

THE LEVEL OF COORDINATION MOTOR ABILITIES OF PODKARPACIE DISTRICT SPORTS TEAMS MEMBERS IN MARTIAL SPORTS, SHOOTING AND ARCHERY

Stanisław CIESZKOWSKI

*Faculty of Physical Education, University of Rzeszow, Rzeszow, Poland
cieszko@onet.eu*

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Abstract:

The purpose of this study is an attempt to define the level of selected coordination motor abilities in boys aged 15 and 16 years, engaged in sports training within the scope of Podkarpackie Voivodeship sports teams. 83 athletes engaged in martial sports, as well as shooting and archery were examined. Agility (coordination of the entire body), simple reaction time, spatial orientation and movement frequency were assessed. The complete collected material was standardized in 0 and 1 of the total number of voivodeship teams members.

INTRODUCTION

Individual sports set various requirements with respect to coordination abilities [4, 7, 11, 13, 14]. Coordination motor abilities play a special role at the initial stages of training, since the development of coordination abilities that are most important for the given sport is the precondition for mastering the motion skills [10, 12]. The correctly performed improvement of coordination impacts positively the whole process of technical advancement [2, 10, 13].

Raczek et al. [8], point out that relations occurring between CMA and sports result change as a function of training. That means that they are closely correlated with results at the initial training level, and along with the increase of athletes' sports level they become more and more important as specific factors [3, 6, 12].

Based on research results, the models of coordination requirements for the individual sports were developed. Hirtz and Sass [2] Raczek [10] Ljach [5] defined the dominating coordination requirements in sports games and athletics, Blume and Habusch [1] in lawn tennis, whereas Zimmermann and Nicklisch in fencing [13].

The purpose of this study is an attempt to define the level of selected coordination motor abilities in boys aged 15 and 16 years engaged in training within the scope of Podkarpackie Voivodeship sports teams in martial sports, shooting and archery.

MATERIAL AND METHOD

Material for this study includes examination of physical and motor development of children and teenagers aged from 8 to 20 years engaged in sports training within the scope of Podkarpackie Voivodeship sports teams conducted in May 2013. For the purposes of this study, measurements of the selected coordination motor abilities were used, and the test group consisted of martial sports (boxing, freestyle and classical wrestling, sumo, karate, fencing), archery and shooting representatives. In general, the examination included 83 athletes aged 15

and 16 years. The assessment of coordination motor abilities was carried out using the following tests:

1. Agility (coordination of entire body) – 4x10 m shuttle run with moving blocks (according to IPFT instructions) (15).
2. Movement frequency – tapping with the more efficient hand (time of 25 touches of every ring was recorded)
3. Simple reaction time – measure of reaction time was used (time of reaction exclusively for visual stimuli in green was measured)
4. Spatial orientation – cross device was used (time of 49 impulses was recorded)

The complete collected material was analyzed using the basic methods of mathematical statistics. Arithmetic means along with supplements were calculated. In order to capture the intergroup differentiation, the average results of individual tests and sports events were standardized for 0 and 1 of the total number of examined voivodeship sports teams members.

TESTS RESULTS

Arithmetic means of analyzed coordination motor abilities along with supplements are presented in Table 1.

Table 1. The level of selected coordination motor abilities in boys aged 16 years, involved in training within the scope of Podkarpackie Voivodeship teams.

Sport		Spatial orientation	Reaction time	Movement frequency	Agility (coordination of entire body)
Shooting	X	66,67	24,06	11,33	10,99
	S	9,23	2,25	1,05	0,80
	V	14,97	9,35	9,27	7,28
	Min-max	80,41-46,79	27,17-20,42	13,34-9,80	12,38-9,56
Archery	X	76,57	28,94	13,77	11,34
	S	16,50	4,00	2,73	0,58
	V	21,55	13,82	19,83	5,11
	Min-max	113,37-59,36	35,77-22,85	19,01-9,73	12,49-10,74
Boxing	X	64,41	26,56	10,60	10,66
	S	8,99	1,43	0,75	0,46
	V	13,96	5,38	7,08	4,32
	Min-max	77,80-51,92	29,08-24,69	11,83-9,74	11,26-9,88
Freestyle wrestling	X	75,11	27,85	12,34	10,93
	S	16,27	2,04	1,50	0,65
	V	21,66	7,32	12,16	5,95
	Min-max	107,10-48,69	30,92-23,31	14,47-10,17	12,26-9,95
Wrestling (calssic style)	X	72,37	28,89	11,60	11,39
	S	11,64	3,39	1,49	2,12
	V	16,08	11,73	12,84	18,61
	Min-max	97,73-54,93	35,54-23,54	14,14-9,24	19,11-9,51
Sumo	X	67,57	28,49	11,83	11,04
	S	14,23	1,64	1,59	0,93
	V	21,06	5,76	13,44	8,42
	Min-max	88,23-54,93	29,54-25,85	13,67-10,15	12,01-9,89
Fencing	X	76,52	27,55	14,03	11,35
	S	15,87	3,38	1,62	1,06
	V	20,74	12,27	11,55	9,34
	Min-max	112,67-57,53	34,92-24,42	17,34-11,96	13,35-9,86
Karate	X	70,41	26,90	11,87	10,43
	S	15,44	5,46	2,47	0,19
	V	21,93	20,30	20,81	1,82
	Min-max	95,56-48,68	33,62-21,00	15,98-9,73	10,68-10,17
Control group	x	63,84	24,83	10,74	10,30
	s	12,73	2,95	1,33	0,39

1. Spatial orientation

Spatial orientation defines human's abilities to evaluate the position of body and changes of that position in relation to the reference point, as well as the ability to perform movements in desired directions (9). The highest level of that coordination motor ability features boxers. That group is also characterized by the lowest intragroup differentiation, what is evidenced by the size of the variation coefficient. On the other hand, archers and fencers proved to be by far the weakest in that test. In this case, differences in relation to the total number of voivodeship sports teams members are at the level of 1s and are statistically significant. The analysis of standardized indicators values show that athletes engaged in all discussed sports present a much lower level of the discussed ability in comparison to the total number of examined persons (Table 2 Fig. 1).

Table 2. Standardized in 0 and 1 indexes of district team members aged 15 and 16 years.

L.p	Sport	Spatial orientation			Reaction time			Movement frequency			Agility (coordination of entire body)		
		D	WU	t ⁰	D	WU	t ⁰	D	WU	t ⁰	D	WU	t ⁰
1	Shooting	-2,83	-0,22	0,80	0,77	0,26	0,93	-0,59	-0,44	1,59	-0,69	-1,77	4,31*
2	Archery	-12,73	-1,00	3,16*	-4,11	-1,39	4,37*	-3,03	-2,78	7,97*	-1,04	-2,67	8,00*
3	Boxing	-0,57	-0,04	0,15	-0,83	-0,28	1,00	0,14	0,11	0,37	-0,36	-0,92	3,00*
4	Freestyle wrestling	-11,27	-0,89	2,74*	-3,02	-1,02	3,68*	-1,60	-1,20	3,90*	-0,63	-1,62	4,50*
5	Wrestling (classic style)	-8,53	-0,67	2,29*	-4,06	-1,38	4,37*	-0,86	-0,65	2,10*	-1,09	-2,79	3,03*
6	Sumo	-3,73	-0,29	0,87	-3,66	-1,24	3,95*	-1,09	-0,82	2,66*	-0,74	-1,90	5,28*
7	Fencing	-12,68	-0,99	3,16*	-2,72	-0,92	2,99*	-3,29	-2,47	7,83*	-1,05	-2,69	6,18*
8	Karate	-6,33	-0,50	1,61	-2,07	-0,70	2,05*	-1,13	-0,85	2,51*	-0,13	-0,33	1,18

*statistical significance $p \leq 0,05$

2. Reaction time

The capacity of a swift motor reaction shows human's abilities regarding initiation and execution of purposeful, short-time movement action carried out in response to a signal at the most favorable moment (9). That ability features especially athletes engaged in shooting who present the highest level of that coordination motor ability, whereas boxers are characterized by the lowest intragroup differentiation. Against that background, the group of archers features by far the worst results. The analysis of standardized indicators values show that, except for the group of shooters, the representatives of other analyzed sports events present a much lower level of swift reaction capability in relation to all examined athletes, and the recorded differences show the feature of significance at the level of $\alpha \leq 0,05$ (Table 2, Fig. 1)

3. Movement frequency

The ability to perform movements with high frequency defines human's capacity to carry out maximal number of movements with the entire body or its selected part (9). That ability is predominating among boxers and shooters. Both of those groups feature also the lowest results' changeability that does not exceed 10%. On the other hand, the lowest level of that coordination motor ability was recorded in the group of fencers and archers. Similarly as in the case of spatial orientation – except for boxers – the representatives of other analyzed sports are characterized by a much lower level of that ability in comparison with the total number of examined athletes aged 15 and 16 years, and the recorded differences are statistically significant.

4. Agility (coordination of entire body)

Agility is the capability of the body to perform movements at the specified difficulty level in a precise and swift manner (16). That ability distinguishes especially the examined karate fighters and boxers, respectively. In both cases, the lowest intragroup differentiation can be observed. In the group of classical style wrestlers in turn, that ability features both the lowest level and the highest differentiation. Noteworthy is also the fact, that athletes from all dis-

cussed sports present a much lower level of that coordination motor ability. Except for karate fighters, the recorded disproportions are at the level from 0.92 to 2.69 and are statistically significant (Table 2, Fig. 1).

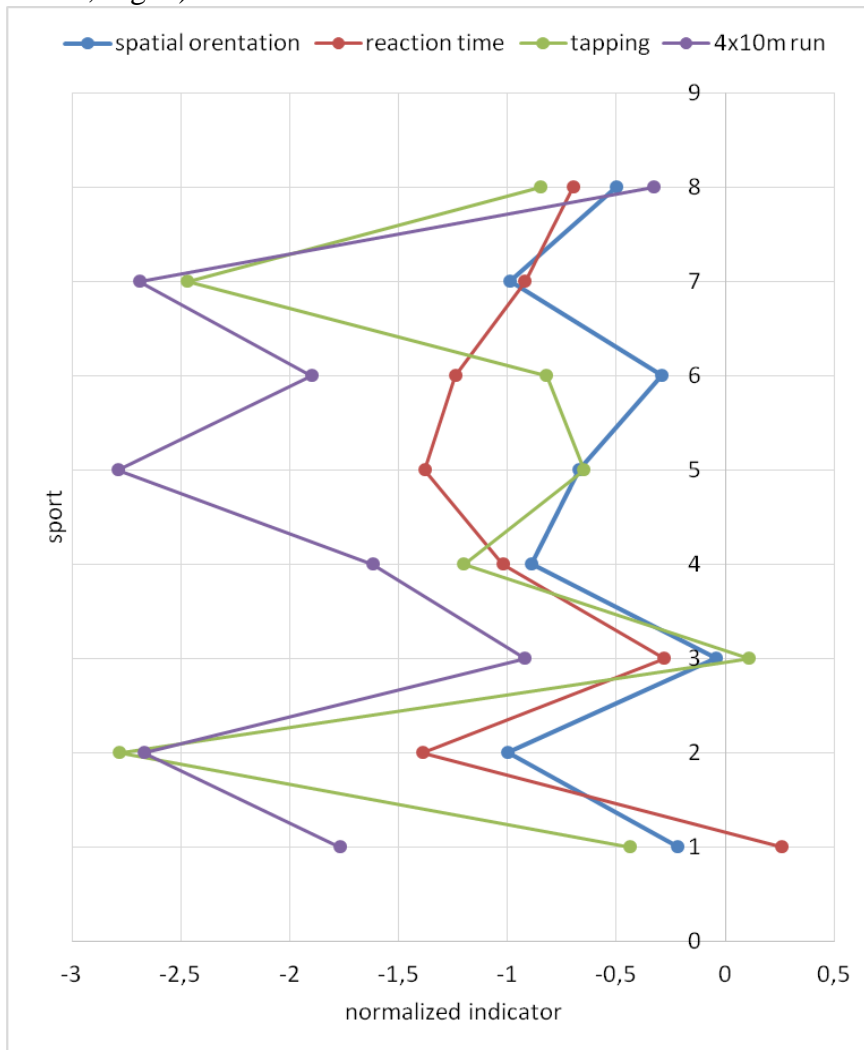


Figure 1. Normalized indicator of coordination for selected sport

SUMMARY AND CONCLUSIONS

Coordination motor abilities play an important role in increasing the efficiency of physical education and sports training of children and youth [2, 10, 13]. They provide the basis for the development of movement technique in individual sports [4, 7, 12, 13]. The role of those abilities is important not only with regard to sports. In the age of progress in the field of technology and civilization, human's capabilities such as spatial orientation, preservation of static and dynamic balance or a swift reaction to various stimuli coming from the external environment are essential. The conducted analysis of selected coordination motor abilities of young athletes engaged in various sports reveals a differentiated level of those abilities, depending on the specialization. And so, spatial orientation dominates among boxers and athletes engaged in sport shooting. On the other hand, the capability of a swift motor reaction distinguishes shooters, and the movement frequency is predominant among boxers. Agility (coordination of the entire body) is a motor ability, the highest level of which was recorded among karate fighters. From the standpoint of sports training, it is noteworthy that the athletes engaged in the analyzed sports feature – what was confirmed by results analysis – a significantly

lower level of the discussed coordination motor abilities in relation to all examined Podkarpackie Voivodeship sports teams members.

The conducted analysis of results allows for drawing the following conclusions:

1. The level of individual coordination abilities in athletes who are members of voivodeship sports teams differentiates significantly the discussed sports.
2. Within all analyzed sports, the level of individual motor abilities in athletes engaged in them differs from the level of the total examined population of athletes, and the recorded disproportions are statistically significant.
3. During recruitment and selection of candidates to particular sports events, it seems appropriate to use tests evaluating coordination motor abilities, since they constitute the basis for the effective development of sports technique in individual sports.

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