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## ISBSS-4617

### **The Impact of the Techniques and Tactics Appropriate by the Athletes' in Phase Triple Jump and Their Relationships with the Finale Results**

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#### **Abstract**

The purposes of this study were to describe and compare the techniques used by elite world triple jumper and the Algerian elite time to determine the impact of correct models phases whom allowing the elite to beat world record. The subjects were three world elite and three currently national elite.

In the lack of new technology, the base of our study thinks about

- 1- Decrypt the practice model and distribution of the phase between our champions (world-national).
- 2- Compart the relationship of the practice model or style between our champions (world-national).
- 3- Compare the difference in practice model between our champions (world-national).

For that, we have shoes the Analysis of variance and correlation of the distances achieved in each of the phases with the official distance of jumper and “t” student to compare implementation distribution of phases (hop, step and jump) with the results accuses.

Our aim for this research is to:

- Using the biomechanics to determine errors and integrated the modern scientific methods into the program monitoring sports.
- Allows our elite's and them coach's to the modality distribution of efforts in model small phrases to improve their performances during training and competitions.

**Keywords:** phase / techniques OF triple jump.

#### **Introduction**

The original triple jump as practiced by the Greeks was no more than three long jumps. The regulated triple jump was protected at the end of the XIX century, first by the Irish and then by the Americans. (International association of athletics federation, 2002)

The triple jump was inspire by the ancient Olympic Games and has been a modern Olympics event since the Games' inception in 1896. According to IAAF rules, "the hop shall be made so that an athlete lands first on the same foot as that from which he has taken off; in the step he shall land on the other foot, from which, subsequently, the jump is performed." (IAAF,

2013). The current male and female world record holders are Jonathan Edwards of Great Britain, with a jump of 18.29 m (60 ft 0 in), and Inessa Kravets of Ukraine, with a jump of 15.50 m (50 ft 10 in). Both records were set during 1995 World Championships in Gothenburg. (Koski, Rissanen & Tahvanainen, 2004)

The current record male Africa 17.37 m (56 ft 11<sup>3</sup>/<sub>4</sub> in) by Tarik Bouguetaïb (MAR) and female is 15.39 m (50 ft 5<sup>3</sup>/<sub>4</sub> in) Françoise Mbango Etone (CMR). The best record Algerian female is 14,98 m (+0,2 m/s) By Baya Rahouli in Meeting Almería 1 juillet 2005 the best record male Algerian is 16, 92(m) by Lotfi Khaïda Monaco Herculis games in August 7, 1993 (Fédération algérienne, 2014).

The literature review reveals that the triple jump consists of a running approach, 3 take-off phases in which the athlete hops on one foot, lands on the same foot, steps onto the opposite foot, and finally jumps and lands in the sand pit (Miladinov O, Bonov P, 2004) (Abeer Eissa, 2014) and the lengths of the three phases are typically about 39 %: 30 %: 31 % of the total length of the jump for the Russian technique, and 35 %: 29 %: 36% of the total length for the Polish technique (McNab, 1968). (ALLEN, S.J., KING, M.A. and YEADON, M.R., 2013) mention in his report that the world record performances from 1911 to 1985 a move away from a hop-dominated technique with a small step phase (40-41%:22%:36-38%), towards a hop-dominated Technique with a larger step phase (37-39%:28-30%:31-33%), and latterly towards a jump-dominated technique (34-35%:28-30%:36-37%).

For this reason, our goal is to introduce the biomechanics evaluation before explaining the reason scientific of the absence of the Algerian performance elite in this discipline. By discussing the adoption of the model relationship and the importance of maintaining the distribution ratios applied in the outcome.

In addition, our research analysis the performance of Algerian elites as first part and the second part was to compare their results with the world's elite 2009 to illustrate the importance of the good contribution of the phase jump on the results. Our motive is to highlight the biomechanical assessment for Algerian coaches to plan the choice of the right assessment technique to their athletes.

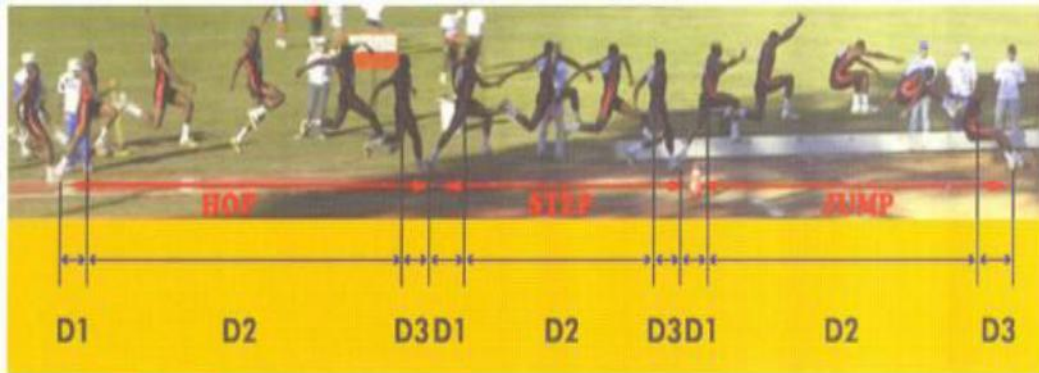
### **Material and Methods**

For the purposes of analysis, we have calculus the distance of the step phase (the distance of the hop), and step phase (the distance of the step), and the phase jump (the distance of the jump), in two-dimensional (Hay, 1975).

The analysis of the present study was with the software kinovea, on the capture and measured distance of each phase of triple jump as Figure 1.

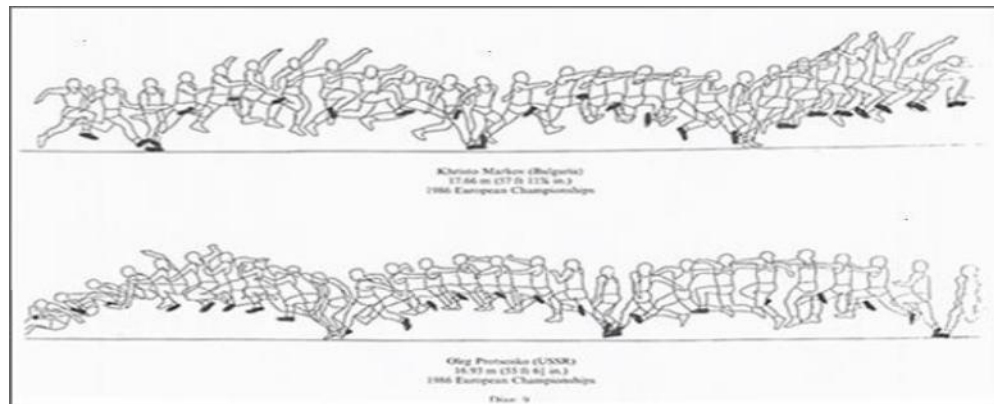


**Figure 1. The method chosen to calculate the variables in two-dimensional analysis**  
 (Nelia Alfano Moura, Tania Fernandes de Paula Moura, Joao Paulo Borin, 2003)



Our experience was inspired by the study: Triple Jump: Using Quantic Biomechanics to Calculate Centre of Mass,

Vertical and Horizontal Velocity during Triple Jump



**Data Collection**

**Subjects:**

The subjects were the three-world champion berlin 2009 heir results from the (project by the german atletecs federration, 2009) and for algerien we have made analyses of them performance in similar study

(Ahcenneahmed Zerfmohammed , 2015)

**Table 1 description of the acquired results the samples.**

Variables	Distance	hop Ratio	step Ratio	jump Ratio
world champion	17.92	6.49	5.41	6.02
Vice World	17.60	6.51	5.41	5.68
third place	17.54	6.01	5.77	5.92
champion Algeria	16.16	5.79	5.10	5.27
vice Champion	16.15	5.72	5.02	5.41
third place	16.09	5.89	4.99	5.21

**Biomechanical Analysis of the Triple Jump Men Final**  
**12th IAAF World Championships in Athletics - Berlin 18. August 2009**

Dr.L.Mendoza/E.Nixdorf/R.Isele/C.Günther



Name / Att.	Jump distance [m]			Stride length [m]					relativ dist. [%]		
	off.	real	loss	2L	1L	Hop	Step	Jump	Hop	Step	Jump
Idowu P. 3rd	17.73	17.92	0.19	2.58	2.49	6.49	5.41	6.02	36	30	34
Evora N. 6th	17.55	17.60	0.05	2.68	2.26	6.51	5.41	5.68	37	31	32
Copello A. 6th	17.36	17.54	0.18	2.41	2.29	6.01	5.77	5.92	34	33	33

We record an error in Table 1 that the results transmitted from the source indicates that the result of the third rider and 17.54 m. something that does not match its Length who offers her 17,862m and 17,682m will be real.

For this reason, our research will be limited on the champion and vice champion (world-national).

**In addition**

1- the tow national elite that we have Filming with the Protocol/Two motion-picture cameras, filming at nominal rates of 100 frames per second, were have used to record the performance of the subjects on each trial. These cameras were placed at distances of 19.4 m and 22.1 m from the midline of the triple jump runway, with their optical axes at right angles to this line. The first camera was placed 0.9 m forward (or on the pit side) of the front edge of the board and was used to record the subjects' performances during the hop phase of the triple jump. The second camera was placed 13.0 m forward of the front edge of the board and was used to record performances during the step and jump phases (James G. Hay and John A. Miller, Jr., 1985).

2- A series of markers was placed in carefully measured locations along the inside curb of the



track between the runway and each camera. These markers served later as Reference measurement.

### Data Reduction

Our cameras were attached to our laptops to record directly into folders prepare in advance for each subject chosen for analysis. The distances of the analyses tests are show in Table 1the Subjects and Performances of Algerian elite’s team.With the software Kinovea, the films obtained for each test were phase analysis for each variable and participant.

### Data Analysis

The data analysis procedures used in this study consisted of the computation of the means and standard deviations of all the variables identified in the theoretical mode and for which data could be collected, and the computation of the Pearson product-moment correlations between each of these variables and the official distance of the triple jump. To identify important associations among the independent variables, correlations was also computed between them variables found to be significantly related to the official distance of the jump and the other variables identified in Figure 1.

### Results

#### 1-Decrypt the practice model and distribution of the phase bit win our champions (world-national).

**Table 2 - Decrypt the practice model Triple Jump chosen by the samples.**

Variables	Distance(m)	hop Ratio%	step Ratio%	jump Ratio%	Hop% x step%	Hop% x jump%	Step% x jump%
world champion	17.92	36.22	30.19	33.59	6.03	2.62	-3.40
Vice World	17.60	36.99	30.74	32.27	6.25	4.72	-1.53
champion Algeria	16.16	35.83	31.56	32.61	4.27	3.22	-1.05
vice Champion	16.15	35.42	31.08	33.50	4.33	1.92	-2.41
MEAN	16.96	36.11	30.89	32.99	5.22	3.12	-2.10
SD	0.94	0.67	0.58	0.65	1.06	1.19	1.04

Through the results in Table 1, showing that all of the samples tend to apply the small step phase model. Where the hops stage is the largest of the Polish distribution model (McNab, 1968) the nearest that any of the simple came to the 39%: 30%: 31% ratio of McNab The mean ratio of the phase distances for the means world championship subjects was 36.60%: 30.46%: 32.93% and For the Algerian elites was 35.11%: 32.23%: 33.18%. (S.J. Allen, M.A. King, and M.R. Yeadon, 2013)

. In addition, the model of our simple Ranged Between ratio (37%:30-31%:32-33%).

From the above we can conclude that Phase hop is long then the phase step how confirm the shows of small phase as technical model.

**1-Compart the relationship of the practice model or style between our champions (world-national).**

**Table 3 those relations with the results achieved.**

Correlations		World hop	World step	World jump
Algerian hop	Pearson Correlation	1.000**		
	Sig. (2-tailed)	.		
	N	2		
Algerian step	Pearson Correlation		1.000**	
	Sig. (2-tailed)		.	
	N		2	
Algerian jump	Pearson Correlation			1.000**
	Sig. (2-tailed)			.
	N			2

\*\*Correlation is significant at the 0.01 level (2-tailed).

Through Table 3 shows that the variables have a high correlation positive at 0.01 and very significant relationship

Based on that relationship we can confirm that simples applied the small step model where the long hop must covered the biggest jump distance with small phase step distance.

**3-Compare the difference in practice between our champions (world-national).**

**Table 4 Independent Samples Test on the difference in practice between our samples.**

Independent Samples Test		m	SD	t	df	Sig. (2-tailed)		
hop	World	6.50	0.01	8.120	2	.015		
	Algerian	5.76	0.05					
step	World	5.41	0.00	27.003		2	.001	
	Algerian	5.06	0.06					
jump	World	5.85	0.24	2.738			2	.112
	Algerian	5.34	0.10					

Through the results in Table 2, show there is a statistically significant difference in favor the world champions in all comparisons except the jump phase, although the mean is in the interest of world champions. This Deference explains the good mastery of technique and good distribution of phase's efforts.

As for the comments on the application of this model, we find that the world champions they are the best because they respect more than the Algerian elites, the modality technically of model "long hop a small step.

These findings are consistent with results ( ALLEN, S.J., KING, M.A. and YEADON, M.R., 2013) Which confirms: the optimization of Large vertical velocities in the hop phase resulted in longer hop phases, and shorter step phases, how conclude that the hop-domination techniques is overall, whereas smaller vertical velocities led to larger step phases and balanced model or step-dominated techniques.

### **Discussion**

The study showed that the small step phase model is the most used by athletes or our samples were the hop-dominated.

Our prediction basis that we found the majority of respondents focus on the hop phase to achieve long distance greater distance.

This study are consistent with results (James G. Hay and John A. Miller, Jr., 1985) that produced shorter hop distances than jump distances (Polish technique).

The variance in lengths and ratios of distances during the performance phases (hop, step, and jump) from the champions of world and current national elites was related to the impact of the technics and tactics appropriate by the athlete distribution of phases on the results of the triple jump event.

that beer Elisa clear by the change in the influential bio-mechanic indicator values (horizontal velocity loss, vertical velocity, take-off angels, time of braking and pushing) and instability of skillful performance of competition.

For our research, we explain it by the good mastery of technique and modality of distribution of phase's efforts.

As for the comments on the application of this model, we find that the world champions they are the best because they maintain the distribution ratios in the phase step Unlike the Algerians. That (K. Dziewiecki, Z. Mazur, and W. Blajer, 2013) Indict in the distinct phases must be learned and practiced to combine them in one successful (long distance) event. Improving the final speed horizontal ideal for the athlete and Condition not to lose control of the technique and influence in achievement (Schexnayder, Irving, 2006)

### **Conclusion**

From the purposes of this study, that goal to describe and compare the techniques used by elite word triple jumper 2009 and the Algerian elite time we have determine the impact of application of modality model phases whom allowing the elite to beat world record.

For:

Decrypt the practice model and distribution of the phase between our champions (world-national).

All simples practice the small step as model in the distribution of the phase.

For:

2-Compart the relationship of the practice model or style between our champions (world-national).

The coloration is significate how confirm the same technique practice by de simples.

For:

Compare the difference in practice between our champions (world-national).

The world champions are the best in adaptation of this technique and that tactic are sow respect to the exigent

of good practiced of this model

### **Our aim or our recommendation:**

For the national elites and their technical steps:

- Using the biomechanics to determine errors in practice the theoretical models of the sports tricks.
- Integrated the modern scientific methods into the program monitoring sports.
- Respect the modality distribution of efforts in model small phrases to improve their performances.

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