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AN ATTEMPTED ASSESSMENT OF COORDINATED RHYTHM AND HIGH FREQUENCY OF LEG MOVEMENT OF FOOTBALLERS

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Оцінка координованого ритму та високої частоти ногомоторики футболістів.
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Анотація. Автор розглядає можливість розроблення тесту, який би дозволив оцінити координований ритм і високу частотність ногомоторики футболістів. До експерименту було залучено 212 футболістів різних вікових груп. Розроблений тест забезпечує надійність та точність результатів.

Ключові слова: футбол, координовані можливості, тести.

Introduction. Coordinative motor abilities determine bodily abilities as concerns the performance of motor activities in an accurate and quick manner in a rapidly changing environment. The basic factor that integrates this type of ability is the biological background, that is functions of the central nervous system and the senses, in particular the capacity of neurons to store information and recover it in the process of movement control [3].

The motor coordination processes take place due to the neurophysiologic mechanisms of information organization, that is the systems of control and adjust movements. Components of that system (the central nervous system, the arrangement of receptive organs – receptors and the muscle system) conditioned first of all by genetic and environmental factors form the coordinative predisposition of motor abilities. These predispositions interact variously, establishing complexes of predispositions. The individual complexes of predispositions are decisive as regards the level of various coordinative motor abilities. W.J. Ljach defines coordinative motor activities as "psycho-motor properties which determine the readiness to control and regulate motor activities in an optimal manner" [2].

Coordinative motor abilities in contemporary football play a fundamental role and condition the achievement of sport mastery as well as set out major criteria in the selection of young footballers to a game. Specialist from the world renown Ajax Amsterdam School believe that the basic components of sport mastery of a footballer are: technique and coordinative abilities, a game review, often called a football intelligence, personality and the speed of technical, tactical and locomotive action.

According to this author, the leading coordinative abilities in football ranked in accordance to their importance are: ability to rhytmicise and ability to make rapid leg movements, getting redirected, differentiation of movement parameters, special orientation and coordination of movements [7]. In turn, M.S. Bril [1] sees the following to be leading: differentiation of movement parameters, getting redirected, response time, anticipation. W.J. Ljach [2] is in favour of getting redirected, differentiation of movement parameters, orientation, response time, feedback, while K. Zimmermann [9] has the following order: orientation, adaptation, differentiation of movement parameters, response time.

Observing how contemporary and outstanding footballers play such as: C. Ronaldo, L. Messi confirms the conviction that rhytmicisation and high frequency of leg movements allows them to effectively perform the most difficult play technique components when in direct contact with the opponent. This author is of an opinion that most of all these abilities can be of a key importance in achieving sport mastery by footballers.

Therefore, the objective of this paper was to work out a test that will be used to carry out an overall assessment of these coordinative abilities that is coordinated rhythm and high frequency of leg movement in footballers.

Materials and Method

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If a movement task is to be used as a test it has to be: standardized (a detailed description of how the test is performed), it has to be characterized by a proper result scatter, but, first of all, it has to have defined parameters of reliability and accuracy.

Standardisation of a performed movement task (test): the subject stands next to the ball to his left, then moves his left leg over the ball (crosswise), brings the right leg and shifts the body balance onto the left leg and moves the right leg crosswise over the ball, brings to it his left leg and shifts the body balance onto the right leg. Such a bilateral cross movement over the ball forms a single cycle. The test consists in repeating that cycle twenty times, while the assessment is expressed in the time required by the subject to complete the task, which is measured to a 0.1 sec accuracy.

Thirty-seven students, practicing football, of the Department of Physical Culture, Gorzów Wlkp., took part in a doubled evaluation of the reliability test. The results obtained from 175 footballers of different age from such clubs as: "Ruch" Chorzów, "Carbo" Gliwice, "Piast" Brzeg, "MKS" Oława, "MKS" Kluczbork, "Rodło" Opole were used in the evaluation of the reliability test. The test used in the evaluation of reliability was performed in 2004 and 2005, while those which were applied to evaluate accuracy were done in 2007 and 2008.

The reliability of a test was expressed as a correlation coefficient between a test and its retake. Both measurements were taken on the same day, with the students having been familiarised with the course of the task a few days before.

The accuracy of a test was expressed as a correlation between the test results and an averaged list by three experts who assessed the efficiency of each player on a 1 to 10 scale. The experts were coaches of a given team, team managers and the researcher. The values quoted by the experts were much similar, hence an averaged value from three evaluations was considered as sufficient.

Test Results. Reliability evaluation: a group of 37 studied twice allowed to determine the correlation coefficient r = 0.96 significant at a level of 0.001.

Accuracy evaluation: the results obtained from studying footballers of different age allowed to determine the correlation coefficient between the test results and the averaged evaluation by three experts.

Table 1

Results from a study of footballers of different age tested in a "coordinated rhythm of high frequency leg movement" with respect to the criterion of a play effectiveness (n = 175)

Pos.	Sports club	Age (years)	Number of subjects	Test result		Correlation coefficient	Reliability of correlation coefficient
				□x	çx		
1.	"Ruch" Chorzów,	18-19	13	23.54	2.01	-0.84	0.001
2.	"MKS" Kluczbork, "Rodło" Opole	16	32	29.37	1.99	-0.61	0.001
3.	"MKS" Oława	14-15	18	37.34	4.29	-0.45	0.05
4.	"MKS" Oława	12-13	24	37.80	4.28	-0.46	0.05
5.	"Carbo" Gliwice	15	18	41.68	3.27	-0.55	0.01
6.	"Carbo" Gliwice	14	18	46.21	3.40	-0.60	0.01
7.	"Carbo" Gliwice	13	18	50.01	2.99	-0.46	0.05
8.	"Piast" Brzeg	15	19	36.67	3.80	-0.58	0.01
9.	"Piast" Brzeg	12	15	44.04	2.70	-0.58	0.01

Discussion of Test Results. The obtained correlation coefficient r = 0.96 at $p < 0.001$ in doubled evaluation of the reliability of the test has to be considered as a very high coefficient. This con-

firms a high consistency between the test and its retake, hence a repeatability of the results. Likewise, in the study of the evaluation of accuracy all the obtained correlation coefficient was statistically significant at a level from 0.05 to 0.001. Table 1 also shows that decisively the best results were obtained by 18-19 year old footballers of "Ruch" Chorzów Sports Club. This is so chiefly because they are classed as older juniors coming directly from the stand-by team of the Premier Division team from Chorzów, while some of them had already played in senior games in the Premier Division. Moreover, it is also acknowledged that the test results are related to the subjects' age, the older the footballers, the better the results.

Discussion. The most difficult components of footballer technique require that an adequately high level of coordination of motor abilities is maintained. Especially as far as dummies, dribbling and ball hitting etc. are concerned. The timing of their performance is close to the timing of the test.

According to many researchers [6, 7] the ability to rhythmicise allows to grasp, recreate and implement dynamic changes in movement in ordered and repeated cycles. The dynamic-time-space order of movement in the concept by Schnabel – after Osiński [4], is understood as a complex feature of movement, characteristic of "smoothness, precision, consistency, strength and rate of that movement."

The dependency between a high frequency of movements allows to perform a maximal number of movements with the whole body or its part in a strictly defined time of the duration of the movement task. This is the character of work prevails in the prepared test where leg movements as well as the whole body have to be made rapidly. This ability rests on the ability of the central nervous system, and in particular on the ability of the nervous centres controlling antagonist muscle groups and the flip-flopping phases of activation and suppression.

Pölmann and Kirchner [5] consider the ability to rhythmicise and the related ability to perform high frequency movements as extremely important and specific coordinative motor abilities. An effective performance of the most difficult components of the footballer technique, that is dribbling, dummies and goal shots is determined by a coordinated work rhythm (often with high or maximal frequency) of lower extremities. An analysis of the play by the top footballers (L. Messi, C. Ronaldo) confirms that finding.

Conclusions

1. The prepared test "coordinated rhythm of high frequency leg movement" is a test of a very high reliability: $r = 0.96$, and also accuracy – with respect to the criterion of play effectiveness of footballers of different age. The coefficients varied between $r = 0.46$ and $r = 0.84$, and were statistically significant from $p < 0.05$ up to $p < 0.001$.
2. For the test to be widely used in practical work it need to be supplemented with additional studies that will allow to work out a 1 to 100 scale (Scale T).

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ОЦЕНИВАНИЕ КООРДИНИРОВАННОГО РИТМА И ВЫСОКОЙ ЧАСТОТНОСТИ НОГОМОТОРИКИ ФУТБОЛИСТОВ

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Аннотация. Автор рассматривает возможность разработки теста, позволяющего оценивать координированный ритм и высокую частотность ногомоторики футболистов. В эксперименте взяли участие 212 футболистов разных возрастных групп. Разработанный тест обеспечивает надежность и точность результатов.

Ключевые слова : футбол, координированный возможности, тесты.

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Abstract: The author seeks to work out a test that will allow to assess the ability of coordinated rhythm and high frequency of leg movement of footballers. The study was performed on 212 footballers in varied age groups. The prepared test has a very high reliability and accuracy of results and is simple to perform.

Key words: football, coordinative abilities, tests.