

## **SIMULATION OF THE SOME BIOMOTOR FEATURES FOR THE SELECTION OF THE VOLLEYBALL PLAYERS AGED 7**

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*Original scientific paper*

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### **Abstract**

*The purpose of this study was identification of talented volleyball players in the frame of morphological and motor parameters. Based on methodology, this study belongs to identification on the basis of the expertise and simulation. The methods applied are avantguard and introduced for the first time for the purpose of the description of selection in volleyball. Simulation protocol defined 12 initial conditions, or 'limitations', which are needed to ensure the selection of children with maximal exposition to selected conditions. The results have shown the strenghts of this protocol, and singled out children with highest chances for success in volleyball. The originality of this study is in simulation and applicability in various conditions. There are basically no limitations except in the domain of expertise on specific or a group of issues. The expansion of initial conditions is possible.*

**Key words:** *biological dimensions, seven-year old pupils, simulation, volleyball*

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### **Introduction**

Volleyball with its structural features belongs to the group of polystructural acyclic sports. Dynamics of actions, especially in modern volleyball, is highly accentuated together with almost incredible individual movements which literally take a fraction of a second.

Features of this sport are multiple and multidimensional, where some features simply must be above average in order to achieve significant results (Janković and Marelić, 1995).

For the realization of volleyball demands in senior volleyball, there are three preconditions which must be fulfilled in order to achieve the professional level, which are articulated as sports' models (Bonacin, Bilić & Bonacin, Da., 2008): a) First precondition is understanding of the volleyball model, the characteristics of the game that are implemented, and the players' features needed for the realization of the goals; b) Second precondition is understanding the transformational process which brings the beginners aged 7 or 8 to the professional level; c) Third precondition is recognition of the specially talented children in accordance with their features (Bonacin & Smajlović, 2005).

Selection is one of the key terms, and it cannot be taken lightly, without some sort of insight to the future of the sport and of the given child who dedicates 10 or 15 years of life to achievement of the professional level.

### **Problem and aim**

Assuming that introduction covered preconditions a) and b), there remains c) recognizing the potential in children. Such a procedure demands very clear differentiation and identification of necessary features in order not to exclude gifted children, and include children that are not gifted in long-term training processes. This is also a problem of this essay, objective realization of features needed in boundaries of defined parameters, morphological and motor in this case. The subject of this essay are children aged 7, basically the age in which children start to show interest for this sport, even though this does not imply that there is a systematic training, it implies above all games which develop the potential for the latter application in training. The goal of this essay is the exact identification of talented children based on initial values of their morphological and motor dimensions.

### **Methods**

Data described with 26 variables from 249 boys aged 7 is analyzed for the purpose of this essay. 14 of those are morphological variables chosen to cover complete morphological area of longitude, volume and fat tissue: height, length of arms and legs, wrist diameter, knee diameter, shoulder width, pelvic width, weight, forearm girth, shin girth, chest girth, upper arm skin wrinkle, back skin wrinkle, torso skin wrinkle.

For the estimate of motor skills 11 variables are used, which are designed to cover primary motor dimensions like coordination, movement frequency, flexibility, balance, repetitive strength, agility, static strength and stamina. Exercises used are: side step, backwards training ground, hand tapping, foot tapping, standing on the balance bench, long jump from standing position, ball throwing, high start 20 metres running, sit ups.

Finally, one variable is used to assess functional capability of cardio-vascular system: three-minute running. The results are prepared and primarily processed using classical methods of univariant and multivariant analysis. After that data is transformed and processed in a way to enable the application of simulation protocols for the identification of the entities based on given criteria.

**Results**

Variable	Total sample parameters						Chosen entities					
	MIN	AVG	MAX	STD	Z-MN	Z-MX	SIM	E157	E221	AVG2	Z	
height	113.97	128.43	146.83	5.44	-2.66	3.38	>132.00	132.23	138.97	135.60	1.32	
arms length	60.00	71.44	82.10	3.70	-3.09	2.88	>74.00	74.23	82.10	78.17	1.82	
leg length	42.93	53.00	65.70	2.98	-3.38	4.26		56.33	57.23	56.78	1.27	
wrist diameter	3.57	4.19	5.00	0.26	-2.43	3.11		3.97	4.13	4.05	-0.56	
knee diameter	6.50	7.74	9.50	0.47	-2.62	3.72	>8.00	8.03	8.07	8.05	0.65	
shoulder width	20.30	27.24	30.40	1.54	-4.50	2.05		27.60	28.33	27.97	0.47	
pelvic width	15.50	20.30	24.27	1.45	-3.32	2.74		21.10	22.50	21.80	1.04	
weight	16.50	27.02	44.40	4.41	-2.39	3.85		27.33	30.00	28.67	0.37	
forearm girth	13.90	17.79	23.07	1.54	-2.53	3.42	>26.00	17.30	17.60	17.45	-0.22	
shin girth	19.20	25.76	34.03	2.19	-2.99	3.77		26.23	26.20	26.22	0.21	
chest girth	49.90	60.68	79.60	4.12	-2.62	4.59		58.37	62.60	60.49	-0.05	
upper arm skin wrinkle	5.83	11.44	25.90	3.63	-1.54	3.98	<10.00	6.17	9.60	7.89	-0.98	
back skin wrinkle	3.47	7.01	24.97	3.13	-1.13	5.74	<6.00	3.97	5.67	4.82	-0.70	
torso skin wrinkle	2.97	7.43	30.23	4.82	-0.93	4.73	<6.00	3.40	5.07	4.24	-0.66	
side step	11.23	16.23	25.33	1.99	-2.52	4.58	<14.00	13.60	13.77	13.69	-1.28	
polygon backwards	11.69	22.94	57.84	6.46	-1.74	5.40		13.87	21.77	17.82	-0.79	
balance bench	0.17	1.73	5.00	0.70	-2.22	4.64	>2.00	2.03	3.03	2.53	1.14	
torso flexibility	19.01	36.84	60.01	8.46	-2.11	2.74		29.86	47.34	38.60	0.21	
hand tapping	12.00	19.27	30.67	2.86	-2.54	3.99	>21.00	24.00	21.00	22.50	1.13	
foot tapping	8.99	15.71	22.68	1.96	-3.43	3.56	>15.00	17.99	15.32	16.66	0.48	
long jump	56.65	112.89	163.35	17.28	-3.26	2.92	>125.00	128.00	125.01	126.51	0.79	
ball throwing	3.17	10.45	22.00	3.04	-2.40	3.80		10.30	5.40	7.85	-0.86	
20 metres run	4.07	4.93	6.30	0.43	-2.03	3.20		5.17	5.17	5.17	0.55	
sit ups	0.00	21.55	39.00	6.67	-3.23	2.62		28.00	23.00	25.50	0.59	
arms strength	0.00	10.91	50.50	8.66	-1.26	4.57		6.40	19.00	12.70	0.21	
3-minute running	250.00	443.98	570.00	57.87	-3.35	2.18		485.00	459.00	472.00	0.48	

(MIN=minimum, AVG=arithmetic middle, MAX=maximum, STD=standard deviation ,Z-MN, Z-MX=minimal and maximal z value, SIM=simulation values, E157, E221=chosen entities AVG2=average values of chosen entities, Z=z value of AVG2)

Results in sheet 1 show the applied protocol. Initial values were given for 12 variables, and those values had to be exceeded by applicants. Initial values were given to: height, leg length, knee diameter, forearm girth, standing on the balance bench, hand and foot tapping, long jump from standing position. Values that had to be smaller than those given were for fat tissue wrinkles, and side step. This is made under assumption that future volleyball players need accentuated height, and understandably long legs, also the ankle structure to withstand vertical jumps, and also accentuated sense of balance in tight spaces as occur in volleyball. This is also used to assess the speed of object handling(arms), and positioning in space (legs), and heightened leg agility. Logically, values of all variables differed in the function of random vectors, even though it is known that

all dimensions are structured together, but it is designed that neither has crucial or eliminatory influence on the simulation goal.

**Discussion and conclusion**

Simulation had been stabilized after tenth iteration and had chosen 2 entities which fulfilled all conditions based on given values (SIM). Those two entities, E157 and E221 are very much identical, and thus it is confirmed that this protocol is highly efficient. As shown, those are very tall children, which are over 1,2 of standard deviation in overall sample, on about -1 of standard deviation considering fat tissue, with great agility, speed, balance, and with all the other parameters that suggest that they can meet all the requirements of modern volleyball.

For the complete picture, further expansion of sets of variables is needed for those individuals chosen to continue with serious training (anticipation, reaction time, psychological variables), but this does not undermine achieved results. With the sample of 249 boys aged 7, described with 26 biomotoric variables, simulation protocol is applied for the purpose of identification of possible entities capable of great successes in volleyball.

On the basis of initial parameters (initial simulation conditions), algorithm singled out two boys that show a cluster of features needed to be a superb volleyball player. This shows that this protocol is indispensable in selection procedures, especially because it takes into account critical value of chosen parameters, but all the other parameters are constituted according to goals.

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## SIMULACIJA NEKIH BIOMOTORIČKIH DIMENZIJA ZA SELEKCIJU ODBOJKAŠA UZRASTA 7 GODINA

### Sažetak

Svrha ovog istraživanja bila je identifikacija za odbojku nadarene djece u skupu morfološko-motoričkih parametara. Metodološki, istraživanje pripada identifikaciji temeljem ekspertnog znanja i simulacije. Primjenjene metode su avangardne i po prvi puta primjenjene u svrhu opisa selekcije u odbojci. Simulacijskim protokolom definiran je skup od 12 početnih uvjeta, odnosno "ograničenja" koji su u stanju osigurati odabir upravo one djece koja po izmjerenim parametrima imaju maksimalne mogućnosti ekspozicije u odabranim uvjetima (odbojci). Rezultati su pokazali svu snagu ovog protokola i izdvojili djecu s najviše izgleda za uspjeh u odbojci. Originalnost istraživanja je upravo u simulaciji i mogućnosti primjene modela u različitim situacijama. Ograničenja praktično ne postoje osim u prostoru ekspertnog znanja o pojedinom problemu ili skupu ciljeva. Naravno da je moguće proširenje startnih parametara, odnosno početnih uvjeta ili dodavanje novih varijabli.

**Ključne riječi:** biološke dimenzije, sedmogodišnjaci, simulacija, odbojka

Received: December 12, 2008.

Accepted: May 26, 2009.

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