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INFLUENCE TECHNIQUE VS IDEAL MODEL ON CREDIBILITY THEORY DISTRIBUTIONS RATIOS: A CASE STUDY OF TRIPLE JUMP

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Abstract

The objective of this study is to describe and compare the techniques used by elite triple jumpers in the world to determine the impact of the modality distribution ratios in achieving results. Our subjects were the 2009-2011 global elite's finalists with five (5) Algerian amateur athletes. In the absence of technological methods in Algeria, our study explores the reports (IAAF):

1. To describe the phase distribution of the practice model between our world champions (2009 and 2011)
2. To compare the credibility theory of distributions ratio achievement with the modality dominant techniques practiced by champions (2009 and 2011).
3. To answer this question: can we consider the phase difference ratios as a bad distribution error in the technical ideal?

As a result, we chose the analysis of variance and the correlation of relative distances obtained from each phase of the official distance achieved by the athlete. For the study statistics, our used data is based on the "t" independent method compared to the impact phase distributions (hop, step, and jump) charged with the results achieved in the test. However, our goal for this research is:

• Using biomechanics to determine errors and integrate the modern scientific methods in monitoring the athletic program.

• To allow our elites and their coaches to examine the impact of modality distribution ratios in achieving results in order to choose the good combined efforts and the selected template model practiced to improve the best performance in training and competition.

Keywords: the gain in vertical speed, distribution phases, results in triple jump.

Résumé

Les objectifs de cette étude étaient de décrire et de comparer les techniques utilisées par les élites du triple saut du monde pour déterminer l'impact de la modalité des distributionspratique par ses dernières pour améliore leurs résultats.

Nos sujets étaient les 2009-2011 élites mondiales finalistes.et 5 athlètes algérien amateur confirme. En l'absence des moyens de messieurs technologique en Algérie, notre étude vis a explore les rapports (IAAF) pour :

1- Décrivez le modèle de pratique de la distribution des phases entre nos champions du monde (2009 and 2011).
2- Comparer la crédibilité théorie des ratios de distributions avec la réalisation personnelle de la technique choisir par notre champion (2009 and 2011).
3- pour rependre a la question : Peut-on considérer les différences distributions ratios des phasesautant que des erreursvis-à-visa la bonne pratique del'idéal technique ?

Pour cela, nous avons choisi l'analyse de variance et la corrélation des distances relatives obtenues à partir de chaque phase de la distance officielle de l'athlète et en utilisant le "t"comme moyen de comparons, des distributions des phases (hop, step jump) dansles résultatsobtenu.

Notre objectif pour cette recherche est :

• Utilisation de la biomécanique pour déterminer les erreurs et intégré les méthodes scientifiques modernes dans le suivi du programme des sportives.

• Permuter à nos élites et leurs entraîneurs à examiner l'impact des modalitésde distributions et leurs crédibilitésdans les pratiques personnalisés comme style au model (technique) pour améliorer les performances en matièred'entrainement et compétition.

Mots Clés: Le gain en vitesse verticale ; phases de distribution ; résultats triple saut

Introduction

Techniques can be defined as "a set of communicable ways implemented by man to perform a given task most effectively" (Vigarello et Vives, 1983). However, Grosser, M. (1982) defines technique as the ideal model of a movement relative to a specific sport activity. In our case, the athlete's aim is to maximize the horizontal distance jumped. This jump is composed of three take-off phases (hop, step, and jump). However, each one plays an important role as they require the jumper to tolerate extremely high

forces of impact and to maintain a high level of horizontal velocity. Furthermore, Abeer Eissa (2014) confirms that the Biomechanical Studies have been conducted to identify the factors affecting the performance of the triple jump in an attempt to determine the optimum techniques for individual athletes (Bing Yu, PhD, 1982). Below is a list of researchers and the means of the percentage phase contributions they found for elite male triple jumpers as the modality of their technique practiced.

Researcher	HOP	STEP	JUMP
Milburn (1979)	36.3%	31.3%	32.4%
Smith and Haven (1982)	33.6%	28.9%	37.5%
Fukashiro et al.(1981)	36.9%	29.1%	34.0%
Hay and Miller (1985)	35.4%	29.4%	35.3%

Clifford Larkins stated that in the findings listed above, the mean contribution of the phase distances varied with each study. Hay and Miller's (1985) and the optimal phase ratio is different from athlete to adder (Bing Yu, PhD, 1982). This is because the Velocity conversion coefficient is the determinant of the optimum phase ratio. In conclusion, this modest study is similar to other studies based on the global means of results tests practiced by different athletes. Consequently, an ideal technique does not correspond with the principles of training individualization that we explain with deference to the practice of the athlete for execution of the technical and its ideal model (Seirul-lo Vargas, 1987).

Therefore, the aim of this study is to put in evidence that the conclusion of the studies is similar to other experience. Firstly, the answer to the following questions below was given:

- Is there any optimum phase ratio difference between our world champions (2009 and 2011)?
- Is there any optimum phase ratio difference between practitioners in the case of major dominant technique (2009 and 2011)?

Secondly, we have carried an experience based on the control of ideal technique practiced by our sample, and try to see the protocol in research tools to answer the following question:

- Can we consider the phase's difference ratios as bad distribution errors in the technical ideal?

For that, we have chosen the Kinematics analyses because it is one of sectors in the study of biomechanics that shows the geometrically, spatial, and temporal description of the movement by the framework of the following parameters: time, position, trajectory, angles, linear velocity, linear acceleration, angular velocity, and angular acceleration. Therefore, the assessment of these analyses is supposed to utilize these parameters in order to obtain some objective information, concerning the technique elements and proceedings, as well as the base mechanism, which is specific through some sportive discipline or event." [I, Mihai, 2009]

Methods and Means

Population

•(a)**World champions 2009** (project by the German athletics federation, 2009)

Name / Att.	Jump distance [m]	Stride length [m]		
	Real	Hop	Step	Jump
Idowu P. 3rd	17.92	6.49	5.41	6.02
Evora N. 6th	17.60	6.51	5.41	5.68
Copello A. 6th	17.54	6.01	5.77	5.92
Sands L. 5th	17.34	6.52	5.20	5.62
Girat A. 1st	17.39	6.16	5.41	5.88
Li Y.4th	17.32	6.33	5.24	5.75
Spasovkhodskiy I. 2nd	16.96	6.47	4.80	5.69
Gregorio J. 2nd	17.15	6.33	5.10	5.72
M	17.40	6.35	5.29	5.79
SD	0.29	0.19	0.28	0.14

(b) For world Championship participants 2011 (IAAF, 2011)

Name / Att.	Jump distance [m]	Stride length [m]		
	Real	Hop	Step	Jump
Taylor C. 4th	18.10	6.19	5.29	6.62
Idowu P. 4th	17.77	6.67	5.64	5.60
Claye W. 3rd	17.67	5.77	5.43	6.47
Copello A. 5th	17.62	6.40	5.38	5.84
Evora N. 1st	17.46	6.44	5.18	5.84
Olsson C. 1st	17.45	6.37	5.09	5.99
Sandsa L. 5th	17.59	6.63	4.77	6.19
Compaore B. 3rd	17.48	6.32	5.23	5.93
M	17.64	6.35	5.25	6.06
SD	0.22	0.28	0.26	0.34

5 Algerian amateur athletes confirmed

Research Tools

For Experience One

- Explore the literature on everything related to the subject of our research
- Explore the reports and the quantitative analysis of our sample
- Explore the reports and the qualitative analysis in similar studies
- Explore the biomechanical analysis used in similar studies
- Explore the statistical analysis used in similar studies.

For Experience Two

Our Protocol

In another experiment, we have done this protocol based on the practical Dominant techniques (see figure1).

1- Pretests and fix the dominant practice technique
2- Extend the means of phases
3- Color two percent (2%) of the average phase of support
4- one-week adaptation training
5- Retest

Results and Discussion

1. Is there any optimum phases' ratio difference between our world champions (2009 and 2011)?

Table 1(a). For World champions 2009 (project by the German athletics federation, 2009)

Name / Att.	Jump distance [m]	Stride length [m]			Relative distance. [%]			Dominant techniques
	real	Hop	Step	Jump	Hop	Step	Jump	
Idowu P. 3rd	17.92	6.49	5.41	6.02	36	30	34	the Russian technique
Evora N. 6th	17.60	6.51	5.41	5.68	37	31	32	the Russian technique
Copello A. 6th	17.54	6.01	5.77	5.92	34	33	33	Balanced technique
Sands L. 5th	17.34	6.52	5.20	5.62	38	30	32	the Russian technique
Girat A. 1st	17.39	6.16	5.41	5.88	35	31	34	Balanced technique
Li Y.4th	17.32	6.33	5.24	5.75	37	30	33	the Russian technique
Spasovkhodskiy I. 2nd	16.96	6.47	4.80	5.69	38	28	34	the Russian technique
Gregorio J. 2nd	17.15	6.33	5.10	5.72	37	30	33	the Russian technique
M	17.40	6.35	5.29	5.79	36.50	30.38	33.13	the Russian technique
SD	0.29	0.19	0.28	0.14	1.41	1.41	0.83	

Table1(b). For World Championship participants 2011 (IAAF, 2011)

Name / Att.	Jump distance [m]	Stride length [m]			Relative distance. [%]			Dominant techniques
	real	Hop	Step	Jump	Hop	Step	Jump	
Taylor C. 4th	18.10	6.19	5.29	6.62	34	29	37	Polish technique
Idowu P. 4th	17.77	6.67	5.64	5.60	37	32	31	the Russian technique
Claye W. 3rd	17.67	5.77	5.43	6.47	33	31	36	Polish technique
Copello A. 5th	17.62	6.40	5.38	5.84	36	31	33	the Russian technique
Evora N. 1st	17.46	6.44	5.18	5.84	37	30	33	the Russian technique
Olsson C. 1st	17.45	6.37	5.09	5.99	37	29	34	the Russian technique
Sandsa L. 5th	17.59	6.63	4.77	6.19	38	27	35	the Russian technique
Compaore B. 3rd	17.48	6.32	5.23	5.93	36	30	34	the Russian technique
M	17.64	6.35	5.25	6.06	36.00	29.88	34.13	the Russian technique
SD	0.22	0.28	0.26	0.34	1.69	1.55	1.89	

From table 1(a-b) through the results of the mean of Stride length, we can judge that the comparison is significant at the 0.05 level (2-tailed).

Table1(c). Total (2009-2011) T Independent Sample

variables		T	df	Sig. (2-tailed)
Hop	Equal variances assumed	.105	14	.918
	Equal variances not assumed	.105	12.133	.918
Step	Equal variances assumed	.575	14	.575
	Equal variances not assumed	.575	13.954	.575
Jump	Equal variances assumed	-1.985	14	.067
	Equal variances not assumed	-1.985	9.178	.078

From the table 1(c) through the results of the Independent Samples T Test, we can judge that the comparisons are not significant at the 0.05 level (2-tailed).

Table 2(d). Total (2009-2011) Correlations

		Hop	step	jump
Hop	Pearson Correlation	1	-.377	-.554*
	Sig. (2-tailed)		.150	.026
	N	16	16	16
Step	Pearson Correlation	-.377	1	-.020
	Sig. (2-tailed)	.150		.941
	N	16	16	16
Jump	Pearson Correlation	-.554*	-.020	1
	Sig. (2-tailed)	.026	.941	
	N	16	16	16

***. Correlation is significant at the 0.05 level (2-tailed).**

From the table1 (d) through the results of the Correlations, we can judge that the correlation have a strong negative significant at the 0.05 level (2-tailed). Thus, this is between the hop and the jump except for the step phase that is not significant.

Conclusion

From the table1 (a-b-c-d) through the results, the mean of the lengths of the three phases are typically 36%, 30%, and 33% for champions 2009 and 36%, 30%, and 34% for champions 2011. Thus, the single difference was noted in Phase jump for champions 2011. For T student, we noted that there is no significant difference between the lengths of the three phases except in the Correlations between jump (2009-2011) and hop which is strongly negative. Furthermore, since the comparison is low, we confirmed that the dominant technique is based on the benefit of the Hop-dominated technique. Based on these results, we can judge the variation observed in the reports as: optimum phase ratio is different from athlete to adder. In our study, we note that the strategy chosen for the practice of our

athletes in an ideal model is the main causes of this variance. Subsequently, Grosser, M. (1982) defines technique as the ideal model of a movement relative to the exigency of a specific sport activity. In our case, it was expressed based on the objective of the hop to achieve horizontal and vertical velocity because it is the first phase of the triple jump (Paul Brice).

Discussion of Hypothesis 1

The contribution that each phase makes to the Relative total distance of a triple jump has been the subject that extends the debate over the years. Much of this debate is concerned with the relative merits of the two most common techniques: the Russian technique (which emphasizes the hop phase) and the Polish technique (which emphasizes the jump phase).

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, T. , 1968).

For our sample pratice, dominant technique is for the benefit of the Russian technique in all comparisons. Hence, the results are within the limits of good operation of the ideal techniques which is confirmed by Bing Yu, PhD (1982) for the Russian technique. The nearest came to the ratio of 39%: 30%: 31%. In addition, based on these results, we asked the second question.

2. Is there any optimum phases' ratio difference between practitioners sample with the same dominant technique (2009 and 2011)?

In this experiment, we classify the sample to be a low performance due to the hop dormant technique:

Table 2(a). For World champions 2009 with hop dormant technique

Name / Att.	Jump distance [m]	Stride length [m]			Relative distance. [%]		
	Real	Hop	Step	Jump	Hop	Step	Jump
Idowu P. 3rd	17.92	6.49	5.41	6.02	36	30	34
Evora N. 6th	17.6	6.51	5.41	5.68	37	31	32
Sands L. 5th	17.34	6.52	5.2	5.62	38	30	32
Li Y.4th	17.32	6.33	5.24	5.75	37	30	33
Gregorio J. 2nd	17.15	6.33	5.1	5.72	37	30	33
M	17.47	6.44	5.27	5.76	37.00	30.20	32.80
SD	0.30	0.10	0.14	0.15	0.71	0.45	0.84

Table2(b). For World champions 2011 with hop dormant technique

Name / Att.	Jump distance [m]	Stride length [m]			Relative distance. [%]		
	real	Hop	Step	Jump	Hop	Step	Jump
Copello A. 5th	17.62	6.4	5.38	5.84	36	31	33
Evora N. 1st	17.46	6.44	5.18	5.84	37	30	33
Olsson C. 1st	17.45	6.37	5.09	5.99	37	29	34
Sandsa L. 5th	17.59	6.63	4.77	6.19	38	27	35
Compaore B. 3rd	17.48	6.32	5.23	5.93	36	30	34
M	17.52	6.43	5.13	5.96	36.80	29.40	33.80
SD	0.08	0.12	0.23	0.14	0.84	1.52	0.84

From the table 1(a-b) through the results of the mean triple jumpers, we conclude that the dominant techniques is for the benefit of the Hop-dominated technique. Based on these results, we can judge the variation observed in the reports that the optimum phase ratio is different from athlete to adder. Based on the conclusion of Bing Yu, PhD (1982), we choose the Independent Samples Test. Hence, the correlation confirms the difference in the mean.

Table 2(c). Same dormant technique T Independent Samples Test

Variables		t	Df	Sig. (2-tailed)
hop	Equal variances assumed	.058	8	.955
	Equal variances not assumed	.058	7.697	.955
step	Equal variances assumed	1.200	8	.264
	Equal variances not assumed	1.200	6.540	.272
jump	Equal variances assumed	-2.115	8	.067
	Equal variances not assumed	-2.115	7.965	.067

From the table 1(c) through the results of the Independent Samples Test, we can judge that there is no significant correlation at the 0.05 level (2-tailed).

Table 2(d). Same dormant technique Correlations

		hop	Step	Jump
hop	Pearson Correlation	1	-.299	.305
	Sig. (2-tailed)		.401	.391
	N	10	10	10
step	Pearson Correlation	-.299	1	-.500
	Sig. (2-tailed)	.401		.141
	N	10	10	10
jump	Pearson Correlation	.305	-.500	1
	Sig. (2-tailed)	.391	.141	
	N	10	10	10

***. Correlation is significant at the 0.05 level (2-tailed).**

From the table 2 (d) through the results of Correlations, we can judge that there is no significant correlation at the 0.05 level (2-tailed).

Discussion of the Hypothesis 2

From the table 2(c-d) through the results of T Independent Samples, it is not statistically significant within all comparisons. Therefore, we concluded that based on the dominant techniques, there is no criterion to distinguish the effect of optimum phases' ratio view of the different ratios registered from our athletes practical. Based on these results, we can judge that the variation observed in the reports as optimum phase ratio is different from athlete to adder. Consequently, Bing Yu, PhD (1982) confirms that the Velocity conversion coefficient is the determinant of optimum phase ratio. From this conclusion, we emphasize that the results are logical which is considered as Comparative distribution. Furthermore, this occurs at the origin of different estimated lineage of the result of the athlete. Our study also confirms its vision and our results are within the limits of good operation of the ideal technical aspect confirmed by Bing Yu, PhD (1982) for the Russian technique. Thus, the nearest came to the 39%: 30%: 31% ratio. In addition, based on these results, we ask the second question relying on the protocol experience two.

3. Can we consider the phase difference ratios as bad distribution errors in the technical ideal?

In order to experiment our hypothesis for that which we have done, this protocol is based on the practical Dominant techniques. Thus, figure1 explains this research Tools.

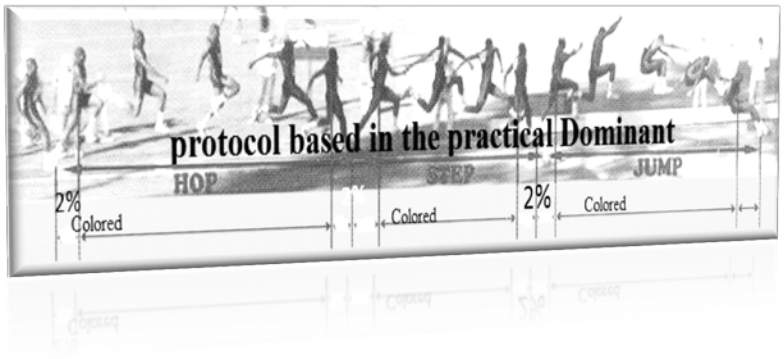

Table 3(a). Results of the Experience Two

Name / Att.	Jump distance [m]		Stride length [m]test1			Stride length [m] test2		
	Real-test 1	Real-test 2	Hop t1	Step t1	Jump t1	Hop t1	Step t1	Jump 1
Athlete 1	14.50	14.42	5.22	4.51	4.77	5.18	4.54	4.70
Athlete 2	15.04	15.02	5.61	4.69	4.73	5.60	4.70	4.72
Athlete 3	13.75	14.08	4.68	4.32	4.75	4.75	4.42	4.91
Athlete 4	15.02	15.33	5.44	4.70	4.87	5.46	4.80	5.07
Athlete 5	14.17	14.36	5.32	4.43	4.42	5.36	4.46	4.54
M	14.50	14.64	5.26	4.53	4.71	5.31	4.82	4.51
SD	0.56	0.51	0.35	0.17	0.17	0.33	0.16	0.21

From the table 3 (a) through the results, we can judge that the mean of the lengths of the three phases are typically 36%, 31%, and 33% in the two test. Low on that comparison, we confirmed that the dominant technique is beneficial to the Hop-dominated technique practiced by our sample.

Table 3 (b). Expérience 2 T paired-Simples

Variables		T	df	Sig. (2-tailed)
hop	Equal variances assumed	-1.304	5	.249
	Equal variances not assumed	-2.205	5	.079
step	Equal variances assumed	-.531	5	.618
	Equal variances not assumed	-1.304	5	.249
jump	Equal variances assumed	-2.205	5	.079
	Equal variances not assumed	-.531	5	.618

From the table 3(b) through the results, we can judge that T paired-Samples of the lengths of the three phases are typically not significant at the 0.05 level (2-tailed). Thus, this confirms the dominant techniques.

Table 3 (c). Experience 2 Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	hop & hop 2	6	.993	.000
Pair 2	step & step 2	6	.804	.054
Pair 3	jump & jump 2	6	.701	.121

From the table 3(c) through the results, we can judge that Paired Samples Correlations of lengths of the three phases are typically significant at the 0.05 level (2-tailed) in all comparison except in the jump.

Table 3 (d). Experience 2 Correlations

		Hop	step	Jump
Hop	**Pearson Correlation**	**1**	**.801****	**-.096**
	Sig. (2-tailed)		**.005**	**.791**
	N	**10**	**10**	**10**
Step	**Pearson Correlation**	**.801****	**1**	**.499**
	Sig. (2-tailed)	**.005**		**.142**
	N	**10**	**10**	**10**
Jump	**Pearson Correlation**	**-.096**	**.499**	**1**
	Sig. (2-tailed)	**.791**	**.142**	
	N	**10**	**10**	**10**

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

From the table 3 (d) through the results, we can judge that Correlations of the lengths of the three phases are typically significant at the 0.05 level (2-tailed). However, this can be observed in all comparison except that of the jump

Discussion of the Hypothesis 3

Through the results, table 3 (a-b-c-d) T Independent Samples is not statistically significant within all comparisons. We conclude that the dominant technique is a criterion to distinguish the effect of the optimum phase ratio. Thus, things that are true by Paired Samples Correlations are significant at the 0.01 level (2-tailed). Based on these results, we can judge the variation observed in the reports as the optimum phase ratio is different from athlete to adder. Furthermore, the principle of individual differences (sports training principles) (Bouchard C, Rankinen T, 2001) for the Velocity conversion coefficient is the determinant of the optimum phase ratio. Thus, it is affected by the techniques as a practice of the ideal model of a movement relative to the capacity and the ability of the athlete. From that, we conclude that the distribution is affected by the approach run for the Optimum phase ratio resulting in the Visual control phase affected by the distribution chosen. For this reason, we conclude that the origin of the different phase is defined as an estimate of the athlete's practice of the ideal technique. Furthermore, our study also confirms its vision from the results that are within the limits of good operation of the ideal technical aspect confirmed by Bing Yu, PhD (1982) for the Russian technique. However, the nearest came to the ratio of 39%: 30%: 31%. In addition, we confirm the importance of the distribution models to the choice adopted practice technique. This is because they offer the means to detect the errors practices in each phase based on the distribution of the ideal technique. Moreover, Hui Liu (2012) confirms that the Phase ratio is a measure of effort distribution in the triple jump. Therefore, hop-dominant, balanced, and jump-dominant techniques were three triple jump techniques defined based on phase ratio.

General Conclusion

Our finding confirms the importance of distribution models to choice adopted practice technique. This is because they offer the means to detect the errors practices in each phase. Allen et al. (2013) confirms the description of the techniques used by elite triple jumpers. However, these characteristics were significantly related to the officially recorded distance of the jump. Thus, this helps to confirm the maximum errors of the stride length that can be used to determine which strides are the major contributors to maximum error in toe-board distance. Our study confirms that the optimum phase ratio is different from athlete to adder, and the velocity conversion coefficient is the determinant of optimum phase ratio on the basic ideal practice techniques. Our findings confirms its vision that the results is within the limits of good operation at the ideal techniques which is confirmed by Bing Yu (1982) by the Russian technique. Thus, the nearest came to the 39%: 30%: 31% ratio (Hui Liu, 2012), and the velocity conversion coefficient affected the technique that achieved the longest actual distance (James G. Hay, 1992). The review itself considers each of the biomechanical factors identified in the models and the selected characteristics of the triple jumping techniques. However, it is concluded that research on triple jump techniques has been sparse and have had little impact on practice. Identification of the individual attributes that determine the optimum ratio of the phase distances are subject which is seen as a challenging topics for future research.

Proposals

Nowadays, the disclosure of minute's mistakes from the coach and searcher in Algeria provides a new means of measuring instruments in planning and evaluation. They include:

1. Studying the impact of relations of phase's modality basis in all tests practiced by the championship individual and by the group.
2. Studying the problem posed by other similar studies.
3. Take advantage of this study in the assessment and training of triple jumpers.

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