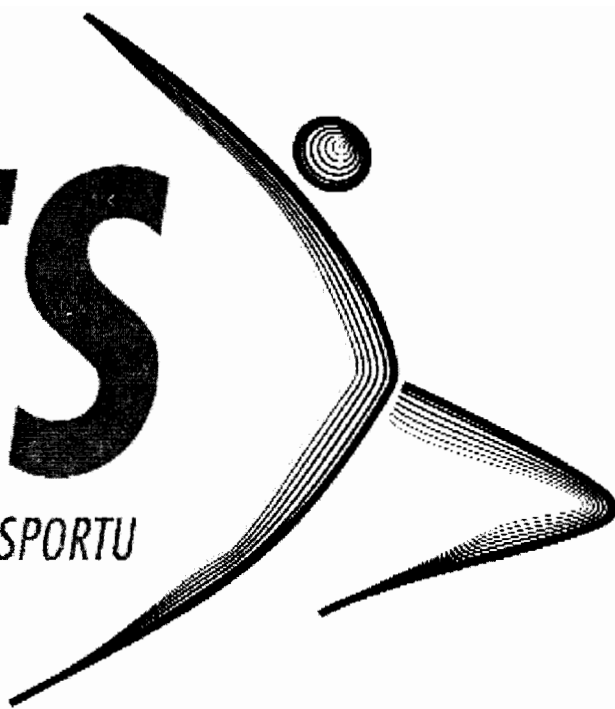


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***MORPHOLOGIC AND MOTOR INTERACTION CHANGES
OF FIRST FORM CLASS PUPILS***

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1. Introduction

Entering systematic school processes always is important for any child. Educational activities bring a whole set of influences on young pupil organism, including new lifestyle, new type of body positions, better attention activation, bigger amount of data for processing and learning, and especially regular guided exercising. This period of life (app. 7 years), in sense of development, is usually marked with crossroad of two important phenomena. One is amalgamation, when some body functions became more stable and integrated, and second is differentiation when some functions became more accurate and autonomous. Those processes play very strong and important role in pupil's biosocial experience and behavior. From kinesiological point of view, these faze, and years to come, usually determine child's future creations in moving. Because of that fact, responsibility for health and successful sport exercising is all our. One way or another, we simply must explore some important changes that "hit" child's body. Among all characteristics, probably interaction between morphologic and motor dimensions is one of most interesting. Reason is simple: This is an age when child function are developed enough for accomplishing and perform very different, even complex moving tasks. Motor mechanisms can function on appropriate level to integrate body inert, energetic resources, information moving components, and recuperation caused by repetitive and long-term work. Still, some child's characteristics of this age seem to avoid our competency, like changes in morphologic and motor interaction that consequently follow child's natural development as well as our work in kinesiology.

2. Methods of work

There was a total sample of 249 male pupils aged 7 years (Ist class of primary school) at the beginning of transformation process. All of them were able to include in educational school system without any visible motor, morphological or psychological aberrations. There was a battery of 14 morphologic variable applied with intention to cover body height (AVIT), arm length (ADUR), leg length (ADUN), biacromial width (ASIR), bicrystal width (ASIK), knee diameter (ADIK), wrist diameter (ADRZ), body weight (ATEZ), chest circumference (AOGK), lower leg circumference (AOPK), forearm circumference (AOPL), skinfold of the back (AKNL), upper arm skinfold (AKNN) and abdominal skinfold (AKNT). All the measures were taken according to the international biological program.

The following variables were used for the assessment of the motor status: side steps (MKUS), held part in the hang (MVIS), long jump from a standstill (MSDM), standing on the bench (MP20), polygon backwards (MPOL), sit-ups (MDTS), 20m run from a standing start (M20V), straddle forward bend (MPRR), hand-tapping (MTAP), foot-tapping (MTAN) and throwing the ball for distance (MBLD). The variable 3-min run (MT3M) was used to assess the aerobic work. All the measurements were done by qualified people with significant experience in collecting the aforementioned initial data. The data processing methods implied everything from the metric characteristics, over the elementary statistical indicators, up to the multivariate methods. For the purpose of this paper data of standard canonical correlation analysis were condensed. All variable were applied tree times (at the first class beginning, nine months, and eighteen months later).

3. Results

	M 1		M 2				M 3		
	CF1	CF2	CF1	CF2	CF3	CF4	CF1	CF2	CF3
AVIT	-0.21	0.45	-0.23	-0.44	-0.25	0.14	-0.16	0.38	0.19
ADUN	-0.26	0.36	-0.28	-0.38	-0.18	0.08	-0.18	0.30	0.08
ADUR	-0.35	0.50	-0.11	-0.34	-0.02	-0.13	-0.09	0.30	-0.10
ADRZ	0.16	0.20	-0.06	-0.26	-0.49	0.44	-0.06	0.32	0.61
ADIK	-0.16	0.24	-0.20	-0.15	-0.14	0.61	-0.19	0.11	0.32
ASIR	-0.17	0.42	-0.07	-0.50	-0.21	0.19	0.03	0.48	0.25
ASIK	-0.05	0.28	-0.27	-0.57	-0.25	0.21	-0.24	0.56	0.23
ATEZ	-0.45	0.22	-0.42	-0.63	-0.10	0.27	-0.33	0.61	0.12
AOPL	-0.45	0.37	-0.08	-0.72	0.30	0.35	-0.05	0.70	-0.20
AOPK	-0.40	0.48	-0.28	-0.72	-0.20	0.06	-0.23	0.78	0.11
AOGK	-0.38	0.45	-0.15	-0.79	-0.05	0.36	-0.02	0.80	0.13
AKNN	-0.72	-0.08	-0.76	-0.33	-0.01	0.28	-0.74	0.41	0.10
AKNL	-0.61	-0.22	-0.76	-0.39	0.00	0.19	-0.71	0.42	0.01
AKNT	-0.68	0.14	-0.74	-0.56	-0.11	0.10	-0.71	0.60	0.13
MKUS	-0.17	-0.51	-0.36	0.02	0.45	0.25	-0.36	0.00	-0.36
MPOL	-0.52	-0.27	-0.67	0.03	0.24	0.17	-0.60	-0.04	-0.11
MP20	0.14	0.12	0.33	-0.02	0.06	0.15	0.24	-0.09	0.15
MPRR	-0.20	0.58	0.15	-0.43	0.43	0.16	0.14	0.40	-0.29
MTAP	-0.06	-0.07	0.06	-0.29	0.09	-0.03	0.15	0.29	-0.01
MTAN	-0.11	0.22	-0.06	-0.08	-0.15	-0.32	-0.04	0.11	0.00
MSDM	0.51	0.47	0.61	-0.19	-0.27	-0.39	0.65	0.12	0.09
MBLD	0.21	0.44	0.29	-0.47	-0.41	0.33	0.31	0.40	0.42
M20V	-0.14	-0.49	-0.61	0.55	0.02	0.26	-0.62	-0.44	0.15
MDTS	0.30	0.34	0.45	-0.35	-0.22	0.16	0.53	0.42	0.25
MVIS	0.58	-0.06	0.63	0.17	0.34	0.02	0.66	-0.30	-0.34
MT3M	0.60	0.08	0.39	0.06	-0.23	0.45	0.41	-0.11	0.32

Table 1. Canonical factor structure through tree time points
(M 1, 2, 3 = measurements in tree time points, CF 1, 2, 3, 4 = canonical functions)

Results of canonical analyses (Table 1.) confirm presumptions of mentioned processes. Dominantly, we can register different number of significant canonical functions. In the first measurement, there are two functions, in the middle of analyzed period, there exist four functions, and at the end of period, we can recognize three functions. This is clear indication of anthropologic status changes.

At the school beginning, those two canonical functions represent relatively homogenous characteristics, but somewhat divergent in the sense of control moving performance. First pair of factors describes body volume and especially body fat as energetic moving output limit. Second pair describes body height and volume except body fat as strong movement regulation support. All of that are well-known anthropological facts, and brings us small amount of new information.

However, second measurement changes plenty of things. After less than year, under undoubted influence of growing and physical education growing support, functions differentiation happens. First canonical pair of factors expresses body fat as total limit for any kind of energetic signed child activities, and represents global energetic regulation mechanism. Second canonical pair describes body mass in general, as sub-system, which generates limitations in movements characterized with explosive strength engagement. Structures that controls and regulates that functions are facilitating muscle unit mechanisms.

Third pair is very interested and combines transversal body dimensions with specific local activities, which we can describe as better motor functions in relation with gentle bones dimensions. Probably, biomechanical laws are responsible for such factor structuring, especially with rotations in space with short-time ground touches and higher contribution of arm work. This structure is body location and segments regulation in three-dimensional physic space. Finally, fourth canonical pair describes a combination of transversal and circular body dimensions as significant cause for qualitative postural endurance and body segments support. That is obviously very complex synergic regulation mechanism and force control.

Most significant situation we can register after 18 months of exercising. Now, we can see three canonical pairs. First and second pair repeats situation from second measurement, but much better. Therefore, body fat is total limit for any kind of energetic signed child activities, and really represents global energetic and long-term energy deposit regulation. This is mechanism with primarily *biochemical* transformation background. In the similar manner, body mass in general, as sub-system, generates global limitations in movements characterized with explosive strength engagement as well as movements with repeating regime. Structures that controls and regulates that functions are innervations and facilitating muscle unit mechanisms. We can, without any doubt identify it as basic *information component* of moving, no matter if control processors lay in central or peripheral segments of Nervous System. Third and last canonical pair integrates transversal body dimensions with endurance, force realization or force limits. This mechanism is obviously synergic regulation that controls child's movement realization possibilities in *physical* sense.

We must admit that growing of child, and exercise as development support to that growth, results in two types of global processes. First is differentiation of analyzed functions, so that functions become more subtle, accurate, clear and autonomous. On the contrary, as growth continues, indisputable integration apparent with direct repercussions for child's quality of moving as well as quality in general.

4. *Conclusion*

After 18 months of exercising, first form primary school male pupils, measured three times with 26 morphologic and motor variables, have shown us two main development simultaneous process characteristics.

Differentiation of functions takes effect mostly in the first half of total period, right when growth and growth support generated from exercising can express significant changes in analyzed relations. **Integration** of functions continues to the end of treatment and represents three basic types of adaptations: biochemical, informatics and physical.

Common characteristic of those adaptation phenomena is automation or so call "hardware" changes that lead to stability of "low-level" functions. Considering child's status, in that structures we can recognize fundamental persisting qualities for further complex moving, as well as for total quality of life. Our task is to support that persistence, as integral part of natural development, which is very serious obligation.

5. *Literature*

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