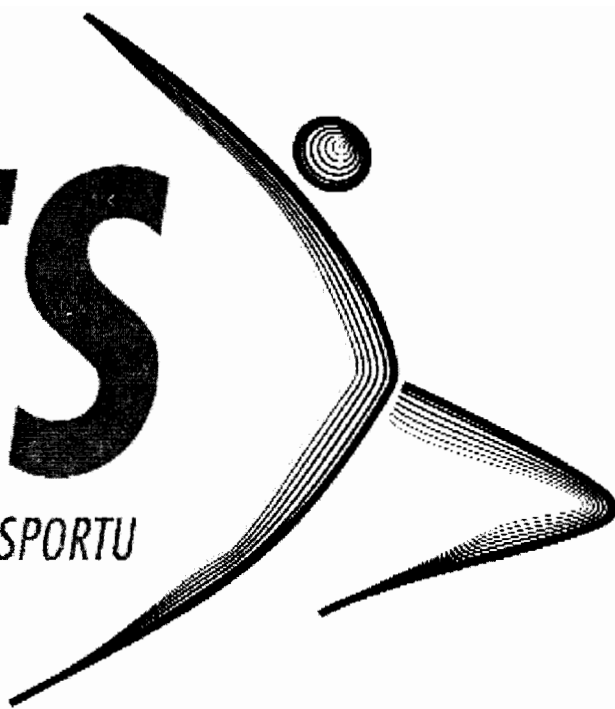


# **NTS**

*NOVE TEHNOLOGIJE U SPORTU*



**ZBORNIK  
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RADOVA**

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## *Real existing development processes in 11-14 years old boys*

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### **1. Introduction and problem**

Researches in kinesiology usually try to determine rules that can explain development characteristics. Especially with subjects characterized with intensive changes of bio-psycho-somatic abilities, like the primary pupils are. We all know very well that many particular changes influence, not only locomotion, but also completely anthropologic system in the period of 11 - 14 years. Some of those changes are out of our control, just because of genetic predispositions and differential sensitivity off applied stimuli complexes. Results of experiments or processes are often strongly divergent and contaminated with many particular influences.

Situation is more difficult because of inadequate problem solutions that lead us out of acceptable conclusions. Therefore, appropriate applications in operational sense are continually absent. Project solutions directed forward strictly bounded groups sometimes generate, so called good results, but transparency of such solutions on other similar populations is extremely weak, and depends of too many different conditions. Finally, almost every new transformation research asks original and unrepeatable plan, tasks and performances. Reason for this lays in explorer's simplification of real problem. Not so long ago, predominant problem definition always centers our effort in abilities structure determination. Unfortunately, although that approach generates some useful information such approach becomes failure in many situations and globally insufficient.

It is better to confirm a very small part of our knowledge than generate amounts of suspicious conclusions with common characteristic that are not operatively applicable for any longer period, and are not transparent almost for any other, even similar, research. This stands especially for motor skills explorations and transformations. Although kinesiology experts try continually to warn that anthropologic area is very complex and complicate, too many researches were "finished" concerning dominantly motor skills. Even in situations when research area includes other characteristics, the basic logic of such projects was still structure determination, and changes in that structure, eventually.

This paper offers slightly different approach. Let us suppose, have some objects, and let those objects are of different chronological age, and even exposed to some different transformation processes. Furthermore, those objects we measure in different time-points. First and dominant task is to bring them into the common space, initially stretched with some measured data (variables). Probably the most efficient way is to expose all data to analysis that will remain only common part of all particular data measured.

In that case, we will free pregnant data and get derived initial information without inconsistent influences, errors, and other contamination issues. Once we clean everything that generates complementary and redundant information, set of real existing rules will remain. The only task is to pick those rules up using appropriate technical support. As we can see, this model is not a problem of mathematical methods, but a problem of logic.

## 2. Material and methods

There was a total sample of 307 male pupils aged 11-14 years (V, VI, VIII, VIII class of primary school). All of them follow one school year educational process with qualitative stimuli in kinesiology, and all of them were able to include in ordinary educational school system without any visible motor, morphological or psychological aberrations. There was a battery of 13 variable applied with intention to cover body height (Avit), body mass (Amas), subscapularis body fat (Akns), abdomen body fat (Aknt), static arms strength (Msta), arm frequency (Mtap), legs explosiveness (Mexp), thorus strength (Msnt), complex running (Mtrc), flexibility (Mgip), arms isometric strength (Mzgb), running for 20 m (M20m) and balance (Mfla). Three sub samples we measure twice (in the beginning and at the end of school year) and VIII Th class at the beginning only. Finally, we collect data of virtually 548 entities described with 13 parameters. We analyzed all data in manner to surround that space, which means to bring all objects in common space. Like mentioned before, strategy for that purpose is generally important, because that is the only way to compare such divergent data, or to derive useful information. As we already know, each individual data is nothing but composite with parts generated from different influences or reasons. For this paper, we apply image (Thurston) logic on initial data, and after image procedure, remain only common part of particular information. This procedure involves multiple criterions for data integrity, so includes common data segment from different objects, different variable bounds, and different age, and different development position, different conditions and so on. Structure of initial data shows reorganization, in way that ensure maximum of common information through all sub samples. From several most interesting further blocks of results, for this paper purposes we expose discriminative analysis through chronological seven groups, and we chose robust analysis (SDA -Momirović,...) that generates better and more useful results then classical (Rao,...).

## 3. Results and discussion

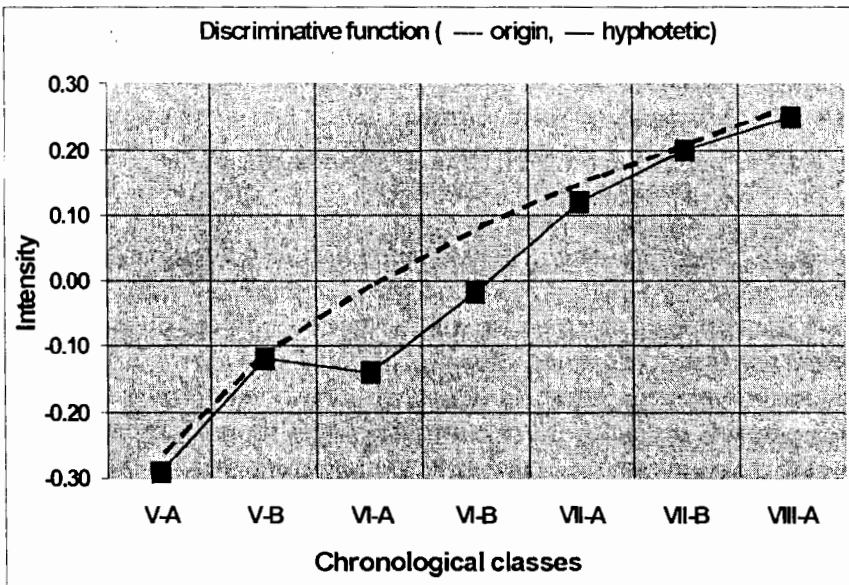
**Table 1. Results of Robust Discriminative Analysis**

	F				C	
	DF01	DF02			DF01	DF02
AVIT	0.77	-0.28	GR V-A	-0.29	0.04	
AMAS	0.42	0.14	GR V-B	-0.12	0.00	
AKNS	-0.42	0.56	GR VI-A	-0.14	0.02	
AKNT	-0.53	0.57	GR VI-B	-0.02	-0.11	
MSTA	0.73	0.32	GR VII-A	0.12	0.03	
MTAP	-0.89	0.22	GR VII-B	0.20	-0.06	
MEXP	0.89	-0.04	GR VIII-A	0.25	0.07	
MSNT	0.68	0.05				
MTRC	-0.71	-0.01				
MGIP	0.44	0.61				
MZGB	0.45	0.06				
M20M	0.74	0.13	DF01	1.00	0.23	
MFLA	-0.22	-0.16	DF02	0.23	1.00	

(Legend: DF01, 02 = discriminative functions, F = discriminative functions in variable space, C = centroids of discriminative functions, R = correlations between discriminative functions, GR = group/class, A = school year beginning, B = school year end).

It is obvious that first function (graph 1.) clearly describes main characteristic of all samples and that is development. As we can see, discriminative analysis on image-composed data results in continual description with well-known "aberration" at adolescent years. Blue (hypothetic) line explains that although real development paradigm (red) differ of monotone function, at VIII Th class all multivariate elements of development composites are established again, without greater loss of global qualitative.

Graph 1. Group Centroids on First Original and Hypothetic function



If we assume mentioned adolescent "aberrations", and accept that return on "predefined" development track, we must agree that here we talk about continuity. First and most important function represents almost affine, well predictable chronological composite. Exposed graph can encourage us just because those 12 Th year "stagnation" disappear after only few years if transformation or any natural process continues qualitatively. From that position, we can conclude that there is no aberration at all, but only our inaccurate point of view. Such phenomena that we explain as partial development stagnation in some parts of total organism is nothing but narrow defined space of human existence. Obviously, if we analyze an ordinary desk looking it from the top and without complete information of its existence, we will see only a table in two dimensions, and no legs at all. Such superficial definition will direct us toward incomplete conclusions and limit our possibilities of understanding real objects, real processes and real applications.

Just like the first function, the second one is equally simple, and describes transformation process in its main component. Higher projections came from body fat reduction, especially through VI Th and VII Th school class. It is visible also that there became lower strength and flexibility. Young pupil's body is definitely prepared for intensified transformation stimuli in order with actual anthropologic characteristics in general. After assuming global process, mostly genetically predefined, the other parallel process exists, and we can described it as directed strictly in to integration support as specific type of adaptation caused by hormonal changes that influence whole organism. This second process is especially important for transformation activities in kinesiology.

Equally, because of significant correlation between mentioned two functions (processes in reality)  $r=0.23$ , it is not allowed to treat pupils' characteristics apart. Our task and aim is always integrated human being, and all our actions in this ages have to contain integrative functionality. That is for sure.

#### 4. Conclusion

Four samples of primary school pupils measured with 13 morpho-motoric variables at the beginning and at the end of school year show us transversal development characteristics in the period of 11-14 years of age. According to aims of paper, we transform whole amount of initial data from original (real metric) to image metric (common space). That procedure generates collection of data with virtually 548 entities described with 13 parameters. We prepare all data in manner to surround that area, which means to bring all objects in common space. Direct consequence of that procedure was practically longitudinal data sequence derived from transversal time points. After that, SDA robust discriminative analysis (similar as standard but much better) of seven samples discovers two simultaneous processes. The first one describes basic developmental functions that depend of genetic predispositions. Especially interesting attribute was fact that adolescent "aberrations" and development stagnation practically disappears after only two years. This means that our influence in higher classes of primary school are very important just because it additionally ensures functions return into slightly predictable, expectable and desired position that tends to integrated human been at later periods of live. Second discriminative function describes main components of applied transformation process. It is obvious an integration support as specific type of adaptation caused by hormonal changes that influence whole organism. This second process is especially important for transformation activities in kinesiology. Those two processes exist simultaneously and cross all over each other.

#### 5. Literature

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