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The quality of landing in the gymnastic exercises, as seen by coaches in acrobatic gymnastics and tumbling

Rafał Grad, Kazimierz Kochanowicz

Gdansk University of Physical Education and Sport in Gdańsk,
The Faculty of Physical Education

Address for correspondence:
Rafał Grad, Akademia Wychowania Fizycznego i Sportu im. J. Śniadeckiego w Gdańsku, Wydział Wychowania Fizycznego
ul. Kazimierza Górskiego 1,
80-336 Gdańsk tel.: +48 663 491 900

e-mail: gradrafal@wp.pl

Summary

Introduction Landing in gymnastics is an important constituent of the final score and the place of the athlete in competitions. The problem of numerous mistakes made in the course of the landing is noticeable in gymnastics, but disregarded in sport acrobatics. Therefore the aim of this research has been to learn the opinions of Polish coaches of acrobatic gymnastics on landings and the mistakes commonly made in their course.

Source material and methods. The research was based on the diagnostic survey, utilizing the questionnaire method. The sample was 22 coaches of acrobatic gymnastics and tumbling, who have been approached during the Championship of Poland of Younger Juniors 2015. **Results.** The research showed the athletes to commit similar mistakes in landing during competition to those committed during training. This is also significantly affected by previous mistakes, named by the coaches as improper joining of elements and incorrect commencement of the last element. Through exercise routines and games the coaches attempt to eliminate landing mistakes.

Conclusions. The most common mistakes both during competitions and in training are steps/skips and unstable positioning of the body. Propping oneself up is significantly more common during competitions than it is during training, since it reduces the loss of points compared to the athlete falling down. During training, however, the athletes do not avoid falls, which results in smaller frequency of injuries during training. According to the coaches, the most important coordination capabilities for correct landing are: spatial orientation, balance and fast reaction time.
Keywords: landing, coaches, acrobatic gymnastics, tumbling

Introduction

Sports of the gymnastic family are characterized by a complex structure of motions performed within a minimal unit of time (Starosta 1989, 2003, Bołoban, Kochanowicz 1998, Kochanowicz et. all 2015, Kochanowicz et. all 2016). It is a group of disciplines in which the esthetic value and beauty are decided by the level of technical skill. Because of this character, the finish is, without doubt, an extremely important constituent of the end result (Bołoban et al. 2009; Marinsek 2011).

The landing completes an element or routine. It begins in the moment of athlete's feet touching the floor, with dissipation of the energy gained in motion by assuming a position of the body dictated by the rules of performed discipline. It ends with a balanced pose being maintained. Judges are tasked with evaluation of the performed routine's difficulty and quality of performance, according to the relevant set of regulations (FIG 2013a, 2013b). A correct landing confirms the technical correctness of of the element performed (Kochanowicz 2006; Sawczyn 2008, Niźnikowski 2009). With no regard to its difficulty, any imperfection will be noticed by the judges.

The research by McNitt Gray (1998), conducted in the course of the Olympic Games 1996 in Atlanta, has shown a large number of landing mistakes committed during the competition while dismounting the gymnastic apparatus. The competitors were to perform twenty dismountings from a horizontal bar and from parallel bars. Only one was performed without fault. Skowron et al. (2008) having analyzed the course of 2000 and 2004 Olympic Games man's team events point at the difference in score between the first and the third place (1,437 to 1,9 point). Further analysis of the video material revealed that one in every three competitors had landed unbalanced. For each of the 12 teams technical mistakes penalties would be as high as 2,5 points for landing. Having analyzed the 2004 Championship of

Europe, Marinsek (2009) found 70% of the competitors to have committed serious landing mistakes.

Despite a large number of papers that dealing with this problem referring to gymnastics, its noticing is more difficult in acrobatic gymnastics, resulting in a search for information among coaches, desiring to improve the quality of landings, so important for the athlete's final place in competition.

Therefore the aim of this research has been to learn the opinions of Polish coaches of acrobatic gymnastics on landings and the mistakes commonly made in their course.

Defined like this, there are several important preliminaries for the research:

1. What is the most commonly made landing mistake?
2. In what way do the coaches instill the correct landing techniques and see to them being carried out?
3. Which physical and coordination capabilities are crucial, in the coaches opinion, for the correct landing?

Material and methods of the research

The data sample was 22 coaches from 55 acrobatic gymnastics and tumbling clubs, approached during the Championship of Poland of Younger Juniors 2015. Eight of them had been women, 13 - men. The respondents age, level of education and number of years worked as a coach are shown in the Table 1. The method utilized had been a diagnostic survey, with a questionnaire as the research instrument. The questionnaire, constructed by the authors, consisted of 21 questions, both open- and close-ended, polytomous questions. The questions dealt with the correct landing during training and competitions.

Tab.1. The characteristics of the respondents

Sex	Male	13 respondents
	Female	9 respondents
Age	Average age	38
Finished schools	Secondary	1 person
	Higher	21 persons
Coach of	team acrobatics	11 persons
	tumbling	11 persons
Average number of years worked	as a coach	14,5
	instructor	11,4

Results

The analysis of the question dealing with the organization of clubs and acrobatic gymnastics training yielded information on the number of coaches in a club, number of training sessions, the duration of a session and the number of athletes under the care of one coach. Especially interesting is the fact of a large variability in duration of a training session (90 to 240 minutes in different clubs), as well as the prevalence of girls over boys among those training acrobatic gymnastics (Tab. 2).

Tab. 2. The characteristics of the acrobatic gymnastics clubs

	$\bar{x}$ Value	Min	Max
Number of coaches in the club	4	1	15
Duration of a training session	131 minutes	90	240
Number of sessions in a week	5	3	9
Number of trainees	7 boys	0	20
	21 girls	0	80

Asked about the way the athletes under their care perform the landing during training, 90,9% of the coaches declared that they always pay attention to the correctness of the landing. 9,1% declared they only do it if the landing is noticeably misperformed. The responses to further questions revealed that over 31% of the coaches react strongly to the athletes' mistakes, chastising them or even punishing in order to improve the athletes' focus, while 22% display such reactions infrequently. Curiously, from those who responded "yes" to the previous question 69,2% of the coaches declared they make their athletes repeat the misperformed element a number of times, taking care to land properly. Another 23,1% of the respondents make their athletes perform additional exercise - a jump and a correct landing. Only 7,7% of the respondents give their athletes additional strength exercises. According to the coaches, the most common mistakes during competitions are bending of arms and legs (25%) and faulty landings (25%), the faults being steps/skips, propping oneself up, falls and unbalanced position of the body. For other mistakes see Figure 1.

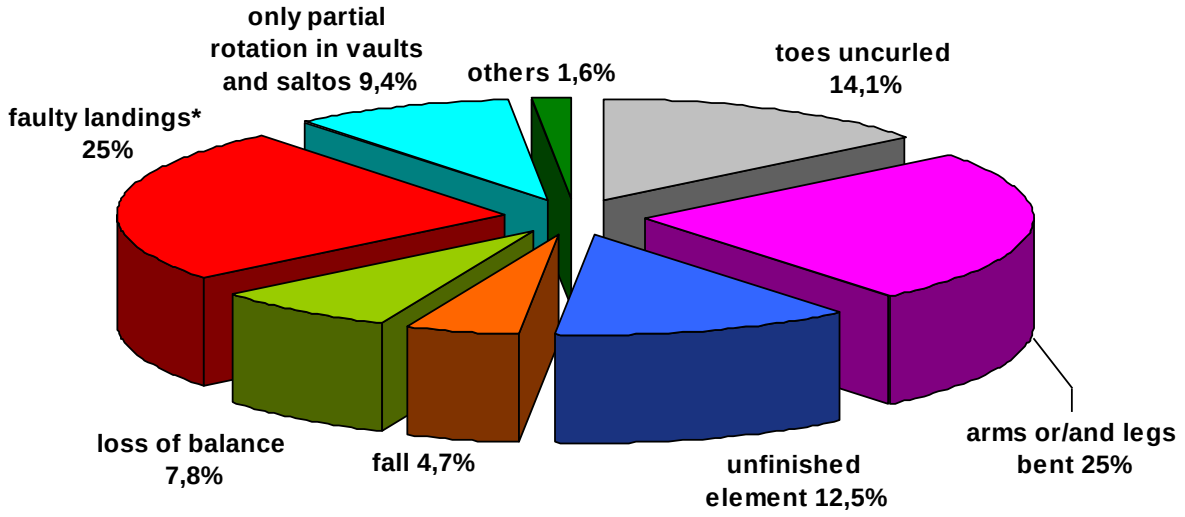

Fig. 1. The most common mistakes of athletes during competition

* steps/skips, propping up, falls and unbalanced position

Asked about the type of landing mistakes their athletes commit during training and competition, the coaches pointed at steps/skips and unbalanced position of the body. The third most common mistakes varies between training sessions and competition. During the competitions, the athletes prop themselves up more often, during training they fall more often (Fig. 2).

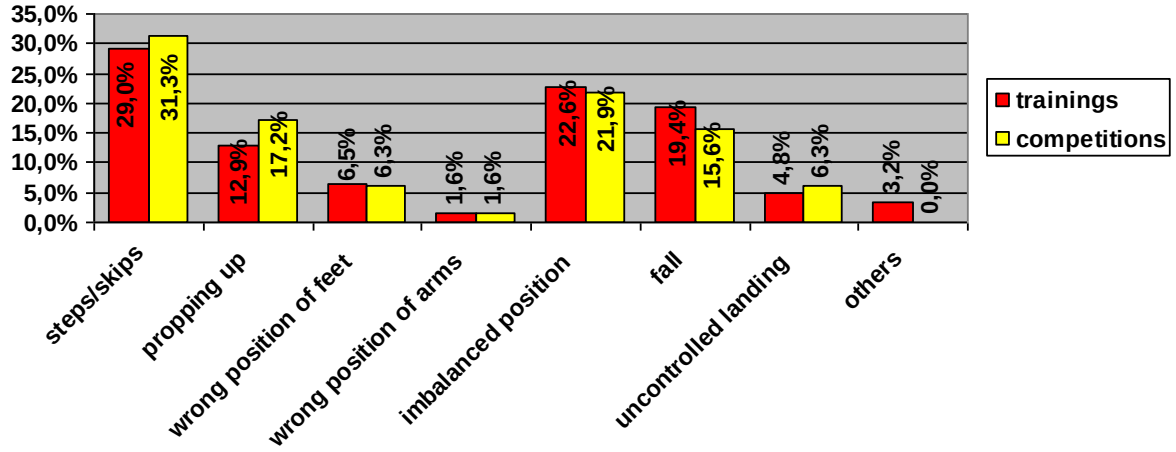

Fig. 2. The most common landing mistakes during training and competition

Further questions concerned the mistakes in performance that have a significant impact on the landing quality (Fig. 3). Most coaches named the improper joining of elements (29,5%), faults in commencing of the final element (21,3%) and the lack of "courbette",

(14,8%) or dynamic change from handstand to foot to jump, with arms held overhead. Both mistakes in the performance of the round-off and performing the element before the main one in too high a way were named by 11,5% of the respondents.

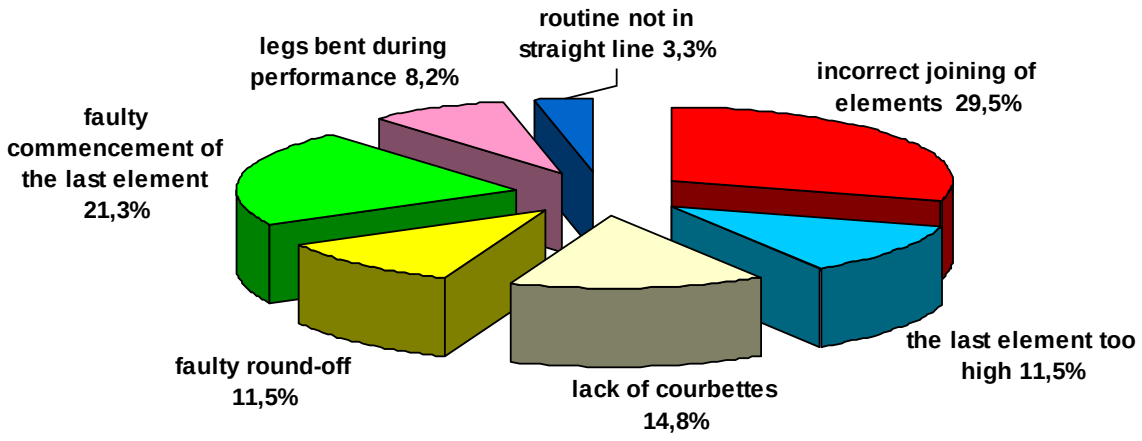

Fig. 3. Mistakes affecting the quality of landing

The next question was "Do you devote part of the training time to landings especially?" 68,2% of the coaches responded "yes". They coach their athletes in landings specifically for (average) 16 minutes, three times a week. Most coaches (68,2%) use exercise routines, with only 31,8% utilizing games (Fig. 4).

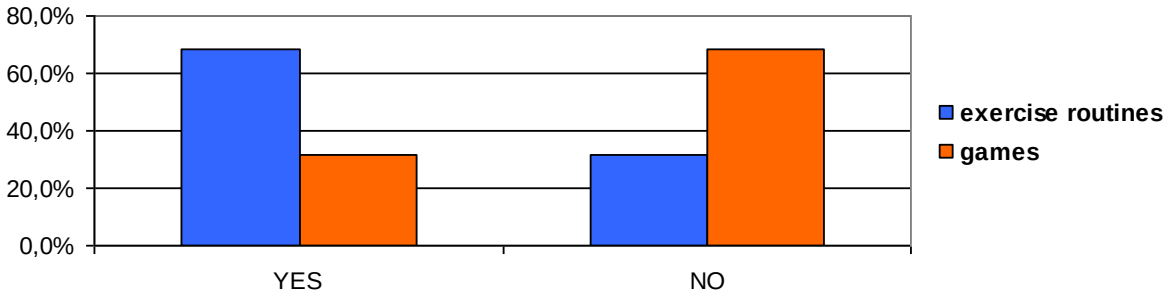

Fig. 4. Forms of landing activities utilized by coaches

The game most commonly mentioned by the respondents is "the glue game" on trampoline or tumbling track. The players have to perform various acrobatic routines, taking care to land

correctly. A correct landing earns the player one point. The player who has the most points wins.

95,5% of the coaches believe that difficulty of the elements the routine consists of may influence the athlete's balance during the routine as well as during the landing.

The questionnaire was designed to provide information on the coaches knowledge about the human sense of balance. For the question that called for enumerating the human organs of balance, only 27,3% of the coaches' answers named the vestibular system, visual system and both exteroception and interoception. To an additional question "Is it possible to train the vestibular system?" over 68% of the respondents answered "yes", while nearly 32% answered "no" or "I don't know" (Fig. 5).

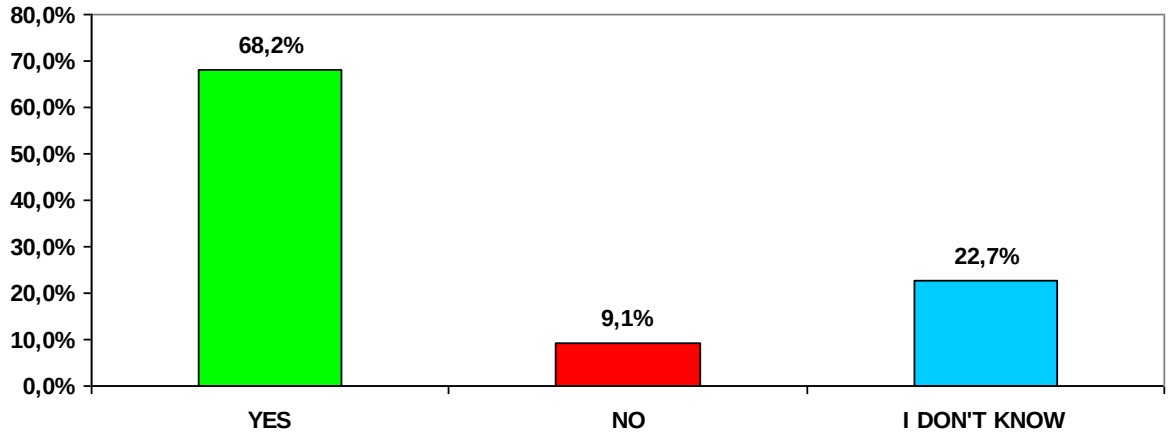

Fig. 5. Plot of the answers to "Is it possible to train the vestibular system?"

As part of the research, the coaches ordered the conditional and coordination capabilities according to the influence they're deemed to have on the correct landing, according to the respondents. They ranked the skills from 1 (the most important) to 4 or 6 (depending on the group) as the least important.

Among the conditional skills the most influential, according to the coaches, are speed-power and endurance-power capabilities (Fig 6).

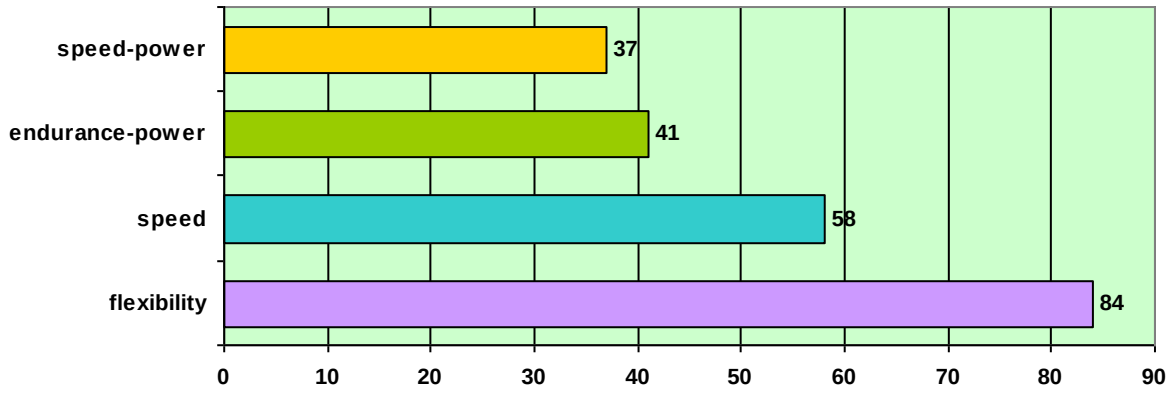

Fig. 6. The most important conditional capabilities for landings (n=22)

The respondents ordered coordination capabilities in a similar way. The most important, according to them, are spatial orientation and balance, followed by the speed of reaction (Fig. 7).

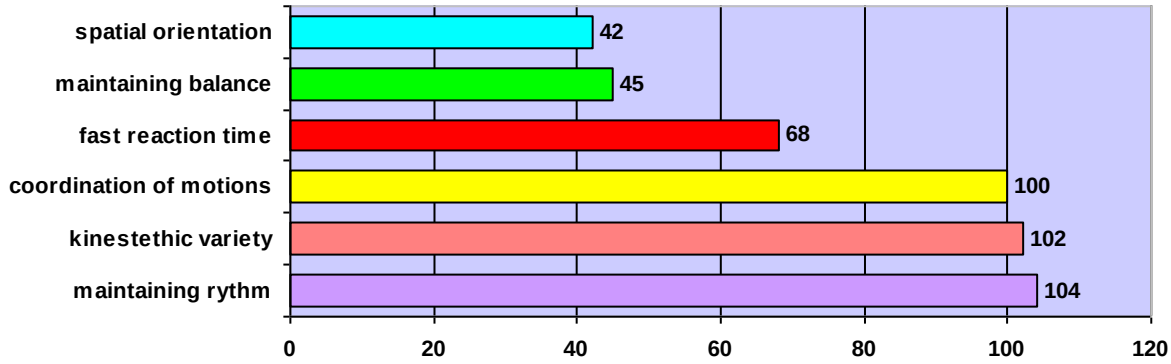

Fig. 7. The most important coordination capabilities for landings (n=22)

Discussion

In acrobatic gymnastics, landing is one of the most important elements that influence the final score. The judges notice the smallest technical imperfection, both in the performance and the finishing of each element. Depending on the type and severity of the mistake, even an entire point may be detracted. (FIG 2013a, 2013b). In the ending phase of the routine or a single element serious injuries ofter occur, which has been notes and confirmed by, among others, Kirialanis et al. (2002), Marshall et al. (2007) Bradshaw and Hume (2012). According to the papers mentioned, the most common injuries are those of the ankle and knee joints. The most injuries are sustained during the following events: floor exercises, dismounting bars and dismounting the horizontal bar. A large number of injuries during the floor exercises may be the result of 4 to 6 acrobatic routines being performed. Bołoban et al. (2009) and Marinsek

(2009) demonstrate the most common landing mistake to be steps/skips, which agrees with the author's results. In the coaches' opinion, the cause of faulty landing may be mistakes in joining of elements or in commencing of the last element, called by Bołoban (2009) the angle of plunging. He also points out that landings mistakes are strongly correlated to the general physical ability, the learned technique and the fixed habits of landing in a specific way.

The research shows that coaches utilize varied exercise routines and games in teaching and improving the landing techniques. Marisek and Cuk (2009; 2013) claim the importance of varied environment during landings. The environment in this case being not only the hardness of mats, height of the apparatus, but also the levels of noise and light.

The landing is a physical skill to be learned and practiced during the entire time of training.

Conclusions

1. The most commonly made landing mistakes both during the training and in competition are steps/skips and an imbalanced position. Propping oneself up is significantly more common during competitions than it is during training, since it reduces the loss of points compared to the athlete falling down. During training, however, the athletes do not avoid falls, which results in smaller frequency of injuries during training.
2. Most coaches utilize exercises or exercise routines for teaching correct landing techniques. Also, they observe the athletes during the performance, taking note of the way of finishing the acrobatic routine. In some situations they make the athletes repeat an element and land correctly, or ask them to perform several jumps and landings.
3. According to the coaches of acrobatic gymnastics and tumbling, the most important conditional capabilities are speed-power and endurance-power capabilities. Among the coordination abilities that have the most influence on the correctness of landings, the coaches name spatial orientation, balance and fast reaction time.

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