

Factor Structure of Technical and Coordination Potential of Soccer Players Aged 15-18

by

Zbigniew Witkowski¹, Leszek Gargula², Wladimir Ljach³

The objective of the work was to determine the structure of technical and coordination abilities of soccer players from 15 to 18 years old.

27 soccer players representing the School of Sports Mastery (SSM) of Cracow and 30 players of "Cracovia" Sports Club participated in the studies. Evaluations in each group were conducted once a year and three times in total (at the age of 15-16, 16-17 and 17-18).

The following methods were used in this work: 1) motor tests allowing to determine the principal coordination abilities (Ljach and Witkowski 2004); 2) motor tests providing information about the level of major technical skills (Ljach and Witkowski 2004); 3) methods of mathematical statistics (factor analysis was used to determine the structure of technical and coordination potential).

The most informative tests providing information about technical and coordination potential of soccer players at this stage of sports development are those based on complex coordination movements, performed with a ball by athletes during a match. Contribution of these tests to total variance constitutes 40,9-42,1 %, whereas that of coordination tests performed without the ball and explaining the technical and coordination potential – 21,4-21,5 %. The following tests are of highest informative value: 26, 24, 25, 9, 10, 19, 22 (Table 4).

Key words: *technique, coordination, motor abilities, soccer*

¹ - Department of Sport Team Games, Academy of Physical Education – Cracow, al. Jana Pawla II 78, 31-571 Cracow, Poland e-mail: kici_2@poczta.fm

² - Department of Motor Learning Academy of Physical Education – Cracow, al. Jana Pawla II 78, 31-571 Cracow, Poland

³ - Department of Motor Learning, Academy of Physical Education – Cracow, al. Jana Pawla II 78, 31-571 Cracow, Poland e-mail: anliakh@skok.awf.krakow.pl

Introduction

Analysis of literature indicates that several studies dealing with determination of components constituting coordination potential of soccer players have been conducted (Roth 1982; Meijer 1983; Hartmann 1999; Witkowski 2003; Ljach and Witkowski 2004). However, studies aimed at all-around examination of coordination abilities (CA) in combination with indices of technical fitness of soccer players being at different stages of sports perfection have not been frequently addressed. The solution of this problem is of tremendous significance for both theory and the practice of soccer because at various stages of sports development of special importance are the tests providing information about the level of coordination and technical fitness of athletes in team sports (Zimmermann and Nicklisch 1981; Hirtz 1985, 1995; Raczek et al. 2002; Ljach and Witkowski 2004). A lack of scientific data in this area creates a condition in which sports selection is primarily based on tests evaluating conditioning (Bangsbo 1994, 1999; Reilly et al. 2000 etc.), or single isolated technical skills evaluating nonspecific coordination for soccer (Bril 1980; Ostaszow 1982; Reilly et al. 1988; Panfil and Paluszek 2000, etc.).

Therefore, the objective of this work was to determine the structure of technical coordination abilities of soccer players from 15-16 to 17-18 years old.

Material and methods

Twenty seven soccer players representing the School of Sports Mastery (SSM) of Cracow and 30 players of "Cracovia" Sports Club participated in the studies. Evaluations in each group were conducted once a year and three times in total (at the age of 15-16, 16-17 and 17-18).

The following methods were used in the work:

1. motor tests allowing to determine soccer's most principal coordination abilities: capacity for accommodation and reorganization of movements, kinesthetic differentiation (sense of ball), sense of movement rhythm, spatial orientation, movement combining, speed of response, balance. In total 22 indices of CAs (Table 1-2) (Ljach et al. 2002; Ljach and Witkowski 2004) were measured;
2. motor tests providing information about the level of major technical skills (5 indices, Table 1-2) (Ljach and Witkowski 2004):
 - accuracy and speed of kicking (passing) the rolling ball with the inside of the foot in motion;

- accuracy and speed of kicking (passing) the flying ball with the middle of the instep; accuracy and speed of stopping the flying ball with the head;
 - speed and accuracy of dribbling the ball with preferred parts of the foot in a straight line and with direction changes;
3. methods of mathematical statistics (factor analysis was used to determine the structure of technical and coordination potential).

Results and discussion

The findings are presented in tables 1-5.

It appears that the utilized battery of tests (for evaluation of 7 principal CAs as well as technical elements such as dribbling with different parts of the foot; kicking (passing) the flying ball with the middle of the instep; stopping the flying ball with the head; kicking (passing) the rolling ball with the inside of the foot while in motion) in all considered age categories explains about 60-65 % of total variance of studied phenomenon (Table 1-2). The given relatively high percentage of explained information could have been probably higher if the battery of tests for factor analysis included tasks determining other technical elements, such as various shots and passes, trappings, fakes, etc. However, analysis of literature (Talaga 1980, 1997; Stula 1989, etc.) demonstrates a lack of objective (valid and reliable) tests which could be used for diagnosis of the above mentioned technical elements. Thus the obtained results indicate the necessity to elaborate tests (in accordance with the requirements of sports metrology) which would allow objective evaluation of other technical skills, such as various types of stopping, shots and passes, fakes and steals which have not been considered in our studies.

Data concerning the structure of technical and coordination abilities of studied groups of soccer players aged 15-16, 16-17 and 17-18 are presented in Tables 1 and 2. Significant differences in the structure of training loads have been registered between players of the School of Sports Mastery and those of "Cracovia" Sports Club as well as in the studied groups of the same players during successive years. The content and the sequence of factors as well as their contributions explaining total variance were also different. During the next stages of studies individual CAs and technical skills constituted integral factors. Revealed differences in factor structures of technical and coordination fitness of soccer players in studied groups and in different age categories could be explained, by rather high individual differences and a relatively small number of studied players.

The following conclusions can be drawn from the conducted research. It has been established that in both studied groups and in all age categories the greatest amount of information about the technical and coordination potential of soccer players is included in tests that contain specific complex coordination movements with the ball performed during the game. Tests of such type reveal on the average 40,9-42,1 % of 60-65 % of explained total variance. The other applied tests (performed without a ball) explained only 21,4-21,5 % of total variance (Table 3).

The findings permit to claim that at the stage of sports perfection (at the age of 15-18 years) the most appropriate for evaluation of technical and coordination fitness are specific tests performed with, rather than without the ball. Such interpretation of findings is confirmed by the fact that during these studies the same number of tests were performed with (tests No. 2, 4, 6, 7, 10-13, 15, 18, 19, 23-27) and without a ball (tests No.1, 3, 5, 8, 9, 14, 16, 17, 20, 21, 22) (Table 1-2).

On the basis of conducted studies it is safe to conclude that during this period one should give preference to work aimed at improvement of specific coordination and technical fitness. However, in the process of preparation it is also recommended to use means (exercises) for further enhancement of general coordination of players (exercises without a ball). The findings have confirmed the ideas (Zimmermann 1982; Hirtz 1995; Neumaier and Mechling 1995; Pearson 2001; Ljach and Sadowski 1999; Ljach and Witkowski 2004; Witkowski and Ljach 2004) about the necessity to single out within the system of training such independent sections as general and specific coordination training as well as to use separate tests for evaluation of the above mentioned types of preparation.

In order to establish a minimal content of tests which could provide maximal information about technical and coordination abilities of players at the stage of sports perfection a factor analysis was made of two groups of athletes (representing School of Sports Mastery from Cracow and "Cracovia" Sports Club) of all age categories (Table 4-5). It has been discovered that for the purposes of controlling the technical and coordination fitness of athletes at the given stage of sports development, it is advisable to use the following tests (Table 5):

- Time of dribbling over a rectangle (No.26);
- Number of shots at the benches (accuracy of hits) with the inside of the foot (No.24);
- Alternating ball juggling with head and foot (No.25);
- Running round stands to the leading side (No.9);

- Dribbling round stands with the non-dominant foot (No.10);
- Difference in time of slalom dribbling with 2 & 1 balls (No.19);
- Time of running towards numbered balls in a 5x3 m shuttle run (No.22).

Factor analysis (Table 5) allowed to determine CAs being of greatest importance for soccer players at the age of 15-18: movement accommodation and reorganization, spatial orientation, sense of rhythm, movement combining. The gathered material has confirmed previous observations (Blume 1981; Zimmermann 1982; Meijer 1983; Hirtz 1985; Raczek et. al. 2002; Witkowski 2003; Ljach and Witkowski 2004) according to which the principal role in training of male and female soccer players at the stage of sport perfection is played by such CAs as movement accommodation and reorganization, differentiation (sense of ball), sense of rhythm, movement combining, spatial orientation. At the same time such CAs as speed of simple response, static and dynamic balance are of relatively smaller importance. The tests determining the ability of kinesthetic differentiation (sense of ball) did not have a high factor load in creation of respective factors. However, significance of the above mentioned ability has been manifested in full measure in technical tests “number of shots at the bench with the inside of the foot” and “number of shots at the bench (accuracy of hits) with the inside of the foot” which in their essence require manifestation of the given ability. Besides, the significance of the ability for kinesthetic differentiation has been manifested relatively evenly in all outlined factors. The fact that tests evaluating the ability for kinesthetic differentiation did not have a high factor load in separate factors is probably explained by their relatively smaller reliability as compared to other utilized tests (Witkowski 2003).

Conclusions

1. The most informative tests providing information about the technical and coordination potential of soccer players at the stage of advanced training are those based on complex movements with a ball, performed by athletes during a match. Contribution of these tests to total variance constitutes 40,9-42,1 %, whereas that of coordination tests performed without a ball and explaining the technical and coordination potential only 21,4-21,5 %.
2. The following tests are of highest informative value:
 - Dribbling the ball over a rectangle;
 - Number of shots at the bench (accuracy of strike) with the inside of the foot;
 - Alternating ball juggling with head and foot;
 - Running round stands to the leading side;

- Dribbling round stands with non-dominant foot;
 - Difference in time of slalom between stands while dribbling with 2 and 1 ball
 - Difference in time of running towards numbered balls in a 5x3 m shuttle
3. The findings have confirmed, the existing in theory and practice of soccer situation according to which it is necessary to organize special studies aimed at elaboration of reliable and valid tests determining such technical elements of soccer players as receiving the ball, trapping, passing and shooting.

References

- Bangsbo J. 1994. Fitness Training in Football – a Scientific Approach. August Krogh Institute, University of Copenhagen, Denmark.
- Bangsbo J. 1999. Sprawność fizyczna piłkarza. Centralny Ośrodek Sportu, Warszawa.
- Blume D.-D. 1981. Kennzeichnung koordinativer Fähigkeiten und Möglichkeiten ihrer Herausbildung im Trainingsprozess. Wissenschaftliche Zeitschrift der DHfK, 3, 17-41.
- Bril M.S. 1980. Otbor w sportivnykh igrach. Fizkultura i Sport, Moskwa.
- Hartmann C. 1999. Ausbildung der koordinativen Fähigkeiten. In: C.Hartmann, H.-J.Minow. Sport verstehen – Sport erleben. Teil 2. Trainingsmethodische Grundlagen. Freistaat Sachsen, 322-347.
- Hirtz P. 1995. Koordinationstraining gleich Techniktraining W: Krug J., Minor H.J. (red.). Sportliche Leistung und Training. Academia, S.Augustin.
- Hirtz P. und andere 1985. Koordinative Fähigkeiten im Schulsport. Berlin: Volk und Wissen, Volkseigener Verlag.
- Ljach W., Sadowski J. 1999. O koncepcjach, zadaczach, miestie i osnovnykh polozeniach koordinacjonnoj podgotowki w sportie. Teorija i praktika fiziczeskoj kultury, 5, 40-46, (in Russian, English abstract).
- Ljach W., Witkowski Z. 2004. Koordynacyjne zdolności motoryczne w piłce nożnej. Centralny Ośrodek Sportu, Warszawa. – 179 s.
- Ljach W., Witkowski Z., Zmuda W. 2004. Sportiwno – dwigatelnyje testy dla ocenki specyficznych koordinacyjnych sposobnostiej futbolistow. Teorija i praktika fiziczeskoj kultury, 8, 51-54, (in Russian, English abstract).

- Meijer H.-W. 1983. Charakteristik und Bildung der koordinativer Fähigkeiten im Fussballsport. *Theorie und Praxis der Körperkultur*, 7, 537-541.
- Neumaier A., Mechling H. 1995. Allgemeines oder Sportartspezifisches Koordinationstraining? *Leistungssport*, 5, 14-18.
- Ostaszow P.W. 1982. Prognozirowanie sposobnostej futbolistow. *Fizkultura i Sport*, Moskwa.
- Panfil R., Paluszek K. 2000. Obiektywizowanie procesu doboru do gry zespolowej (na przykladzie pilki noznej). W: *Efektywnosc systemów szkolenia w różnych dyscyplinach sportu*. AWF, Warszawa.
- Pearson A. 2001. *Speed, Agility and Quickness for Soccer*. A and C Black, London.
- Raczek J., Mynarski W., Ljach W. 2002. Kształtowanie i diagnozowanie koordynacyjnych zdolności motorycznych. *Podrecznik dla nauczycieli, trenerów i studentów*. AWF, Katowice.
- Reilly T., Bangsbo J., Franks A. 2000. Anthropometrics and physiological predispositions for elite soccer. *Journal of Sports Sciences*, 18 (9): 669-683.
- Roth K. 1982. *Strukturanalyse korodinativer Fähigkeiten*. Verlag Limpert. Bad Hamburg.
- Science and Football* (edited by ReillyT., Lees A., Davids K., Murphy W.J.). London: E and FN Spon.
- Stula A. 1989. Testy i sprawdziany stosowane w szkoleniu pilkarzy noznych. AWF, Poznan. – 118 s.
- Talaga J. 1980. *ABC mlodego pilkarza*. Sport i Turystyka, Warszawa. – 247 s.
- Talaga J. 1997. *Trening pilki noznej*. Centralny Osrodek Sportu, Warszawa. – 271 s.
- Witkowski Z. (2003). *Koordinacjonnyje sposobnosti junych futbolistow: diagnostika, struktura, ontogenez (praca doktorska)* (in Russian). Moskwa. – 232 s.
- Witkowski Z., Ljach W. 2004. *Cwiczenia kształtujące koordynacyjne zdolności motoryczne w pilce noznej*. Centralny Osrodek Sportu, Warszawa. – 198 s.
- Zimmermann K. 1982. Wesentliche koordinative Fähigkeiten für Sportspiele. *Theorie und Praxis der Körperkultur*, 6, 439-443.
- Zimmermann K., Nicklisch R. 1981. Die Ausbildung koordinativer Fähigkeiten und ihre Bedeutung für die technische bzw. Technisch-taktische Leistungsfähigkeitender Sportler. *Theorie und Praxis der Körperkultur*, 10, 764-768.

Corresponding Author:

Dr Zbigniew Witkowski

Department of Sport Team Games, Academy of Physical Education –
Cracow, al. Jana Pawla II 78, 31-571 Cracow, Poland e-mail: kici_2@poczta.fm

Legend for Tables 1, 2 and 4:

Test (index): 1. Running through hoops without dribbling (sec). 2. Running through hoops with dribbling (sec). 3. Difference in time of running through hoops and 30 m flat running (sec). 4. Difference in time between task 1 and 2 (sec). 5. Turns on the bench (number). 6. Leading foot shots at the target (points). 7. Non-leading foot shots at the target (points). 8. Running round stands to non-leading side (sec). 9. Running round stands to the leading side (sec). 10. Dribbling round stands with non-leading foot (sec). 11. Dribbling round stands with leading foot (sec). 12. Difference in time between 10 and 8 (sec). 13. Difference in time between 11 and 9 (sec). 14. Slalom between stands without dribbling (sec). 15. Slalom between stands with dribbling (sec). 16. 5x3 m shuttle running (sec). 17. Time of rectangle running without a ball (sec). 18. Slalom between stands with 2 ball dribbling (sec). 19. Difference in time of slalom between stands with 2 a 1 ball dribbling (sec). 20. Rolling ball trapping with foot (cm). 21. Running towards numbered balls (sec). 22. Difference in time of running towards numbered balls and 5x3 m shuttle running (sec). 23. Number of shots at the benches with the inside of the foot (number of points). 24. Number of shots at the benches (accuracy of hits) with the inside of the foot (number of points). 25. Alternating ball juggling with head and foot (number of points). 26. Time of dribbling over a rectangle (sec). 27. Difference in time of rectangle while running & dribbling (sec).

Table 1

Factor structure of technical and coordination potential of soccer players (n=27) from 15-16 to 17-18 years old representing School of Sports Mastery (SSM) in Cracow

	Test (index)	15-16 years					16-17 years					17-18 years				
		Factor, % of total sample dispersion														
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
CC, technical skills		15,1%	13,0%	12,9%	12,3%	10,2%	16,4%	12,3%	11,6%	11,0%	10,8%	14,5%	14,0%	11,4%	11,0%	10,5%
		63,5%					62,1%					61,4%				
Sense of rhythm	1.	21	86	23	03	08	06	29	66	26	09	06	06	27	59	63
	2.	06	07	08	90	04	08	12	16	04	86	66	05	05	19	36
	3.	19	86	01	06	26	05	62	13	14	02	10	07	28	73	16
	4.	16	37	18	82	08	06	02	07	05	90	67	07	15	01	15
Balance	5.	12	49	34	05	16	43	08	23	32	15	15	48	37	18	01
Differentiation (sense of ball)	6.	03	25	07	35	09	57	01	24	01	11	16	67	12	26	32
	7.	03	25	07	35	09	27	12	21	50	12	01	22	46	29	17
Accomodation & reorganization of motor actions	8.	13	26	04	44	44	15	20	20	21	74	62	34	10	28	21
	9.	27	31	11	59	31	28	01	02	58	33	55	43	21	27	17
	10.	26	79	21	12	22	40	14	56	04	50	87	05	03	20	02
	11.	69	14	35	22	03	81	13	01	16	11	45	39	54	01	04
	12.	16	56	21	14	44	39	24	55	04	26	77	16	11	08	18
	13.	78	05	38	15	16	71	14	03	11	04	20	20	72	16	14
	14.	13	01	61	13	46	46	17	17	40	16	09	68	07	05	30
	15.	13	03	11	01	84	43	67	11	32	18	02	20	72	33	20
	16.	05	01	84	02	07	24	06	11	69	12	19	15	04	15	15
	17.	05	06	53	61	31	09	11	71	24	20	13	09	31	11	72
Movement combining	18.	81	14	24	32	11	30	76	04	19	03	21	48	07	03	43
	19.	81	14	27	30	20	18	84	02	11	06	20	39	37	17	50
Speed of response	20.	24	36	32	32	10	48	10	09	22	03	63	10	31	29	29
Spatial orientation	21.	21	14	38	07	38	16	06	63	28	47	34	52	05	21	43
	22.	13	05	77	05	06	11	02	32	80	20	16	39	01	35	30
Kicking (passing) the rolling ball with the inside of the foot in motion	23.	42	27	17	46	23	01	01	21	73	25	36	02	05	69	05
	24.	38	58	06	05	30	31	41	50	06	20	18	05	19	76	01
Kicking (passing) the flying ball with the middle instep; stopping the flying ball with the head	25.	32	31	02	35	31	71	04	09	35	13	18	34	54	42	02
Dribbling with different parts of the foot in different directions	26.	70	02	09	38	36	73	25	31	04	09	23	76	14	18	20
	27.	79	02	24	02	18	75	30	09	10	02	18	82	01	24	10

NOTE: 1) while presenting factor loads ciphers and comas have been omitted; 2) factor loads = 0,70 are in bold.

Table 2

Factor structure of technical and coordination potential of soccer players (n=30) from 15-16 to 17-18 years representing "Cracovia" Sports club

	Test (index)	15-16 years					16-17 years					17-18 years				
		Factor, % of total sample dispersion														
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
CC, technical skills		17,1%	16,2%	11,4%	10,7%	9,9%	13,9%	13,8%	13,4%	12,2%	9,6%	20,0%	13,5%	10,3%	9,9%	8,8%
		65,3%					62,9%					62,5%				
Sense of rhythm	1.	28	02	86	17	15	05	88	03	01	04	05	85	05	02	14
	2.	74	01	54	01	07	08	12	08	86	08	45	21	14	47	15
	3.	41	21	03	47	19	08	79	05	31	31	28	68	14	06	20
	4.	77	03	06	15	22	06	24	09	87	10	48	27	17	48	07
Balance	5.	53	25	01	05	22	09	49	34	22	10	47	08	30	09	18
Differentiation (sense of ball)	6.	47	30	16	20	05	14	19	19	37	24	17	15	66	27	02
	7.	52	15	43	32	23	13	04	27	10	35	33	27	14	12	08
Accomodation & reorganization of motor actions	8.	72	05	20	01	05	14	32	56	38	33	11	31	05	47	16
	9.	81	03	11	06	04	02	16	58	48	17	12	30	33	63	29
	10.	65	11	10	41	41	86	05	25	03	07	83	04	08	12	07
	11.	38	29	47	46	31	47	37	50	16	12	52	53	07	24	04
	12.	42	10	03	47	49	86	09	01	14	07	83	17	06	07	01
	13.	15	32	48	49	35	51	34	33	01	19	52	46	05	02	07
	14.	28	13	36	66	21	55	18	26	21	21	58	20	46	04	10
	15.	08	21	06	86	02	38	16	73	09	03	26	01	40	73	11
	16.	41	11	62	18	29	02	67	02	16	41	12	77	16	03	06
	17.	53	43	26	05	17	03	59	28	34	08	12	60	25	46	14
Movement combining	18.	03	05	05	16	90	01	10	27	17	78	20	01	12	12	89
	19.	06	03	08	18	89	22	19	17	22	76	09	01	04	18	92
Speed of response	20.	24	64	29	19	31	14	65	10	42	17	42	38	12	08	06
Spatial orientation	21.	06	60	34	06	07	68	33	04	29	20	71	35	18	13	01
	22.	22	67	07	06	26	74	17	02	43	10	65	33	05	16	04
Kicking (passing) the rolling ball with the inside of the foot in motion	23.	08	66	17	28	16	41	06	45	01	52	09	13	79	03	18
	24.	05	52	07	05	13	19	14	54	10	46	01	03	86	27	02
Kicking (passing) the flying ball with the middle instep; stopping the flying ball with the head	25.	39	73	01	09	08	33	41	24	30	08	49	35	45	10	20
	26.	19	84	14	14	12	15	26	63	40	08	70	23	24	27	32
Dribbling with different parts of the foot in different directions	27.	06	83	04	15	06	18	08	61	33	12	72	04	18	14	30

NOTE: 1) while presenting factor loads ciphers and comas have been omitted; 2) factor loads = 0,70 are in bold.

Table 3

Percent of total common variance explained by special (performed with a ball) and general (performed without a ball) tests in groups of soccer players representing the School of Sports Mastery and "Cracovia" Sports club

Age	Players of SSM Cracow		Players of SC "Cracovia"	
	Specific tests	General tests	Specific tests	General tests
15-16	37,6 %	25,9 %	45,3 %	19,9 %
16-17	39,6 %	22,5 %	42,1 %	20,7 %
17-18	45,4 %	16,0 %	39,0 %	23,5 %
average	40,9 %	21,5 %	42,1 %	21,4 %
Percent of explained total variance	60 - 65 %		60 - 65 %	

NOTE: during calculations when the factor was formed by specific and general tests together, one half of total sample variance explained by this factor was given a to specific test, whereas the other to the general test.

Table 4

Factor structure of technical and coordination potential of soccer players at the age of 15-18 (n=171)

CA, technical skills	Test (index)	Factor, % of total sample dispersion				
		1	2	3	4	5
		14,8%	14,2%	12,4%	8,1%	7,5%
		57 %				
Sense of rhythm	1.	47	37	03	28	40
	2.	31	72	17	12	11
	3.	29	19	11	38	49
	4.	13	65	18	01	32
Balance	5.	35	34	19	10	02
Differentiation (sense of ball)	6.	30	48	11	02	23
	7.	12	18	14	09	45
Accomodation & reorganization of motor actions	8.	01	77	19	03	16
	9.	05	79	05	02	01
	10.	03	40	74	18	11
	11.	44	22	63	05	16
	12.	03	07	73	19	21
	13.	47	14	62	06	16
	14.	11	02	51	07	17
	15.	03	09	62	17	01
	16.	06	05	23	01	53
	17.	31	73	11	08	01
Movement combining	18.	08	06	17	91	01
	19.	07	03	08	95	01
Speed of response	20.	51	13	08	03	06
Spatial orientation	21.	43	34	37	08	11
	22.	32	25	13	07	70
Kicking (passing) the rolling ball with the inside of the foot in motion	23.	58	18	14	01	05
	24.	70	09	07	05	08
Kicking (passing) the flying ball with the middle instep; stopping the flying ball with the head	25.	67	16	20	04	07
Dribbling with different parts of the foot in different directions	26.	72	29	16	20	13
	27.	68	05	25	19	15

NOTE: 1) while presenting factor loads ciphers and comas have been omitted; 2) factor loads = 0,60 are in bold.

Table 5*Structure of technical and coordination potential of soccer players aged 15-18 (n=171)*

Factor	Factor (the most informative tests constituting the given factor)	Factor contribution to total variance
1	<ul style="list-style-type: none"> - Ability for quick & accurate dribbling with different parts of the foot (straight, arched and with alteration of the direction of movement) (26, 27) - Ability for accurate and quick kicking (passing) the rolling ball with the inside of the foot in motion (24) - Ability for quick and accurate kicking (passing) the flying ball with the middle instep; ability for accurate and quick stopping with the head (25) 	14,8 %
2	<ul style="list-style-type: none"> - Ability for accommodation and reorganization of motor actions (9, 8, 17) - Ability for sense of movement rhythm (2, 4) 	14,2 %
3	Ability for accommodation and reorganization of motor actions(10, 12, 11, 13, 15)	12,4 %
4	Ability for movement combining (19, 18)	8,1 %
5	Ability for spatial orientation (22)	7,5 %
Percentage of total sample variance		57,0 %

