

THE SELECTION OF THE PSYCHO-MOTOR TRAINING ACCORDING TO THE FUNCTIONAL ANALYSIS OF THE CEREBRAL HEMISPHERES

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Abstract

The present work approaches the process of selection according to the psycho-motor component in the game of handball, according to the psychological criterion of analysis of the functional dominance of the cerebral hemispheres. The subjects of the research were children aged 11-12 years, on the level of stage 1 of the selection. The sampling of the sportsmen on the two groups was carried out using a battery of psychological tests and a specific model of the senior handball player, previously carried out. The psycho-motor aspects considered the dynamic, segment and general coordination, the static coordination – balancing, the perceptive-motor one respectively.

The general conclusion of the pedagogic experiment was that the selection of the sportsmen according to a hemisphericity profile determined to obtain superior results on the psycho-motor level in relation to other criteria.

Key words: selection, psycho-motor skills, model, dominance, hemisphericity, performance

INTRODUCTION

The human body must be analyzed as a whole in which psychic and somatic elements are interdependent. "Knowing your own body of knowledge underlying identity" (Albu, 2006: 16).

The psycho-motor skills are a branch of applied psychology and regards the integration of the motor functions with the psychic ones, as an effect of education and the development of the nervous system (DEX 1998, Albu, 2006).

The development of the psycho-motor skills is appreciated as a complex process with a series of particularities, namely: the manifestation of new types of behavior is determined by the influence of the quantity accumulations on the quality leaps; through consecutive and gradual reorganizations the new performances are a transformation effect of the old ones; the different characteristics have individual development rhythms, the evolution is in stages, each age stage having a certain characteristic.

In an effort of synthesis, the Romanian author C. Albu (2006) draws attention to the role that experience has in psycho-motility, evoking two theories. At first, it is believed that practice develops elements of motility to be included in overall coordination. It forms a global scheme and is considered an action programming will then repeat the same way. The second theory assumes that experience causes motor learning schemes from basic elements. Thus, the child's behaviour will achieve its intended purpose and go on to become the basis of

conduct that will result in cognitive development. In other words, the game will be objective in motric elements support learning.

The tests presented in Table 1 tried to detect the component elements of psycho-motor skills proposed by M. Epuran (1976): corporal scheme, dynamic, segment and general coordination; static coordination – balancing, perceptive-motor coordination and rapidity of movements.

The concepts *functional asymmetry* and *hemisphericity* result from the evolution of the understanding regarding the contribution of the cerebral hemispheres to the mental functions, respectively of indication of the specific functional character of the two cerebral structures: right and left (Botez, 1996; Roco, 2004). The essential discovery of a perturbation of the language functions which was exclusively determined by a lesion of the left hemisphere resulted in the concept of *dominant hemisphere*. Recently the American psychophysiologicalists asserted that the functional asymmetry of the two hemispheres is quite accentuated, acquiring a specialization character: the left side ensuring the verbal symbolism, the right one the spatial perception. Although numerous studies were carried out by different specialists (surgeons, physiologists, psychologists) over more than 100 years, the conclusion was reached that there are several means by which the two hemispheres can unequally contribute to the *behavior* and this diversity of

functional asymmetry prevents the exact nature from being identified.

According to studies that took several years, Ned Herrman and his team considered that the horizontal approach (left hemisphere/right hemisphere) is too simple to make differentiated categorizations. Analyzing and combining the works and the experiments made by Paul MacLean (the three-dimensional dimension of the brain: reptilian, limbic, neo-cortex) with the ones initiated by Roger Sperry, Joseph Bogen, Michael Gazzaniga (the separation of the brain in two halves), the Herrman group proposed and accomplished in an integrative vision *The Whole Brain Model* (Herrman, 1996; Rusu, 2007). This model is organized horizontally and vertically and metaphorically structured on four dials or specializations (Roco, 2001, 2004; Petre, 2009), as follows:

- A. The left cortical sector (LCo). The activation of this sector determines the person to appreciate things and ideas analytically, on component parts. They prefer the mathematical operation of the technical and scientific concepts, the utilization of logical, algorithmic reasoning, the detailed and exact reflection on all facts (with all their characteristics) to the purpose of decision making.
- B. The left limbic sector (LLi). When this sector is activated, the individual has increased capacity of control of their emotions. The accomplishment of this fact presupposes a series of actions and habits: to plan, to organize, to order, to classify, so that everything is sure, clear and orderly. The person is very detail oriented, lives by a horary, a quite strict program with compliance with certain rules and norms. They are an adept of the stability on all planes, can have difficulties when confronted with the necessity of fast adaptation to atypical situations or a new status.
- C. The right cortical sector (RCo). This activation means that the person in case resolves the problem situations with the "help" of imagination and intuition. They think in complex images, do not take into account details and rules, perceive the whole, has many ideas, associated different facts and happenings, finding unprecedented solutions, being predisposed to artistic activities.
- D. The right limbic sector (RLi). The activation of this specialization presupposes a sociable person who feels good in groups, willing to communicate verbally, but also non-verbally, empathically, very well inferring the states of mind of the ones around. They have no emotions when they have to talk about their feelings, has lots of passions, is animated by ideals and values.

The overall objective of the research is the experimental efficiency argument applying the analysis of functional predominance of the cerebral

hemispheres in stage I of sports training in playing handball.

ORGANIZING THE RESEARCH

The research was conducted at the sports clubs C.S.S. Dinamo Brasov and H.C. "Extrem" Baia Mare, performance sport units dealing with training children and juniors in the handball game.

The purpose of this scientific activity was to identify to what extent the psychological criterion (the analysis of the functional predominance of the cerebral hemispheres) can be considered as valid in the more objective and efficient selection process. So, previously a representative model of hemisphericity for the senior handball player was made up, according to specific psychological tests. In a succinct presentation the configuration of the four components for the handball players with left dominance is: LCo – 75.4%, RCo – 64.5%, LLi – 76.5%, RLi – 52.1%, and for the ones with **right dominance** : LCo – 67.7%, RCo – 80.3%, LLi – 61.5%, RLi – 75.7%.

For the optimal development of the pedagogic experiment, we made up 2 groups of 20 subjects each (aged 11), having the following considerations in view:

- the components of the experiment lot were selected according to the model of hemisphericity of the senior player;
- the subjects of the witness sample were haphazardly chosen, only according to the criteria consecrated in sport practice.

This fact was followed by the moment of the initial testing which comprised an ensemble of tests for the identification of the level of the psycho-motor training. In order to check the sportive evolution in time through relating to the hemispheric configuration of the two categories of subjects, after one year (2011) the final testing was reached, when the above mentioned tests were repeated. It is to be mentioned the fact that the training methods were similar for all the sportsmen; no individualized or preferential training was used for certain children.

The tests utilized were the following:

- A. Tests of identification of dominance:
 - Questionnaires of action preferences
- B. Tests for the identification of the technical level specific to the handball game
 - Matorin test
 - Test of psycho-motor coordination
 - Throwing and catching of the handball ball
 - Tapping test.

Description of tests:

The questionnaire of action preferences comprises 72 items grouped in 4 sections A, B, C, D; each of them having 18 items corresponding to the 4 cerebral sectors: left cortical, right cortical, left limbic, right limbic. The answer variants are included in a continuum between 1 and 5, where 1 represents a

much reduced accord for the affirmation of the item, and 5 total accord. The intermediary values 2, 3, 4 express different shares of accord. This questionnaire offers relevant data regarding the existing rapport on the coordinates Rationality – Emotionality – Left way of operation – Right way of operation.

Matorin test – aimed at the general coordination, consists in leaps with breaking out from the spot, followed by rotations along the longitudinal axe of the body. The test was applied by trading a line of 30-35 cm on the ground, the subject is positioned with their feet close to each other on each side of the line. For the measurement a compass and a ruler of 40-45 cm were used, set between the soles of the performer after the moment of touch down. 3 leaps with rotation towards the left and 3 leaps with rotation towards the right were executed and the arithmetical mean of the degrees was calculated. The interpretation was made by the following standard:

- Sufficient – for values between 180 – 270 degrees
- Good – for values between 271 – 360 degrees
- Very good – for values over 361 degrees

Test of psycho-motor coordination – aimed at the correct evaluation of the distance. The subject's eyes are tied and is initially positioned at the end of a straight line (traced on the ground), with the length of 7 m. Under these circumstances the performer walks the distance of the length of the line and stops when they consider that they arrived at its end. The place where the subject stopped is marked, the evaluation of

the test being done as follows: if the length of the line was overcome or if they did not reach its end, the difference in centimeters is recorded. The evaluation is based on the following standard:

- Unsatisfying – for values over 50 cm (U)
- Satisfying – for values between 31 – 50 cm (S)
- Good – for values between 11 – 30 cm (G)
- Very good – for values between 0 – 10 cm (VG)

Throwing and catching of the handball ball from one hand to the other. The exercise is made individually, the subject's arms are raised laterally and while walking they throw the ball with one hand over the head and catch it with the other. The test is made for 10 seconds, once and the number of correct executions is recorded (when the ball was caught).

Tapping test – it is a pencil-paper test and it aims at the coordination eye-hand, the rapidity of the movements of the fingers and the spatial representations. The test consists in marking 3 points in each circle on the answer sheet with the pencil, within the shortest time. 10 seconds were previously granted to practice and the test results were timed for 30 seconds. The correctly completed circles are counted, the test is applied once.

RESEARCH RESULTS

The analysis of psycho-motility revealed noticed improvements in all subjects, except that the athletes included in the experimental group excelled, so that it highlights issues that have been objectified in terms of conclusions in the next lines.

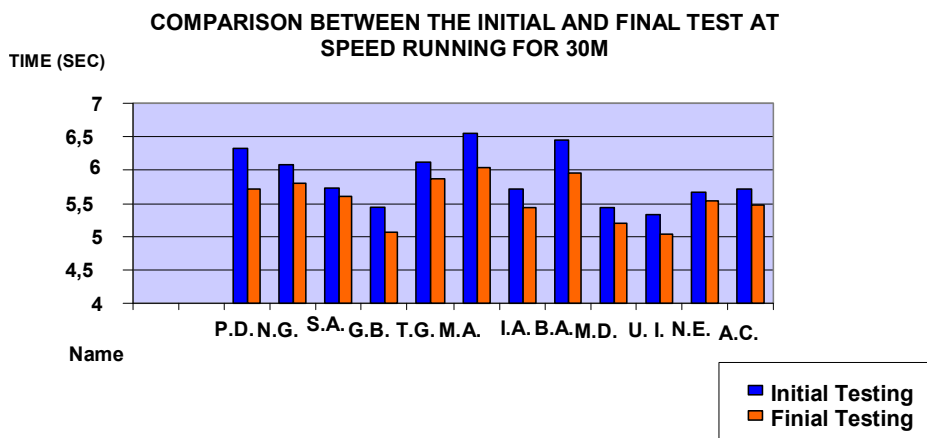
Table 1. Dynamics of the indices of psycho-motor skills of the handball players in the pedagogic experiment (n = 40)

No.	Control test	Subject groups	Initial testing			Final testing			t	P
			$\bar{X} \pm m$	S	Cv	$\bar{X} \pm m$	S	Cv		
1.	<i>Ball throwing-catching, 10 sec, max. nr.</i>	E	6±0.3	1.21	20.16%	8.80±0.1	0.52	5.91%	9.47	<0.001
		M	6.3±0.2	1.12	17.78%	7.20±0.2	1	13.89%	2.89	<0.01
	<i>t; P</i>	E-M	0.67>0.05			6.60<0.001				
2.	<i>Coordination test, cm</i>	E	47.6±1.5	6.65	13.97%	41.15±0.7	3.20	7.78%	3.88	<0.01
		M	46.8±1.7	7.41	15.83%	45.65±1.6	7.14	15.64%	0.48	>0.05
	<i>t; P</i>	E-M	0.36>0.05			2.58<0.05				
3.	<i>Matorin test</i>	E	196.8±7	31.3	15.90%	269.7±2.09	9.33	3.46%	9.99	<0.001
		M	207.2±7.3	37.6	18.14%	213.5±5.8	37.6	17.61%	0.60	>0.05
	<i>t; P</i>	E-M	1.04>0.05			10.08<0.001				
4.	<i>Tapping, nr. X, max.</i>	E	25.7±0.9	4.02	15.64%	30.9±0.5	1.97	6.38%	5.24	<0.001
		M	25±1	4.38	17.52%	27.2±0.7	3.20	11.76%	1.81	>0.05
	<i>t; P</i>	E-M	0.57>0.05			4.46<0.001				

Note

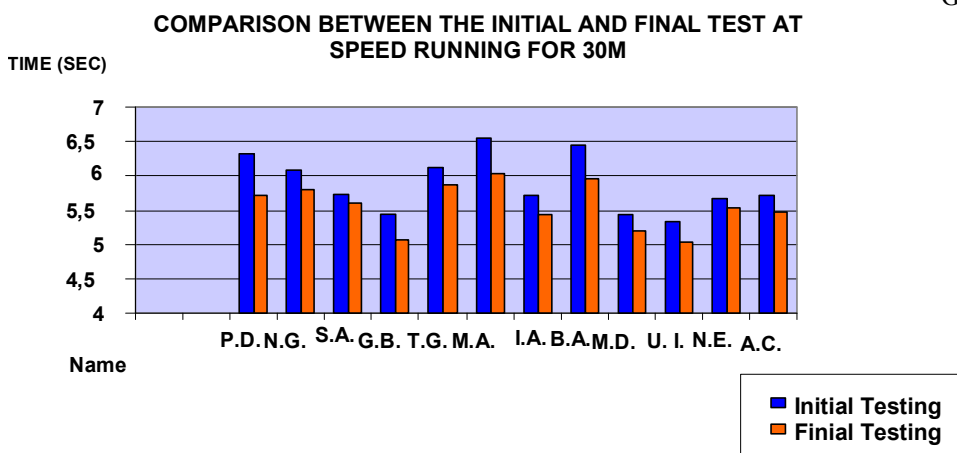
P		0.05	0.01	0.001
t	n=20	2.086	2.845	3.850
	n=40	2.021	2.704	3.551

Graph No.1



Psychomotor indice results from initial testing

Graph No.2



Psychomotor indice results from final testing

CONCLUSIONS

- 1) The results of the pedagogic experiment that aimed at the psycho-motor training of the beginner handball players mainly reveal the fact that the most eloquent sporting progresses were the ones intervened on the level of the group experiment. The assertion is objectified by the dynamic of the recorded scores both in their horizontal analysis (intra-group) and the vertical one (inter-groups). The evolution of the parameters found on these coordinates was quasi-generally appreciated to values of $P < 0.001$ and secondary $P < 0.01$ and < 0.5 .
- 2) In all the presented tests it was started from about the same aptitude stage for all the subjects implied in the research and towards the end of the study the tendency became obvious that on the psycho-motor component the experimental lot was positively distinguished, obtaining superior performances in all the evaluated specific procedures and structures.
- 3) The level of homogeneity signaled in the two samples during the two moments of testing was generally of medium level, being framed in the interval 11.76-20.16%. The exceptions from this tendency was noticed in the experiment group (final testing) where the values corresponded to a great homogeneity: 3.46-7.78%
- 4) The selection of the subjects according to a hemisphericity profile similar to the one of the senior sportsmen proved as efficient and real premises for the accomplishment of a more conclusive and efficient selection process is outlined.
- 5) Observations made in the course of research, dynamics and distribution values psycho-motility component analysis reveals not only the validity criterion in the selection of optimal cerebral dominance handball players, but also a striking evidence for all sports games. Obtaining objective feedback is determined by its use of its components under review, the specific structures

similar in team sports, and ease of application at any stage and period of training.

Based on results in the teaching experiment, we recommend the following:

a. Practical use of cerebral dominance criterion for the purposes of completeness and efficiency of the selection process in both sports and playing handball in other sports;

b. The method of assessing the functional analysis of the cerebral hemispheres must be made by a person competent in this field (preferably in collaboration between sports psychologist and coach) by administering a battery of specific tests;

c. In the game of handball, effective application of cerebral dominance criterion depends on the following steps of the method:

→ battery of psychological tests specific administration, identifying the level of hemispheric activation and brain dominance profile shape.

→ reporting profile obtained cerebral dominance model handball player (as a standard of performance on this component) and understanding of related meanings.

→ psychological findings corroborating the results obtained reported on plans: morpho-functional, motor, technical, tactical, etc.

d. It is preferable that age subjects from which to begin this process of selection corresponding to stage I of sports training, that 10-12 children involved in sports practice. At this age, a possible "inconsistency" in the model for the selection of sports, make the shift action is much easier. Given the fact that from one year to another competitive players have numerous transfers, the criterion in question can be used successfully and stages 2 and 3 of athletic training;

e. Knowledge of meanings related to cerebral dominance may have benefits in optimizing the selection process, but also in improving sports training lessons in their individual peculiarities as adaptations of athletes.

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LE CHOIX DE LA FORMATION PSYCHOMOTEUR SELON L'ANALYSE FONCTIONNELLE DES HEMISPHERES CEREBRAUX

Résumé

Ce travail traite du processus de sélection à travers la composante psychomotrice dans le jeu de handball, à partir du critère psychologique d'analyse de la dominance fonctionnelle des hémisphères cérébraux. Les sujets examinés lors de cette recherche ont été des enfants âgés de 11-12 ans et l'échantillonnage des sportifs sur les deux groupes s'est réalisé par l'utilisation d'une batterie de tests psychologiques et à partir d'un modèle spécifique au joueur de handball (senior) – préalablement réalisé. Les aspects psychomoteurs ont visé la coordination : dynamique, segmentaire et générale, statique- l'équilibrage, respectivement, perceptive et motrice. La conclusion générale, résultant de l'expérimentation pédagogique, c'est que la sélection des sportifs à base d'un profil d'hémisphéricité, a déterminé l'obtention de résultats supérieurs au niveau psychomoteur, par rapport à d'autres critères.

Mots clés: sélection, psycho-motricité, le modèle, la domination, hémisphéricité, la performance