance of Lithuanian men single scull and double scull rowers were one of the lowest and the average pace was the highest compared to the records of other finalists. The speed changes in distance of women single scull rowers were among the highest while the average pace was the lowest compared to the records of other Final A participants. Although Lithuanian women single scull rowers had high speed changes in the distance and their rowing pace was low, high average speed in the whole distance allowed them winning at the European championship.

Keywords: boat speed, tactics, number of strokes.

INTRODUCTION

Obviously, race strategy is not a dominating factor that determines performance in rowing. Higher physiological work capacity and better technique give undoubtable advantages (Kleshnev, 2001). The sport of rowing has produced little scientific research on the effect of different pacing strategies on performance (Garland, 2005). This is perhaps surprising given the popular belief that pacing strategies have major effects on performance in most sports, and although there may be little physiological difference between elite competitors, athletes may win or lose depending on their pacing strategy (Foster et al., 1994; Fukuba, Whipp, 1999).

In competitive rowing, it is tactically and psychologically advantageous to gain placement at

the front of the race by increasing effort at the start. This will allow the rowers, who

look backwards down the course, to be able to monitor the position of other boats and react to any sudden advances from other competitors, and also allows them to avoid the wake of other boats (Garland, 2005). In some sports, there is some evidence that a fast start is the optimal strategy (Foster et al., 1994; De Koning et al., 1999; Bishop et al., 2002) whereas in other sports a slow start may be beneficial (Mattern et al., 2001). There are several studies on the pacing strategies of elite rowers (Kleshnev, 2001, 2012; Kollman, 2001; Garland, 2005). The competition practise and tactics of rowers in the world championships and the Olympic Games have been analyzed by the Lithuanian researchers, too (Venclovaitė, Raslanas, 2006; Alekrinskis et al., 2007; Venclovaitė, 2008; Šližauskienė et al., 2010). The authors claim (Garland, 2005) that there are no significant differences between men and women rowers and winners in distance pacing nature. After analyzing the tactics of the final A participants at the London Olympic Games rowing regatta, V. Kleshnev (2012) determined that there was no significant difference between the finalists: the winners, bronze medalists and 5th place takers used very similar race strategies. This suggests that now the races were won because of proportionally faster boat speeds in all sections of the race.

Although many scientific publications on Lithuanian rowing have already been published, there are not enough scientific studies on the peculiarities of distance pace of Lithuanian rowers. We think that it might be useful to not only analyze the peculiarities of distance pacing of the best world rowers but also of the best Lithuanian rowers who were successful at the European championship and won medals. That is why our aim was to determine the peculiarities of the distance pacing of the Lithuanian rowers at the European Championship 2012.

RESEARCH METHODS

The following study methods were used: literature review nad competition record analysis. In accordance with the technical records of the European championship 2012 (http://www.worldrowing.com/results/), the peculiarities of distance pacing and tactics variants of the Lithuanian men single scull, double scull and women single scull and the best European rowers were compared. The average speed in distance and speed changes in different sections of the distance of six women boat classes (36 crews) and eight men boat classes (48 crews) in the final A at the European championship 2012 were analysed in comparison with the average speed in distance. On the basis of the methods worked out by V. Kleshnev (2001) twelve tactical variants were singled out. Every tactical variant was marked by two figures: the fastest and the slowest 500 m segment in the 2000 m distance. For example, the tactical variant "1–4" means that the 1st 500 m segment was the fastest and the 4th final 500 m segment was the slowest. According to the GPS data provided at the webpage of the International rowing federation (http://www.worldrowing.com/results/), the average distance pace in men single scull, men double scull and women single scull classes was calculated.

To ensure a normal sample distribution, the Kolmogorov-Smirnov test was applied. The data are presented as means and standard deviations. Statistical significance was set at $p < 0.05$. To determine the reliability of differences of averages between the indexes of separate groups, the Student's (t) tost for independent samples was applied. For performing statistical analyses we used *Microsoft Office Excel 2007* and *SPSS Statistics 17.0.*

RESEARCH RESULTS

The Lithuanian rower won in the European championship 2012 in single scull class by finishing the 2000-metre distance at the speed of 4.79 m/s (Table 1). The same average speed was demonstrated by the rower who took the second place, however his speed changes (%) in the distance were higher (2.54%) than those of the Lithuanian rower (1.97%). All men single scull rowers were faster in the first section of the distance compared it with their average distance speed, and on the second and third distance sections they were behind their average distance speed. In the fourth distance section, only the rowers who took the first and the fifth places were behind their average speed in distance, and other participants of final A exceeded their average distance speed. The rowers who took the second and the third places applied tactical variants with the fastest fourth section of the distance (4–2), and the rowers who took other places applied tactical variants with the fastest first 500-metre section (1–4, 1–2, 1–3).

Table. **The race parameters of the men single scull, men double scull rowers and women single scull rowers in the final A at the European Championship 2012**

Country	Athletes	Place	Average distance speed, m/s.	Boat speed deviation (%) from the average distance speed in the specified 500 m sections				Speed changes, %	Tactical variant
				1	2	3	4		
Men single scull									
LTU	M. Griškonis	1st place	4.79	2.92	–0.91	–0.47	–1.43	1.97	1–4
CRO	D. Martin	2nd place	4.79	0.23	–2.13	–1.47	3.56	2.54	4–2
BUL	G. Bozhilov	3rd place	4.77	1.75	–2.83	–1.54	2.83	2.67	4–2
GBR	G. Thomas	4th place	4.71	2.11	–2.01	–0.29	0.28	1.70	1–2
BEL	T. Maeyens	5th place	4.68	2.01	0.13	–1.25	–0.82	1.45	1–3
HUN	P. Galambos	6th place	4.65	3.08	–1.04	–2.42	0.55	2.36	1–3
Men double scull									
CRO	M. Sinkovic V. Sinkovic	1st place	5.34	2.91	–1.75	–2.54	1.59	2.61	1–3
ITA	A. Sartori R. Battisti	2nd place	5.33	2.03	–3.01	–2.02	3.28	3.06	4–2
NOR	N. J. Hoff K. Borch	3rd place	5.29	2.29	–1.35	–1.95	1.13	2.01	1–3
LTU	R. Maščinskas S. Ritter	4th place	5.27	2.96	–2.23	–2.23	1.71	2.69	1–3
SRB	M. Marjanovic A. Filipovic	5th place	5.27	2.98	–2.03	–2.62	1.91	2.80	1–3
POL	K. Wasielewski W. Chabel	6th place	5.15	6.04	1.05	–1.32	–5.12	4.67	1–4
Women single scull									
LTU	D. Vištartaitė	1st place	4.38	1.51	–1.42	–1.48	1.48	1.70	1–3
SRB	I. Obradovic	2nd place	4.35	–1.46	–0.37	0.31	1.56	1.26	4–1
EST	K. Pajusalu	3rd place	4.33	1.64	–0.93	–0.29	–0.38	1.12	1–2
RUS	J. Levina	4th place	4.28	1.68	–0.77	–0.61	–0.27	1.13	1–2
NOR	T. Gjoertz	5th place	4.26	1.27	–0.58	–0.89	0.23	0.97	1–3
BUL	L. M.Rusinova	6th place	4.21	3.53	0.28	–1.33	–2.29	2.55	1–4

The Lithuanian men double scull took the fourth place at the European championship this year. They were almost 5 seconds behind the winners from Croatia and almost 2 seconds behind the bronze winners from Norway (Table). Lithuanians as most of the participants applied 1–3 tactical variants, which means that their first 500-metre section was the fastest, and the third 500 m section was the slowest. The Italians who took the second place had the fastest fourth 500-metre section and the slowest second 500-metre sections (tactical variant 4–2). The speed changes of the Lithuanian double scull rowers in the distance were 2.69%, they were similar to those of the winners 2.61%. The highest speed changes in the distance were of the Polish rowers (4.67%), and the lowest – of to the Norwegians who took the third place (2.01%).

The Lithuanian women single scull rower who became the champion finished the distance at the average speed of 4.38 m/s. Although her speed changes in the distance were among the highest (1.70%) compared to other finalists, she was able to take the first place (Table). The rower who took the sixth place had the highest speed changes in the distance (2.55%) while rowers who took 2–5th places had only 0.97–1.26% speed changes.

While comparing the speed changes in the distance of the crews who took 1–3rd and 4–6th places at the European Championship 2012, it was determined that crews who took 4–6th places exceeded their average distance speed more in the first section of the distance than those who took 1–3rd places ($p < 0.05$), and in the fourth section the crews who took 1–3rd places were able to exceed

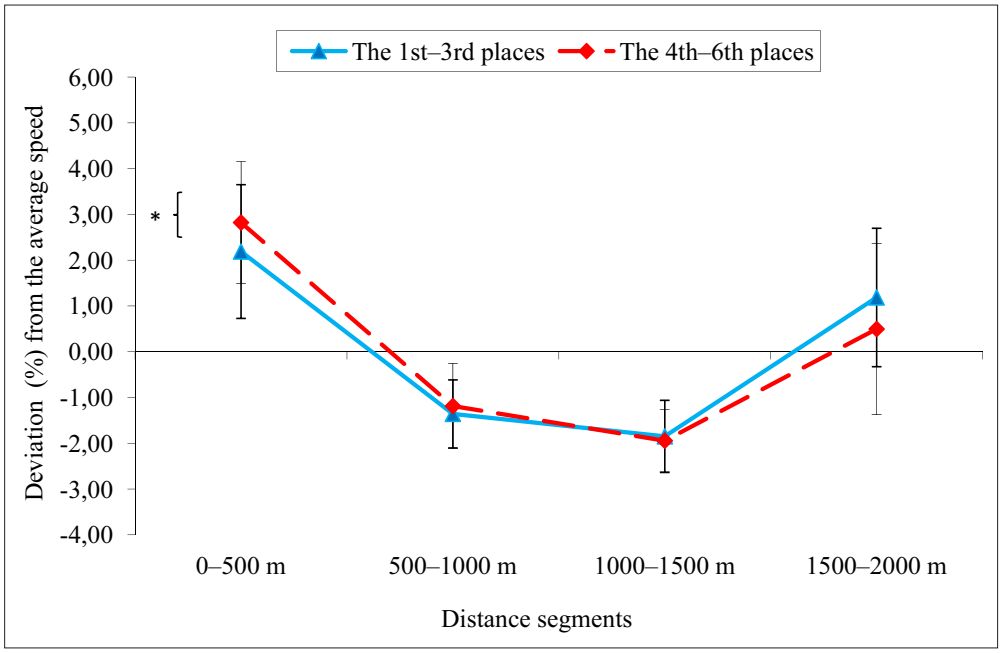

Figure 1. **Speed changes in the distance of men and women crews in Final A at the European Championship 2012 according to places taken**

Note. * – $p < 0.05$, deviations in speed in the respective segments of the crews who had taken the 1st–3rd places and the 4–6th places compared.

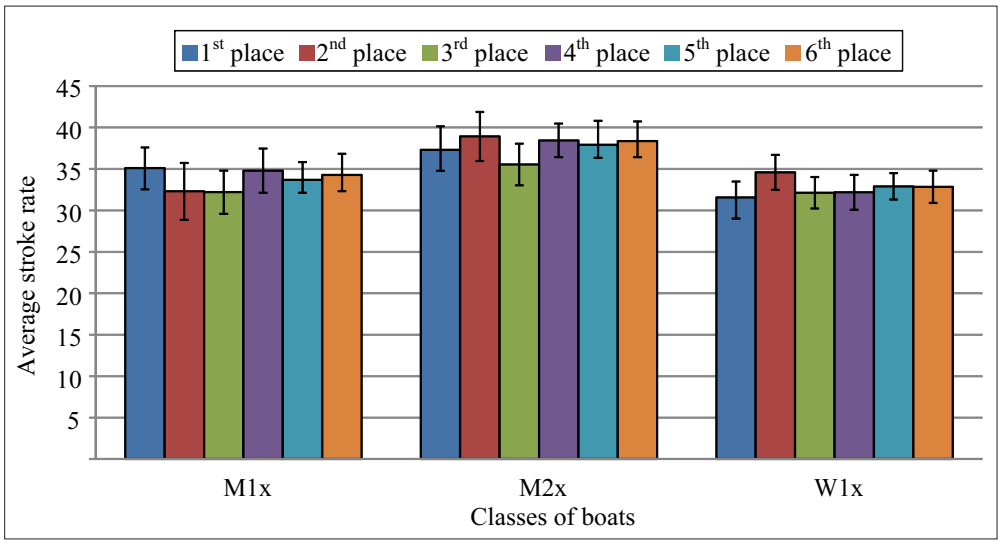

Figure 2. **The average pace of men single sculls, double sculls and women single sculls in final A at the European championship 2012 according to the places taken**

Note. M1x – men single scull, M2x – men double scull, W1x – women single scull.

their average speed more than those who took 4–6th places (Figure 1). The speed changes of crews who took 1–3 places in separate sections of the distance were as follows: +2.19, –1.36, –1.85, +1.19%. The speed changes of rowers who took 4–6th places at the European championship 2012 were as follows: +2.82, –1.19, –1.94, +0.50%.

We compared the average pace of rowers in men single sculls, double sculls and women single sculls who took different places (Figure 2). We determined that the average pace of the Lithuanian men crews was one the highest compared with the crews who took other places. The average pace of the Lithuanian men single scull was 35.1 ± 2.5 strokes/min and men double sculls – 38.5 ± 2.0 strokes/min. At the same time the average pace in distance of the Lithuanian women single scull was the lowest (31.6 ± 2.6 strokes/min) compared with other participants in the final.

DISCUSSION

Elite competitive 2000 m rowing races take 330–460 seconds to complete. This duration falls between the two extremes of the range of pacing strategy studies previously published. S. W. Garland (2005) observed that a fast start was the strategy adopted by elite rowers, similar to that observed previously for races lasting 120–290 seconds (Foster et al., 1994; De Koning et al.,

1999). V. Kleshnev (2011) established that winners are relatively faster in the 1st section of the race, than silver and bronze medallists, but 2nd, 3rd and 4th place-takers usually have faster final section of the race (average data over 11 years (1993–2004)). However, the study results of the World Rowing Championship 2011 show that winners in Olympic events have shown relatively slower speed over the first 500 m than all other finalists. This trend is opposite to what was found in previous World regattas (Kleshnev, 2011). Our research also showed that at the European championship 2012 the crews who took 1st–3rd places were relatively slow in the first 500 metres than those who took 4th–6 th places if to compare it with their average speed in the distance. At the same time the crews who took 1st–3rd places were relatively fast in the last 500 metres than those who took 4th–6 th places compared with their average speed in the distance. The findings of thestudies on the previous Olympic Games show (Venclovaitė, Raslanas, 2006) that women crews who took different places in the final A of the Olympic Games used the same fast start tactics, while the distance pacing of men crews who took different places in the Olympic Games differed.

In rowing, the most decisive factor is the start pacing. "If you lost the first 500 m, there is nothing you can do" says G. Losavio (Лосавио, 1997, p. 30) and gives an example: in the World Championship 1995 a very strong Swiss single scull rower Kseno Miuler was at the bottom of the list in the final until the quarter line of the last section. He hoped to make a great pacing at the finish and did it: he improved a personal time of the first section of the distance by 8 s. But that did not help, he came last. A year later, at the Atlanta Olympic Games 1996, he used a completely different tactics. In the final he started at the fastest speed from the start and won. He beat the second-place winner Canadian Porter by 3 s. This was due to the active start (Лосавио, 1996). This tactics was also applied by the Lithuanian single scull rowers who became winners at the European Championship 2012. They took the leading positions from the beginning and did this till the finish. Men double scull rowers were in the fourth place after the first 500 m. They were the fourth after the finish, too.

L. Aleksandravičius (1981) claims that if there is only one encounter with the competitor planned while choosing the tactics variant, the ability to unexpectedly surprise the competitor, i. e. to come upon him/her, plays an important role. However, if there are several encounters planned (preparatory, semi-final stages, etc.), much attention should be paid to the nature of the competitor's distance pacing while choosing the tactics.

In the final heats, the Lithuanian rowers applied 1–3 and 1–4 tacticalvariants. This confirms the data of other authors. Men and women crews in the final A of the World Championships 2005, 2006 and the Olympic Games 2008 usually used 1–3 tactical variant (Venclovaitė, 2008; Šližauskienė et al., 2010). V. Kleshnev (2011) claims that the most popular tactical variant of the winners is 1–4, and the one of the silver and bronze medallists – 4–1. We determined similar trends, too: the crews who took the second and third places used 4–1 and 4–2 tactical variants with the fastest last 500 metres.

At the beginning of rowing evolution the famous British coach Steve Fairbairn said: "Miles make champions" (Ферберн, 1958). However, many coaches still use this motto. The champions are not made by the miles and kilometres during the training sessions (every rower covers enough of them), but by the ability to discourage the competitors with your speed, make them chase you and fight in-between. This is how all the crews who won in the Atlanta Olympic Games competed. And only this type of tactics may guarantee the victory in regattas, says G. Losavio (Лосавио, 1997).

The other rowing specialist V. Kleshnev (2011) gives some recommendations on choosing tactics: choose the race strategy with faster start section if you are going to win (or die) or choose the race strategy with faster finish and more even distribution of efforts if you want to maximise your result.

As V. Kleshnev (2001) states, the physiological factor should not be forgotten. Energy production in rowing is provided from aerobic sources for 70–80%. Quick increase of oxygen consumption requires significant anaerobic workload at the start of the race. The anaerobic source is more powerful, therefore the first piece of the race should be faster than others. However, it should not be too fast, otherwise rowers would have to tolerate very high oxygen debt and lactate concentration during the race.

During the training session 15–40 strokes per minute are made, while during the race single scull rowers make 32–38 strokes per minute, duration of the stroke is 0.6–2.2 s. In multi-seat boats the rowing pace at start may be 48 strokes

per minute (Secher, 1993). Taller and bigger athletes can produce more work per stroke, which means that their distance per stroke is longer. Smaller athletes can not achieve such a long stroke distance, so they have to use higher stroke rate to compete with others (Kleshnev, 2006). However, our findings showed that men double scull rowers who were the tallest had the highest average pace in distance – 38.5 strokes/min, and women single scull rower who was the smallest in height had the distance finished in the lowest average pace – 31.6 strokes/min. Although the speed changes in the distance of the Lithuanian women single scull rower were high and she had the lowest average rowing pace, she kept up with the high average speed of the whole distance and was able to win at the European championships. More rational allocation of powers in achieving lower speed changes in distance would allow her to use her possibilities even more successfully.

CONCLUSIONS AND PERSPECTIVES

It was determined that the Lithuanian rowers finished the distance in the Final A at the European Championship 2012 differently. The speed changes in the distance of men single scull and double scull rowers were among the lowest compared to those of other finalists, and women single scull rowers' speed changes in the distance were among the highest. The average pace of the Lithuanian men crews was the highest compared to the one of other participants of Final A, and women single scull had the lowest pace compared to other participants of Final A.

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LIETUVOS IRKLUOTOJŲ VARŽYBŲ NUOTOLIO ĮVEIKIMO YPATUMAI 2012 METŲ EUROPOS ČEMPIONATE

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SANTRAUKA

Tyrimo pagrindimas ir hipotezė. Irklavimo sporte skiriamas nepakankamas dėmesys nuotolio įveikimo ypatumams ir lenktynių taktikai. Tuo tarpu kasmet didėjant pasaulio ir Europos čempionatų finalininkų valties greičiui ir rezultatų glaudumui, lemiamos reikšmės gali turėti lenktynių taktika. Nors Lietuvos irkluotojų klausimais mokslinių publikacijų yra paskelbta nemažai, Lietuvos irkluotojų varžybų nuotolio įveikimo ypatumai tiriami nepakankamai.

Tikslas – nustatyti Lietuvos irkluotojų varžybų nuotolio įveikimo ypatumus 2012 m. Europos čempionate.

Metodai. Taikyti šie tyrimo metodai: literatūros šaltinių analizė, varžybų protokolų analizė. Remiantis 2012 m. Europos irklavimo čempionatų techniniais protokolais (http://www.worldrowing.com/results/), išnagrinėtas 84 įgulų vidutinis nuotolio įveikimo greitis ir greičio pokyčiai skirtingose nuotolio dalyse. Palyginta Lietuvos vyrų vienvietės, porinės dvivietės ir moterų vienvietės irkluotojų bei geriausių Europos irkluotojų nuotolio įveikimo ypatumai ir taikomi taktikos variantai.

Rezultatai. Lietuvos irkluotojai greičiausiai įveikė pirmą 500 m nuotolio dalį ir taikė 1–3 ir 1–4 taktikos variantus. 2012 m. Europos čempionate Lietuvos irkluotojų nuotolio įveikimo greičio pokyčiai siekė 1,70–2,69%. 2012 m. Europos čempionate 4–6 vietas užėmusios įgulos pirmoje nuotolio dalyje labiau viršijo savo vidutinį nuotolio įveikimo greitį, negu 1–3 vietas užėmusios įgulos ($p < 0,05$).

Aptarimas ir išvados. Lietuvos vienvietės ir dvivietės irkluotojų nuotolio įveikimo greičio pokyčiai buvo vieni mažiausių, o vidutinis tempas – didžiausias, lyginant su kitais finalistais. Moterų vienvietės irkluotojos nuotolio įveikimo greičio pokyčiai buvo vieni didžiausių, o vidutinis tempas – mažiausias, lyginant su kitomis A finalo dalyvėmis. Nors Lietuvos vienvietininkės nuotolio įveikimo greičio pokyčiai buvo dideli ir mažas irklavimo tempas, išlaikytas didelis vidutinis viso nuotolio įveikimo greitis leido įtikinamai nugalėti Europos čempionate.

Raktažodžiai: valties greitis, taktika, yrių skaičius.

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