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## **Analysis of the show jumping competition according to the type of seat and the way of driving into the obstacle. Part II**

Analiza konkursów skoków przez przeszkody w zależności od rodzaju dosiadu i sposobu najazdu. Część II

**Summary.** A perfect synchronization of the rider and the horse is an art requiring a lot of skill and intuition as well as advanced horse training. The correct body-weight balance allows the rider to smoothly change the riding positions. While observing the riders on the jumping courses we can note a wide variety of riding positions in the distance ride as well as approaching the obstacle. The research was conducted during competitions in show jumping. The analysis was based on 80 riders participating in 4 competitions, 27 of which were not of Polish nationality. The total of 93 horses was taken into consideration. Special attention was paid to the sitting position in different elements of the round (arches, turns, lines etc.). There were three dominating riding positions: half seat – HS – 1, light seat – LS – 2, full seat – FS – 3. In order to show more detailed characteristics of the aforementioned riding positions three last fouls before the jump are presented in a so-called “sequence”. The most effective sequence in approaching verticals and double bars was sequence II (full seat – full seat – light seat), in case of oxers the least fault-prone was sequence I (3 full seats). The analysis showed that the best riders chose a light seat most frequently. However, it was the full seat that was chosen most often and the correlation between this riding position and the number of faults is significant.

**Key words:** show jumping, seat type, seat sequences, approach type

### INTRODUCTION

A perfect synchronization of the rider and the horse is an art requiring a lot of skill and intuition as well as advanced horse training [Mueseler 2001]. Success depends on the correct planning being a result of course observation but also quite often on the decisions made

Table 1. List of particular competitions  
Tabela 1. Zestawienie poszczególnych konkursów

No	Name of competition Nazwa konkursu	Type of competition Rodzaj konkursu	Height of obstacles Wysokość przeszkód	Number of riders in a competition Liczba zawodników w konkursie		Number of horses in competition Liczba koni w konkursie
				Polish polscy	foreign zagraniczni	
1	ZOO* mjr Wiktor Ołędzki memorial ZOO* mem. mjr. Wiktora Ołędzkiego	Open Round Runda Otwarta	120 cm	21 (22)	-	22
2	ZOO*** Barbara and Andrzej Osadziński memorial ZOO*** mem. Barbary i Andrzeja Osadzińskich	Junior Round Runda Juniorska	135 cm	8 (11)	-	11
3	CSI*** – W TORWAR – World Cup Final Central European League, VATTEN-FALL S.A. Prize CSI*** – W TORWAR – finał Pucharu Świata Ligi Europy Centralnej, konkurs o nagrodę VATTEN-FALL S.A.	Small Round Mała Runda	140 cm	14 (14)	10 (10)	24
4	CSI*** – W TORWAR – World Cup Final Central European League, Warsaw Capital City President Prize – phase I CSI*** – W TORWAR – finał Pucharu Świata Ligi Europy Centralnej, konkurs o nagrodę Prezydenta Miasta Stołecznego Warszawy – I faza	Big Round Duża Runda	145 cm	10 (13)	17 (23)	36
	Total/Razem	-	-	53 (60)	27 (33)	93

on the spot and movements invisible to an ordinary eye. The rider is expected to optimally use the energy of the horse and channel it into a calm and harmonious ride. Using all basic riding means the rider communicates with the horse providing all information needed to carry out the ride plan. Correct body-weight balance allows the rider to smoothly change the riding positions [de Nemethy 1997, von Dietze 2007]. A conscious

change of the riding position should positively influence the horse's reactions and allow the animal for a balanced movement while approaching and jumping over the obstacle. While observing the riders on the jumping courses we can note a wide variety of riding positions in the distance ride as well as approaching the obstacle [Paalman 1979]. The correlation between the chosen riding position in arches, turns and approaches and the number of faults per turn is indeed intriguing. The analysis of the conducted research aims at defining such correlations as well as interpreting them in order to identify the most effective way of riding.

#### MATERIAL AND METHODS

The research presented in this paper was conducted during the National (ZOO<sup>\*\*\*</sup>, ZOO<sup>\*</sup>) and International (CSI<sup>\*\*\*</sup>) competitions in show jumping. The analysis was based on 80 riders participating in 4 competitions, 27 of which were not of Polish nationality. The total of 93 horses was taken into consideration (Tab. 1).

The basis of the research consisted of the videos of the full rounds recorded with Sony Digital 8 digital camera. The riding techniques filmed on the videos were in turn carefully analyzed. Special attention was paid to the sitting position in different elements of the round (arches, turns, lines etc.).

There were three dominating riding positions: half seat – HS – 1, light seat – LS – 2, full seat – FS – 3. Half seat – the rider is bent in hips, more or less to the front, his weight is placed strongly on the thigh, knee or foot. Light seat – it is a rider's stance between full seat and half seat. Only the inner parts of the rider's thighs have contact with the saddle. Full seat – the rider sits so straight, that a vertical line may be drawn from his ear, through the shoulder, hip and ankle.

In order to show a more detailed characteristics of the mentioned riding positions three last fouls before the jump are presented in a so called "sequence" (Tab. 2).

Table 2. Sequence designation

Tabela 2. Oznaczenia sekwencji

Letter designation Oznaczenie literowe	Number designation Oznaczenie liczbowe	Sequence no. Numer sekwencji
PPP	333	I
PPL	332	II
PSPL	132	III
LLL	222	IV
PSLL	122	V
PSPP	133	VI
LPP	233	VII
PSPSP	113	VIII
PSPSL	112	IX
LLP	223	X
PLL	322	XI
PSPSPS	111	XII
PPPS	331	XIII

## RESULTS

**The characteristic of the way of approaching the obstacle (sequences)**

The competition analysis proved that in the last three fouls before the jump the riding positions can be classified as a repetitive patterns. Thus it seems logical to check if there are any connections between applying a given sequence and the effectiveness of the jump.

The sequence most frequently chosen by the riders was sequence I (3 full seats). It was chosen 366 times in all analyzed competitions. This means that 72% of all riders chose this particular sequence – Table 3. The most successful rider of the Big Round approached the obstacles in a sequence of 3 light seats (sequence IV), which in the final comparison (Tab. 3) ranked third (28%). In individual competitions, this sequence was ranked second by the number of riders choosing it in the Open and Junior Round.

Table 3. Number of sequences in the competitions  
Tabela 3. Liczba poszczególnych sekwencji w konkursach

Sequence no. Numer sekwencji	Open Round Runda Otwarta		Junior Round Runda Juniorska		Small Round Mała Runda		Big Round Duża Runda		Total Razem	
	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%
I	81	63.6	42	72.7	119	75.0	124	75.0	366	72.0
II	36	31.8	5	9.1	54	45.8	51	47.2	146	38.7
III	2	4.5	0	0.0	9	20.8	5	8.3	16	9.7
IV	31	45.5	12	18.2	18	12.5	25	30.6	86	28.0
V	9	22.7	0	0.0	3	8.3	9	16.7	21	14.0
VI	.	4.5	0	0.0	7	8.3	18	19.4	26	10.8
VII	.	4.5	0	0.0	0	0.0	3	2.8	4	2.2
VIII	0	0.0	0	0.0	2	8.3	2	5.6	4	4.3
IX	12	27.3	0	0.0	5	8.3	7	8.3	24	11.8
X	0	0.0	0	0.0	0	0.0	2	5.6	2	2.2
XI	2	4.5	0	0.0	.	4.2	5	13.9	8	7.5
XII	6	9.1	0	0.0	0	0.0	0	0.0	6	2.2
XIII	.	4.5	0	0.0	0	0.0	0	0.0	.	1.1

The second most recurrent sequence (146 times) was sequence II (full seat – full seat – light seat). This also means that 38% of all riders decided to chose it. Only in the Junior Round this sequence was less frequent (5 times) especially in contrast to sequence IV (12 times). Sequence V ranked fourth by the total number of sequences in a competition as well as by the percentage of riders choosing it. However it is worth mentioning that this sequence did not appear at all in the Junior Round. As far as sequences VI and IX are concerned, they were chosen 26 and 24 times respectively with the percentage of

riders choosing them reaching 10.8% and 11.8%. Those did not appear in the Junior Round either. Additionally, sequence VI dominated in the Big Round (18 times). The sequence half seat – full seat – light seat (no. III) was chosen only 16 times in all observed competitions, most frequently in the Small Round (9 times). All remaining sequences appeared in all competitions no more than 8 times.

The values presented in Figure 1 were calculated as a ratio of the number of times of particular sequence after which faults on obstacles occurred to the total number of a given sequence in the competition. In the Open Round the sequences followed by the largest amount of errors were IV (100%) and XIII (100%). It should be noted, however, that each of those appeared in the competitions only once. A lot less faults were observed in the sequence half seat – half seat – light seat (no. IX) – 33%. Nevertheless, this sequence is ranked second by the number of faults following it. A relatively small number of faults (16.7%) followed sequences II and XII. There is a significant difference in the frequency of those, however, 36 to 6 respectively. At the same time sequence I resulted in the smallest percentage of faults (11.1%) with a very high frequency of appearance (119 times). Sequences III, VII, VIII, X, XI were not chosen by any of the riders.

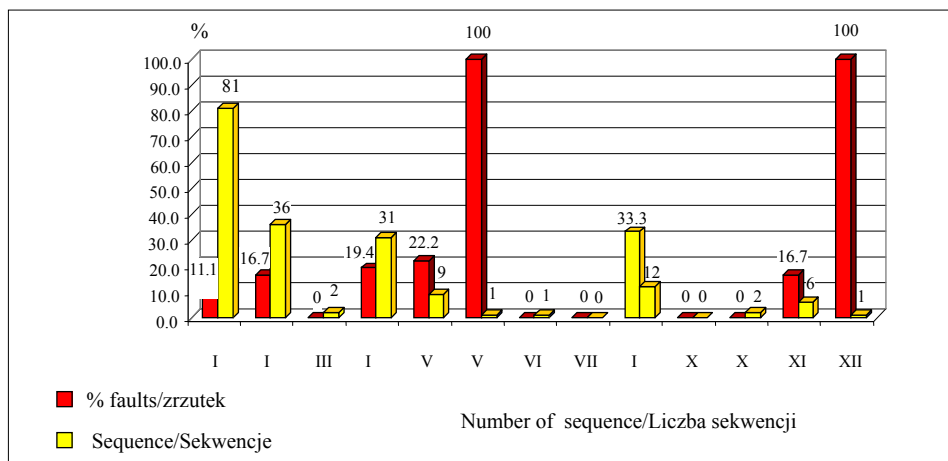


Fig. 1. The faults by the approaching sequence in Open Round (%)

Rys. 1. Błędy popełnione w zależności od sposobu najazdu w Rundzie Otwartej (%)

In Junior Round (Fig. 2) the riders chose only 3 types of sequences – I, II, IV. Sequence III did not appear in any of the rides. However, with sequence II no fault was observed. The most faults followed sequence IV (50%), although it was chosen relatively rarely (12 times).

In the Small Round (Fig. 3) the number of faults following sequence IX (20%) is significantly higher than in case of sequence I (4%). Additionally, it should be noted that in case of sequence IX the percentage of faults is higher, even though the frequency of appearance is lower. It can be thus assumed that choosing this sequence causes more faults in the following jumps. With three light seats (5.6%) – sequence IV, the number of errors was the lowest, however the frequency of appearance was relatively low as well. As far as the sequence II is concerned the percentage of faults was twice as large

(11.1%) as in case of sequence IV, but it appeared 54 times. Comparing the percentages of faults by means of a simple calculation ( $x = 5.6 \cdot 54 / 18$  to  $x = 16.8\%$ ) we can conclude that sequence II was in fact the less fault-prone. Sequences V, VI, VII, VIII, XI proved to be the most effective since they were not followed by any faults. All remaining sequences (X, XII, XIII) were not chosen by any rider competing in the Small Round.

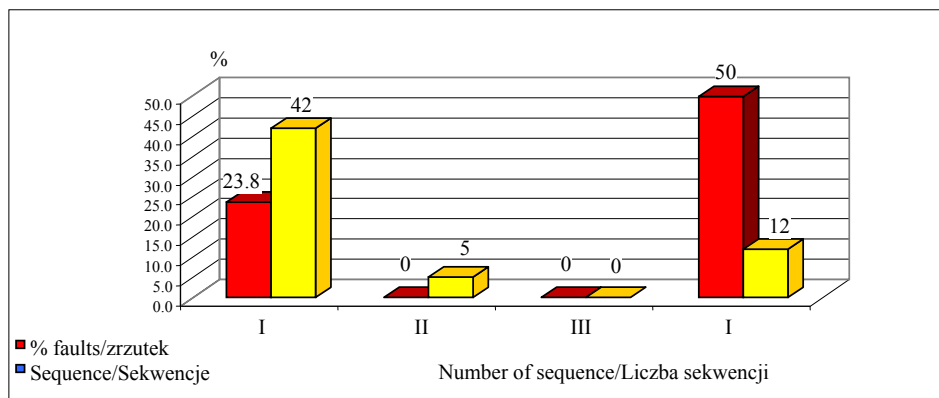


Fig. 2. Faults by the approaching sequence in Junior Round (%)  
Rys. 2. Błędy popełnione w zależności od sposobu najazdu w Rundzie Juniorskiej (%)

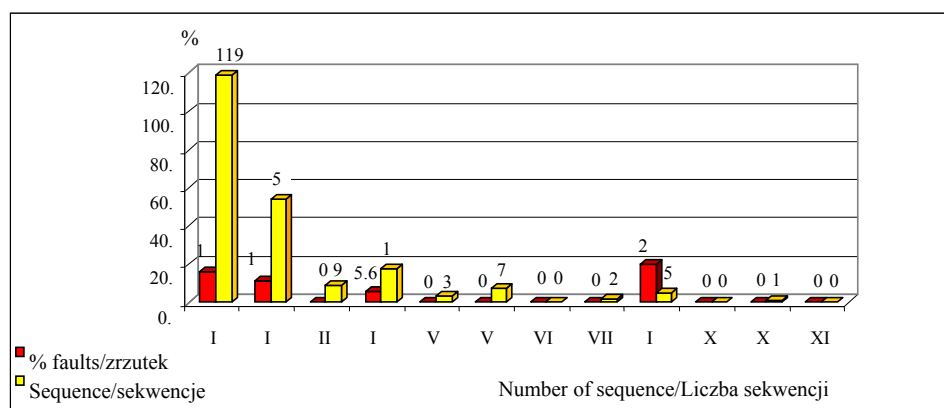


Fig. 3. Faults by approaching sequence in the Small Round (%)  
Rys. 3. Błędy popełnione w zależności od sposobu najazdu w Małej Rundzie (%)

During the most challenging competition (Big Round – Fig. 4) the largest number of faults appeared in the sequence half seat – half seat – full seat (50.0%), marked as sequence VIII. This sequence was chosen twice in the whole competition. Therefore in this case we cannot clearly judge its effectiveness. When looking at the fault percentage, sequences III, IV and V were quite similar (20%, 20% and 22% respectively). Sequence VI rated a little lower (16.7%). When comparing their values it is clear that the sequence followed by the least number of faults was sequence IV (3 x light seat). Sequence II

resulted in the smallest percentage of faults (3.9 %) with quite high frequency of appearance (51 times). Sequences VII, IX, X, XI were followed by no faults, however their frequency was also extremely low. Sequences XII and XIII did not appear.

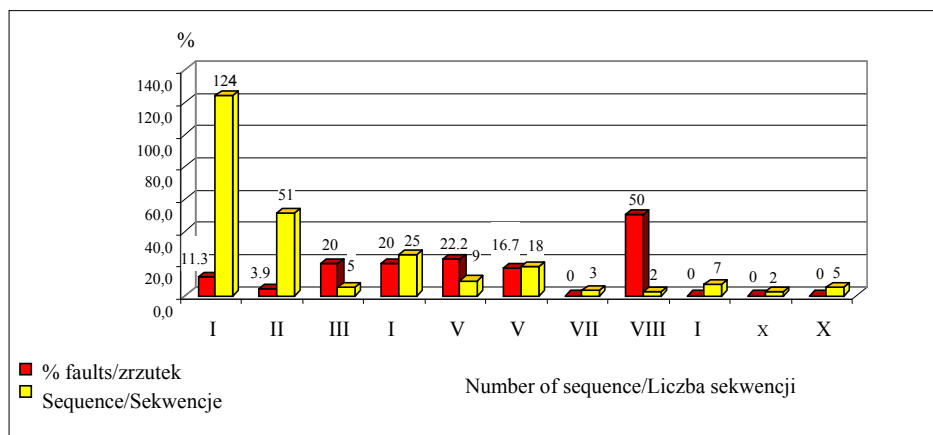


Fig. 4. Faults by approaching position in the Big Round (%)

Rys. 4. Błędy popełnione w zależności od sposobu najazdu w Dużej Rundzie (%)

Data presented in Table 4 reveal that sequence I (triple full seat) was the most often used when approaching all obstacle types: 16.5% approaches resulted in errors at post and rails, 12.7% at oxer, 21.2% at doublebars, and 33.3% at brook.

Table 4. Faults after approaching from arches and turns by sequence (%)

Tabela 4. Błędy popełnione po najeździe z łuków i zakrętów w zależności od zastosowanej sekwencji (%)

Sequence no. Liczba sekwencji	Vertical/Stacjonata		Oxer/Okser		Doublebar Doublebar		Open water Rów z wodą	
	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji	%	total number of sequences ogólna liczba sekwencji
I	16.5	127	12.7	63	21.2	85	33.3	9
II	5.9	51	18.2	33	8.8	34	-	0
III	16.7	6	0.0	.	0.0	2	-	0
IV	27.6	29	17.6	17	28.6	14	50.0	2
V	25.0	8	100.0	.	16.7	6	-	0
VI	0.0	9	0.0	5	42.9	7	-	0
VIII	33.3	3	0.0	.	-	0	-	0
IX	18.2	11	50.0	2	20.0	5	-	0
XII	33.3	3	0.0	.	0.0	.	-	0
XIII	100.0	.	-	0	-	0	-	0

Sequence II appeared to be another one that refer to the application frequency (full, full, and light seat), and resulted in 5.9% errors at post and rails and much more at obstacles of high and wide dimensions: oxer – 18.2%, doublebars – 8.8%. This type of

approaching was absent in the case of brook. Sequence IV (triple light seat) was also interesting, which despite of often application, made remarkable percentage of errors at all types of obstacles (Tab. 4).

While approaching the obstacle from the left turn (Fig. 5) sequence IX resulted in most faults in all competitions (16.7%). Sequences I and IV resulted in comparable values (6.4% and 7.1% respectively). Sequence I proved to be the more effective one – it was chosen most often (110 times) and was followed by a very slight percentage of faults. The sequences that proved to be most effective were III, V, VI, VII, VIII, X, XI, XII. Those resulted in no faults. This however does not allow for any conclusions about their overall effectiveness as their frequency was too low.

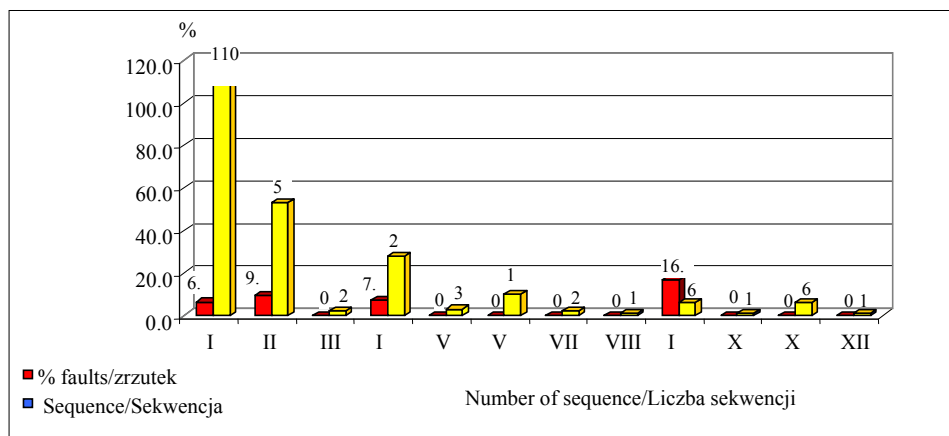


Fig. 5. Faults after approaching from the left turn by sequence (%)

Rys. 5. Błędy popełnione po najeździe na przeszkodę z lewego zakrętu w zależności od zastosowanej sekwencji (%)

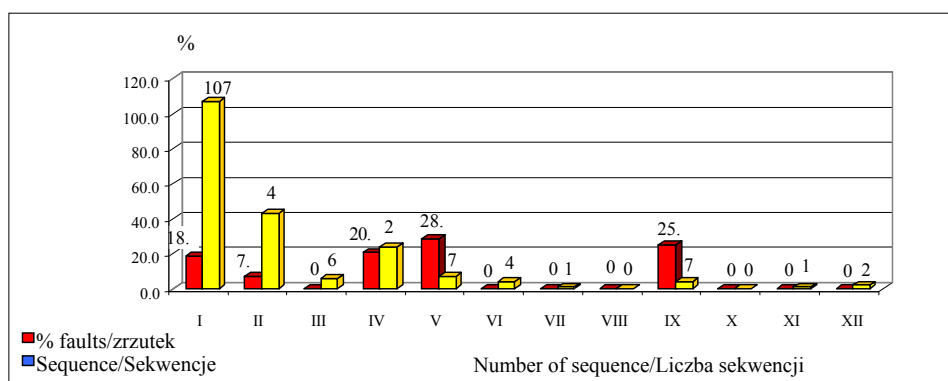


Fig. 6. Faults after approaching from the right turn by sequence (%)

Rys. 6. Błędy popełnione po najeździe na przeszkodę z prawego zakrętu w zależności od zastosowanej sekwencji (%)





Right turns (Fig. 6) were more challenging for riders than left turns. A more sequences a followed by faults (7), moreover the percentage of faults in each sequence was in this case higher.

Sequence V (half seat – light seat – light seat) was most fault-prone. Also sequence IX resulted in a large number of faults (25.0%). The least number of faults followed sequence II (7.0%) even though it was chosen quite often in the right turn jumps. One more time sequences III, VI, VII, XI, XII proved to be the most effective. Sequences VII and X did not appear.

During the left arch approaches (Fig. 7) the riders chose less sequences than in case of let arches. Nevertheless, the number of sequence types followed by faults was the same as in the example discussed above (6). This time the highest number of faults followed sequence VIII (half seat – half seat – full seat) and reached 50.0%. Just like in case of Big Rounds (Fig. 4.) the frequency of the sequence (2) is too low to judge its effectiveness. The remaining sequences were followed by less faults but still caused a significant number of those; sequences III and V – 33.3%, sequence IV only 25.0%. Sequence II was followed by only 4.0% of all faults in the left arch jumps. Just like in case of the right turns (Fig. 6) and Big Round Competition (Fig. 4) this sequence proved to be the least fault-prone with relatively high frequency of appearance.

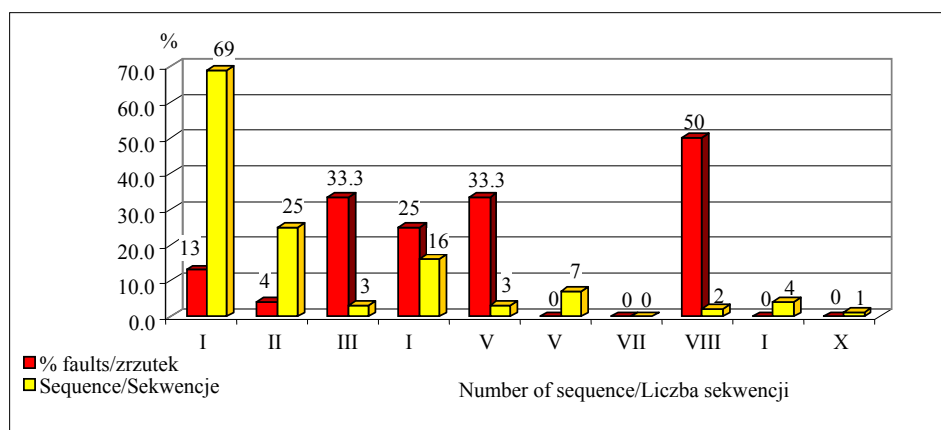
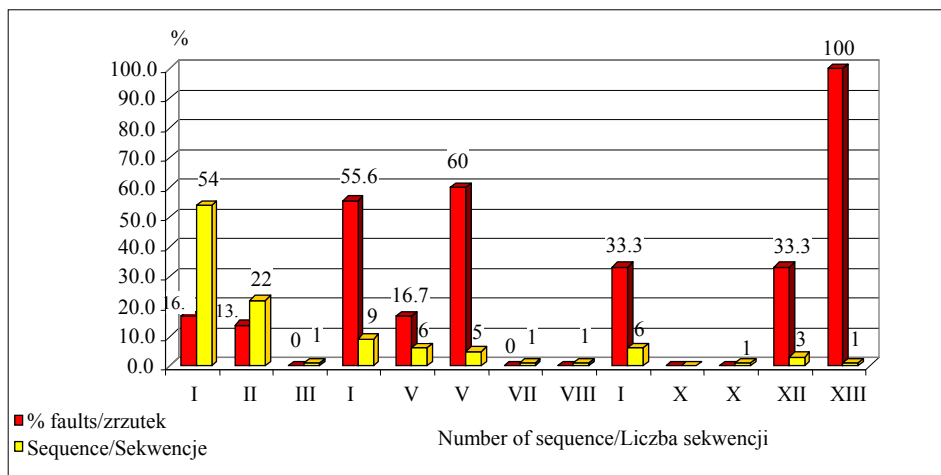


Fig. 7. Faults after approaching from a left arch by sequence (%)  
Rys. 7. Błędy popełnione po najeździe na przeszkodę z lewego łuku w zależności od zastosowanej sekwencji (%)

Approaching the obstacle from the right arch (Fig. 8) led to faults in the largest number of sequences. Sequence XIII was chosen only once. What's more, it was directly followed by a fault. Sequences causing the most faults (60 and 55.6%) were sequences VI and IV respectively and appeared 6 and 9 times. Significantly less faults followed sequences IX and XII (33.3%), in case of XII more faults appeared in proportion to the total appearances (3 times). Sequences I (16.7%), V (16.7%) and II (13.8%) constituted a relatively low percentage of all sequences followed by faults. It should be noted, however, that even though sequences I and V were followed by the same percentage of error, the latter proved to be less effective as it appeared on 8 times. Just like in case of left

arches and right turns sequence II had the lowest value of all. Only 5 sequences out of 13 were not followed by any faults.

The best riders in all competitions chose sequence II (half seat – full seat – light seat) most often (5 times) for all types of obstacles with the exception of the open water. In case of triplebar this sequence was chosen as often as sequence IV (1 time). In case of the open water obstacle, which only appeared in Junior Round, the best rider of this competition approached with last three fouls in full seat.



Rys. 8. Błędy popełnione po najeździe na przeszkodę z prawego łuku w zależności od zastosowanej sekwencji (%)

Fig. 8. Faults after the right arch approach by sequence (%)

Even though sequence II was the most frequently chosen by the best players, it did not appear in the Big Round in any type of the approach or type of the obstacle. In this type of competition for verticals, triple bar and wall sequence IV was most frequent (2, 1 and 1 time respectively), in case of oxers and double bar sequence VII was most popular (1 and 2 times).

In the Small Round sequence II appeared the same number of times as sequence I in case of verticals (2 times) and double bars (1 time). In case of oxers only sequence II appeared (two times). In Open Round, the most successful rider chose a different sequence in each approach (I, II, IV, IX once each). He approached the other types of obstacles with sequence II. This sequence was also chosen by the most successful rider of the Junior Round in approaching all types of obstacles, with the exception of the open water obstacle mentioned before.

The least successful riders chose sequence I most often. The only exceptions were oxers, where each sequence appeared once (I, IV, V, VI, VIII, IX). In the both Big and Small Round, the least successful riders chose 3 repeated full seats before the jump (sequence I), with the exception of oxe approach in the latter. The most approaches to verticals (3) were performed in sequence VI (half seat – full seat – full seat). In Junior Round all jumps were preceded with sequence IV. In the Open Round the approaches to different types of obstacles were quite varied.

## DISCUSSION

Ride during a competition should be a final test of the horse's training and rider's skills. Elements that determine the difficulty level of a given track are: number and height of obstacles, their situation, line geometry [Koziarowski and Jankowski 2000, Koziarowski and Jankowski 2006], number of direction changes in combination with the leg change, or distance between particular obstacles [Peham *et al.* 2004]. Many authors [de Nemethy 1997, Mueseler 2001, PZJ, 2004a, von Dietze 2007] emphasized the importance and significance of the seat, which was referred to as principle and the most direct mean of communication with a horse [de Nemethy 1997, PZJ 2004a]. The seat type and its application frequency greatly depends on the skills and training level of both rider and horse. The approach determines in large measure a given jump over the obstacle.

During the approaching, rider should use well-coordinated equestrian means and balances seat [PZJ 2004b]. Type of the seat during approach is not strictly defined due to different ways of horse's jumping and their individual motion abilities. A rider can present any seat unless it keeps a rhythm, appropriate movement, and necessary impulse [PZJ 2004b]. Grabowski suggested that in situation when a horse approaches in a good way to an obstacle, the rider should not interfere, but allow it for acting and selecting a suitable take-off point [Grabowski 1967, Paalman 1979]. The own study confirmed that full seat was the most often applied during the obstacle approach, while it resulted in large number of errors. The best competitors overcome the track using mainly the light seat.

Obstacle, depending on its situation within the track, can be overcome from the straight approach or from a turning [PZJ 2004b]. It was found that straight approach is the easiest both for a horse and a rider. Like smooth arcs, they also make possible to elongate the stride and to increase the movement. Overcoming the turning just before an obstacle requires more involvement from a horse. Appropriate bending degree, alignment of the horse at turning, and first of all the balance, all have the crucial influence on its right overcome [Bayley and Bowen 2007]. In the study of Sasimowski and Pietrzak [1983b], it was reported that number of left turnings during equestrian competitions was higher than the right ones. Nevertheless, studies performed by some authors revealed that jumps done from a turning are less precise and resulted in larger number of errors [Stachurska *et al.* 2001]. The own study indicated that right turnings caused more difficulties for riders than the left ones. It probably results from the fact that most horses is more elastic to the left side [Paalman 1979].

Number of total errors at a given obstacle during the show jumping competition and associated penalty scores illustrates the difficulty degree of that obstacle [Sasimowski and Pietrzak 1983a, Stachurska *et al.* 2002]. Sasimowski and Pietrzak [1983b] as well as Stachurska *et al.* [2002] considered that post and rails and oxers are relatively difficult and invoke larger number of knock downs. Our analysis revealed that post and rails and double bars were the obstacles making the largest difficulties (depending on their presence frequency) regardless the approaching sequence applied.

## CONCLUSIONS

1. The most effective sequence in approaching verticals and double bars was sequence II (full seat – full seat – light seat), in case of oxers the least fault-prone was sequence I (3 full seats).

2. The analysis showed that the best riders chose light seat most frequently. However, it was the full seat that was chosen most often and the correlation between this riding position and the number of faults is significant.

3. The best riders in all observed competitions chose sequence II (full seat – full seat – light seat) for each type of obstacle, while the least successful riders tended to choose sequence I (3 full seats).

4. Riding in light seat positively influences jumping over the verticals, double bars and walls, but it has a negative effect in case of triple bars and oxers, where full seat proved to be more effective.

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**Streszczenie.** Idealne współdziałanie konia i jeźdźcy jest sztuką wymagającą dużych umiejętności i wyczucia ze strony jeźdźcy oraz wysokiego stopnia wyszkolenia konia. Utrzymanie właściwej równowagi pozwala jeźdźcy na płynne przejścia pomiędzy poszczególnymi rodzajami dosiady. Obserwując zawodników na parkurze, można zauważyć dużą różnorodność w stosowaniu poszczególnych rodzajów dosiady, zarówno w dystansie, jak i podczas najazdu na przeszkodę. Badania przeprowadzono podczas zawodów rozgrywanych w dyscyplinie skoków przez przeszkody. Analizie poddano 4 konkursy, w których łącznie udział wzięło 80 zawodników, w tym 27 spoza granic Polski. Ogółem wystartowały 93 konie. Szczególną uwagę zwrócono na rodzaje dosiady stosowane przez zawodników w różnych elementach przejazdu (łuki, zakręt, linie itp.). Wyodrębniono trzy zasadnicze rodzaje dosiady: półsiad, lekki siad, pełny siad. W celu uzyskania dokładniejszej charakterystyki dotyczącej zróżnicowania rodzajów dosiady trzy ostatnie foule poprzedzające odskok poukładano w tzw. sekwencje. Najskuteczniejszą sekwencją w dojeżdżaniu do stacjonat i doublebarrów okazała się sekwencja II (pełny siad – pełny siad – lekki siad), natomiast w odniesieniu do okserów najmniej błędów popełniono przy zastosowaniu sekwencji I (3 foule w pełnym siadzie). Analiza całych przejazdów wykazała, iż zawodnicy najlepsi pokonywali parkur z przewagą lekkiego siadu. Pełny siad okazał się jednak najczęściej stosowany i stwierdzono duży związek takiej jazdy z liczbą popełnianych błędów.

**Słowa kluczowe:** skoki, rodzaj dosiady, sekwencje dosiadów, sposób najazdu