

## WEIGHT THROWING TRACK EVENTS SHARE IN FIELD COMPETITION

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**ABSTRACT. Introduction.** The carry out of track events provides data relating to body state, being necessary to identify deficiencies, to evaluate learning outcomes, to assess the different training stages level, to calculate the effort capacity progress rate, the behavior prognosis and the results from current following competitions. **Hypothesis** We consider that the statistic correlations as being nonlinear, meaning that veracity of track events depend on the athlete's performances, on the age or training level and lastly by the event itself. **Methods.** I took in to consideration the result at the three weeks track events and correlated it to the result for 8 Romanian National Team man and women throwers contest. In the mathematic – statistic calculation I used the Mathcad software. **Results.** From table of correlation of coefficients between competition results and track events we observe that only the extension, the genuflexions, lie down push ups, standing long jump shot put backward and shot put forward are significantly correlated with throwing athletic shot put event. Some events are correlated between them, standing long jumps with 30 m sprint, the extensions and genuflexions. The tight correlated events may usually replace each other. From the calculation of nonlinear correlations it results that the replacement between them is possible only for certain performance gaps. **Conclusions.** In management of high performance training in preparation of shot put would to renounce at a series of track events that do not have any relevance with throwing and any relevance in prognosis of the result at the next available competition.

**Keywords:** shot putt, track event, competition, correlation

**REZUMAT. Importanța relației dintre probele de control și proba din concurs la aruncarea greutății. Introducere.** Prestarea probelor de control este necesară pentru a obține informații în legătură cu starea organismului, depistarea unor curențe, controlul evoluției învățării, diagnoza nivelului de perțătire în

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diferite etape de pregătire, calcularea ratei de progress a capacității de efort, prognoza comportamentului și rezultatelor din competițiile imediat următoare. **Ipoteză.** Considerăm că, corelațiile statistice sunt neliniare, însemnând că veridicitatea probelor și normelor de control depinde de performanța atletului, de vârstă sau nivelul de pregătire și în ultima instanță de de probă. **Metode.** S-au luat în considerare rezultatele la probele de control cu trei săptămâni și s-au corelat cu rezultatele din concurs pentru 4 aruncători și aruncătoare din reprezentativa României. În calculul matematico-statistic s-a folosit softul Mathcad. **Rezultate.** Din tabelul coeficientilor de corelație dintre rezultatele competiționale și probele de control se observă că numai detenta, genuflexiuni, împins culcat, lungime fără elan aruncarea greutății înapoi și aruncarea greutății înainte se corelează semnificativ cu proba atletică de aruncare a greutății. Unele probe se corelează între ele, precum lungime fără elan cu 30m sprint, detenta și genuflexiuni. De regulă, probele corelate strâns se pot înlocui între ele. Din calculul corelației neliniare rezultă că înlocuirea între ele este posibilă numai pentru anumite ecarturi de performanță. **Concluzii.** În managementul antrenamentului de înaltă performanță în pregătirea aruncătorilor de greutate ar trebui să se renunțe la o serie de probe de control care nu au nici o relevanță cu aruncarea și nicio relevanță în prognoza rezultatului la proxima competiție. Aceasta ar conduce la economie a a energiei și implicit la o mai rapidă refacere a organismului.

**Cuvinte cheie:** aruncarea greutății, probe de control, corelare, concurs

## Introduction

It is known that in performance sport and especially in high performance sport the carry out of track events is necessary in order to obtain information on the body estate, the detection of deficiencies, the evolution of learning outcomes, the assessment of training level in differed training stages, the calculation of effort capacity progress rate, the behavior prognosis and the results from next scheduled competitions.

The norms and track events consist in some exercises that by their structure, involve the manifestation of movement skills preponderance.

Correlation In statistics, dependence is any statistical relationship between two random variables or two sets of data. Correlation refers to any of a broad class of statistical relationships involving dependence. In probability and statistics, a random variable, random variable or stochastic variable is a variable whose value is subject to variations due to chance (i.e. randomness, in a mathematical sense (Yates, D. S., Moore, D.S., Starnes, D. S., 2003).

The basic concept of "random variable" in statistics is really-valued, and therefore expected values, variances and other measures can be computed. However, one can consider arbitrary types such as Boolean Values, Categorical Variables, complex numbers, vectors, matrices, sequences, trees, sets, shapes, manifolds, functions, and processes.

In statistics, groups of individual data points may be classified as belonging to any of various statistical data types, e.g. categorical ("red", "blue", "green"), real number (1.68, -5, 1.7e+6), etc. Mosteller and Tukey (1977) distinguished grades, ranks, counted fractions, counts, amounts, and balances. Nelder (1990) described continuous counts, continuous ratios, count ratios, and categorical modes of data.

Formally, *dependence* refers to any situation in which random variables do not satisfy a mathematical condition of probabilistic independence. In casual usage, *correlation* can refer to any departure of two or more random variables from independence, but technically it refers to any of several more specialized types of relationship between mean values. There are several correlation coefficients, often denoted  $\rho$  or  $r$ , measuring the degree of correlation. The most common of these is the Pearson correlation coefficient, which is sensitive only to a linear relationship between two variables (which may exist even if one is a nonlinear function of the other). Other correlation coefficients have been developed to be more robust than the Pearson correlation – that is, more sensitive to nonlinear relationships (Dietrich, C. F., 1991).

### **Hypothesis**

We consider that the statistic correlations are nonlinear, meaning that veracity of events and event norms are depending on the athlete's performances, on the age or training level and in the last instance by the probe it-self.

### **Methods**

I took in to consideration the result at the three weeks track events and correlated with the result from contest for 4 throwers man and women from Romanian National Team. In the mathematic – statistic calculation I used the Math cad software.

*The events and control norms were the following:*

- Speed running (30 m). Measure the speed movement. The athlete leaves at hearing command with standing start. The athlete runs those with maximum

intensity speed 30 m. The race is made without special shoes (without nails). Is running two times and is denoted the best result. The result is measured in seconds and splits seconds;

- Speed running (50 m). Measure the speed movement. The athlete leaves at hearing command with standing start and those 50 m are runs with maximum high speed. The race is made without special shoes. Is running one only time and the result is denoted. The athletes runs one by one or by two (in pairs).

- Standing long jump. Measure the explosive force of the lower limbs. Standing with the feet slowly apart behind the line, with balance of the arms and a slowly flexion of the feet is jump as far away as. The result is measured from the line till the last sign let on the ground to the inside. The test is executed two times and is denoted the best result in meters and centimeters;

- Standing triple jump. Measure the explosive force of the lower limb. Standing with the feet slowly apart, behind the line and with a slowly balance of the arms and a flexion of the feet is made two successive jumps steeply and the third with landing into the sand pit hole. The result is measured from the line till the last sign let on the sand to the inside. Is jump two times and is denoted the best result in meters and centimeters;

- Genuflexions. Measure the muscular strength of the lower limbs. With the bar lateral charged with barbell, placed on the scapula-humeral belt is made a complete flexion of a lower limbs, after that follows the complete raise from flexion. The test is made only once and is denoted number of raised kilos.

- Snatched. Measure the explosive force of the upper limbs. It is a complex exercises in which are involved both the arms force and the trunk but also the lower limbs force. Standing with the feet apart before the barbell, is take the bar at the middle with the two hands apart at the level shoulders or usually more. The bar is snatched with the lateral barbell (by the powerful contraction) and is rise on the chest level above the head where is kept 3 seconds. It is denoted the number of raised Kilos;

- Pushed from lying position. Measure the arms muscles force: biceps, triceps, pectoral. Standing laying – down in supine position with the arms strait forward, is raising the bar with charge and execute one complete flexion of the arms till of the chest level after that push the bar again in the initial position. Is noted the number of pushed kilos.

- Shot put forward. Measure the explosive force of lower and upper limbs. From the position standing apart behind the line, the arms stretched is taking the weight and by a half-flexion of a lower limbs is throwing the weight from bottom-forward as far as possible. Is measuring from the line till the nearest sign let on the ground by the weight. Is throwing two times and is noted in meters and centimeters the best result.

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- Shot put backward. Measure the explosive force of the muscles, lower limbs, and upper limbs and of a back. Standing with the feet apart at the shoulders level, the weight keeping at a level of metacarpal and phalanges with the back on throw direction by a half-flexion of a lower limb is throwing as far as possible. Is measuring from the line till the nearest sign let on the ground is executed two times and is noted in meters or in centimeters the best throw.

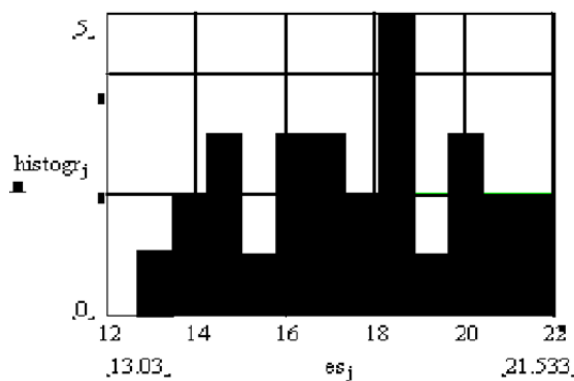
The competition results taken into account were the following:

**Table 1.** Subjects and results

Nr. crt	Name	Date of birth	Sports club	Event	Performance
1	V. A.	1978	CSMCraiova	Shot put	17.51 m (4 kg) m
2	N.I.	1985	C.S.4 Buc.	Shot put	15.05 (5Kg)m
	N. I.	1985	C.S.4 Buc.	Shot put	12.50 (7.260 Kg)m
3	D. Ş.	1983	C.S.4 Buc.	Shot put	13.43 (7.260 Kg) m
4.	M.A.	1985	C.S.4 Buc.	Shot put	18.77 (5 Kg)m
	M. A.	1985	C.S.4 Buc.	Shot put	13.82 (7.260 Kg) m

**Results**

From histogram (fig.1) of contest result in shot put event we observe that the incidence of value results is greater than the weaker ones. The explanation would be that the samples are not randomized, the thrower men from the list seem to be selected or the frequency of valuable competitions for analysed period is greater.



**Fig. 1.** The histogram of the contest result in weight throwing event

**Table 2.** Matching coefficients between the competition results and the control trials at shot put.

	Shot Put	Speed running 30m s	Speed running 50m	Standing triple jump	Genuflections	Pushed from lying down position	Standing long jump	Shot Put forward	Shot Put backward	Standing Shot Put	
	0	1	2	3	4	5	6	7	8	9	10
Shot Put	1	1	n	n	n	.66	.71	.59	n	.67	.78
30m s p	2	n	1	n	n	n	n	.77	n	N	n
50m s p	3	n	n	1	n	n	n	n	n	N	n
Standing triple jump	4	n	n	n	1	n	n	n	n	N	n
Genuflections	5	0.66	n	n	n	1	n	.71	n	N	n
Pushed from lying down position	6	0.71	n	n	n	n	1	n	n	N	n
Standing Long jump	7	0.59	0.77	n	n	0.71	n	1	n	N	n
Shot Put forward	8	n	n	n	n	n	n	n	1	.68	n
Shot Put backward	9	0.67	n	n	n	n	n	n	.68	1	.66
Standing Shot Put	10	0.78	n	n	n	n	n	n	n	.66	1

From table of the correlation of coefficients (Table 2) between competition results and track events we observe that only the extension, the genuflections, lie down push up, standing long jump, shot put backward and shot put forward are significantly correlated with shot put athletic event. Some events are correlated between them, such as standing long jump with 30 m sprint, and the extension and genuflections. The events tight correlated may usually replace each other. From the calculation of nonlinear correlations it results that the replacement between them is possible only for certain performance gaps. For example standing long jump and the extension may be replaced each other only for great value exceptional performances. On the contrary, the other applied track events can be less forecasted from the competition result. 30 m, 50 m, standing triple jump, shot put forward.

## Discussions

First of all, the statistic correlations show only two value streams varying in a parallel way or after empirical relations. The causal link does not result from these variations, but only from logical rationale (Gagea, A. 1999).

The choice and the moment of track event performance are empiric, this does not mean they are not correct, but they reflect the experience, the talent and personality of the coaches or those who lead the training process (team – work, federation, club etc.), (Anton, M.2003).

Although it does not result from our data, but may be argued with bibliographic references, it seems that one events series are not adequate of the throwing events in generally, only to certain events. For example 30 m-50 m sprint, triple jump without impulse for any type of throw and weight throwing forward for weight throwing.

## Conclusions

In management of high performance training weight throwers should renounce a series of track events that have no relevance to throwing or to the next scheduled competition result prognosis. This would conduct to saving energy and implicitly to a speedy recovery of the competitors.

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