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The Impact of the Three Pushes Takeoffs Angel's Phases and their Distributions Strides Lengths On the Performance in Triple Jump.

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Abstract: The purposes of this study were to compare the technique practiced by elite world triple jumper to determine the impact of modality pushes Phrases Takeoffs Angles and the Distributions of Strides Lengths phases allowing the elite to exceed 17-meter, were we have neglect dependence on the practice distribution modality, to explore the weakness in results. From the confirmation of (Hui Liu, 2012) that the weakness or the success of the jumper is in the role of the velocity conversion coefficient affected which technique achieved the longest distance to the assessment of (James G. Hay and John A. Miller, Jr., 1985). That the triple Jump is composed of three take-off phases (Hop, Step, and Jump), each 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. Through previous theoretical background, our subjects were The Results of world elite 2009. In the lack of new technology, Modern measuring instruments kinematics or kinetics. Our study based on rapports take-off angels as measure and Stride length Jump distance of world elite 2009 from the (Project by the German Atletecs Federration, 2009) To verify the hypothesis that support:

The factors affecting the performance are due, to the confirmation of (Gordon Robertson & all, 2004) that any less change in the step phase change the angular momentum created by hop phase and the Effort distribution decides jumping techniques in different phases especially in the hop and step phases set by (Hay, 1992).

From the limits of search, our aims for this study to answer the question:

- Are there any causal relationship take-off angel's pushes phases and their Strides Lengths distributions decides jumping with the Finale Results from the conditions of our experience?

For that, we have chosen the analysis of the Regression, variance and correlation of take-off angels Breaks phases and distances achieved in each of the phases with the official distance of jumper to compare implementation take-off angels push phases with distribution of phases (hop, step and jump) with the Performance. Based on the Effort distribution decides jumping techniques and practice take-off angels push phases of our samples, we confirm:

(1) That the distribution of phases (hop, step and jump) and take-off angels push phases is a criterion mean to assess and judge the level of application of elite; (2) the good phase take-off angels push hop phase transmitting is the key to a great feat in triple jump.

Key words: Three Pushes Takeoffs Angel's Phases, Stride Length, Performance Triple Jump.

I. INTRODUCTION

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 (Abeer Eissa, 2014). Form the hypothesis of Bing Yu and James G. Hay : the involves three consecutive touchdowns and takeoffs at high speed and a change in the support leg were the takeoff of the step should be obtained, that any less change in the step phase change the angular momentum created by hop phase (Gordon Robertson & all 2004) . And the confirmation of (Hui Liu 2012) that the Phase ratio is a measure of effort distribution in the triple jump were three triple jump techniques defined based on phase ratio were the impact of velocity conversion coefficient affected which technique achieved the longest actual distance. Our goal is to introduce the biomechanics evaluation before explaining the reason scientific of the importance of Pits Phrases Takeoffs Angles and Stride Length applied in the outcome. In addition, our research analysis the performance of world elites as modality to illustrate the importance of the good Impact of the Relationship pushes Phrases Takeoffs Angles and the Distributions of Strides Lengths phases on Performance in Triple Jump. Our motive is to highlight the biomechanical assessment for our Algerian coaches to plan the choice of the right assessment technique to their athletes (Zerf Mohammed, Mokkedes Moulay Idris, Bengoua Ali, Bendahmane Med Nasreddin, 2015). That we rely on the interpretation of (Ed Jacoby, 2009) that good phase transmission is the key to a better jump in triple jump and (Boo Schexnayder, 2014) executing the step phase is a physical challenge. Tremendous vertical forces must be generated in the fraction of a second the foot is in contact with the ground. This difficult task demands training.

II. MATERIAL AND METHODS

For the purposes of analysis, we have explore the report IAAF (International Association of Athletics Federations) indicate in the references as repair to Extraction Angle of take-off (°) push phases and Stride Length for each phase form the final tests of our samples.

Data Collection

Subjects:

The subjects were the eight-world champions Berlin 2009 results from the (project by the german atletecs federration, 2009) .

Table 1 Description of The Acquired Results of Our Samples.

Name / Att.	Jump distance [m]			Stride length [m]					Angle of take-off [°]		
	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	14	13	21
Evora N. 6th	17.55	17.60	0.05	2.68	2.26	6.51	5.41	5.68	16	13	26
Copello A. 6th	17.36	17.54	0.18	2.41	2.29	6.01	5.77	5.92	13	15	20
Sands L. 5th	17.32	17.34	0.02	2.92	2.30	6.52	5.20	5.62	15	14	18
Girat A. 1st	17.26	17.39	0.00	2.49	2.33	6.16	5.41	5.88	15	16	19
Li Y.4th	17.23	17.32	0.09	2.30	2.46	6.33	5.24	5.75	16	16	20
Spasovkhodskiy I. 2nd	16.91	16.96	0.05	2.55	2.49	6.47	4.80	5.69	14	13	21
Gregorio J. 2nd	16.89	17.15	0.26	2.71	2.62	6.33	5.10	5.72	15	12	20

Data Reduction

Table 2 Description of The Mean and SD Acquired from the Results of Our Samples.

variables	Jump Dist.	Stride length [m]			Angle of take-off [°]		
Performance	real	Hop	Step	Jump	Hop	Step	Jump
Mean	17.40	6.35	5.29	5.79	14.75	14.00	20.63
SD	0.29	0.19	0.28	0.14	1.04	1.51	2.39

Data Analysis

Based on the tests of our champions our data analysis procedures used in this study consisted of the computation of the means, standard deviations, the Regression of all the variables identified in based of the theoretical model in the similar studies. For the data collected, and the computation the Pearson product-moment correlations between each of these variables with the official distance of the triple jump. To identify important associations among the independent variables in official distance of the jump.

III. RESULTS AND DISCUSSION

Table 3, which Causal relationship pushes Phases Takeoffs Angles and the Distributions of Strides Lengths phases with the Finale Results between our samples.
We have chosen Regression as model statically

Table 3(a) Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Stride length step	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	Stride length hop	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	Stride length jump	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	Angle of take-off hop phase	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Jump distance

From the Table 3 (a) we note that the regression method, which is, used in a manner 4model of comparisons for model1, is the Stepwise where the program has shown that it introduces only the Stride length step as the independent variable in the equation of multiple linear regression. For model2, the program has shown that it introduces only the Stride length hop as the independent variable in the equation of multiple linear regression. For model3, the program has shown that it introduces only the Stride length Jump as the independent variable in the equation of multiple linear regression. For model4, the program has shown that it introduces only the Angle of take-off hop phase as the independent variable in the equation of multiple linear regression.

Table 3(b) Model Summarye

Model	R	R Square	Adjusted R Square
1	.735[a]	.540	.464
2	.921[b]	.849	.789
3	.997[c]	.994	.990
4	1.000[d]	.999	.998

a. Predictors: (Constant), Stride length step
b. Predictors: (Constant), Stride length step, hop
c. Predictors: (Constant), Stride length step, hop, jump
d. Predictors: (Constant), Stride length step, hop, jump, Angle of take-off hop phase
e. Dependent Variable: Jump distance

Table 3(b), we note that the four values of the simple correlation and the coefficient(R Square-Adjusted R Square), are significant in the Predictors used in Model2, 3and4. From that, we confirmed the independent explanatory variables introduces in the equation of multiple linear regression was able to explain the changes in the Dependent Variable Jump distance in practiced of our samples that is required and the rest (0.08)model2, (0.01) model3 and (0.00) model4 are attributable to other factors. For model1 the coefficient(R Square- Adjusted R Square) are not significant where these differences are due to the different distribution models techniques (Hop-dominant, balanced, and jump-dominant).

Table 3(C) ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	.322	1	.322	7.053	.038b
Residual	.274	6	.046		
Total	.596	7			
2 Regression	.506	2	.253	14.067	.009c
Residual	.090	5	.018		
Total	.596	7			
3 Regression	.593	3	.198	235.094	.000d
Residual	.003	4	.001		
Total	.596	7			
4 Regression	.596	4	.149	1057.338	.000e
Residual	.000	3	.000		
Total	.596	7			

a. Dependent Variable: Jump distance
b. Predictors: (Constant), Stride length step
c. Predictors: (Constant), Stride length step, hop
d. Predictors: (Constant), Stride length step, hop, jump
e. Predictors: (Constant), Stride length step, hop, jump, Angle of take-off hop phase

As it is noted in Table3 (c) of the variables Predictor include in analysis to define the explanatory power of the model 1 Model2, 3and4 based by the value of F.

As can be seen from the High explanatory power of multiple linear regression model from a statistical point the F test High moral (P <0.03) in model1, (P <0.00) from others coparisent that we confirms the High moral explanatory power of the models chosen of the multiple linear regression statistical.

Table 3(d) Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1(Constant)	13.390	1.513		8.851	.000
Stride length step	.758	.285	.735	2.656	.038
2(Constant)	4.212	3.022		1.394	.222
Stride length step	1.185	.223	1.149	5.304	.003
Stride length hop	1.089	.341	.693	3.199	.024
3(Constant)	-1.191	.843		-1.414	.230
Stride length step	.930	.054	.902	17.105	.000
Stride length hop	1.220	.075	.776	16.326	.000
Stride length jump	1.023	.101	.487	10.151	.001
4(Constant)	-1.747	.366		-4.776	.017
Stride length step	.904	.023	.877	39.316	.000
Stride length hop	1.175	.032	.747	36.550	.000
Stride length jump	1.129	.047	.538	23.858	.000
Angle of take-off hop	.025	.005	.089	4.568	.020

a. Dependent Variable: Jump distance

We conclude from the Table4 (d) that the independent variable were significant from a statistical point of these tests that we confirmed by t (at the moral level of $P \leq 0.04$) in all comparisons, which it is the Reason, explanatory power of the moral analysis of variance Regression. From that our equation

Model Regression line Jump distance = 13.390+.758 Stride length step

Mode2 Regression line Jump distance = 4.212+1.185Stride length step+1.089 Stride length hop

Mode3 Regression line Jump distance = -1.191+.930 Stride length step+1.220 Stride length hop+1.023 Stride length jump

Mode4 Regression line Jump distance = -1.747+.904 Stride length step+1.175 Stride length hop+1.129 Stride length jump+.025 Angle of take-off hop

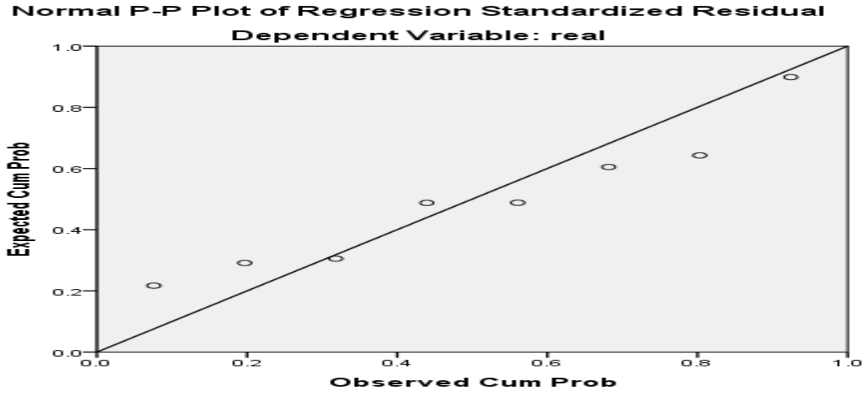

Figure 1: Normal P-P Plot of Regression Standardized Residual Dependent Variable: Jump distance.

Diagram of the points that we find clustered around the line so the data (residuals) distributed according to the normal distribution expertise of the variables in order to calculate the equation

We conclude from the Table 4 (a-b-c-d) that the Jump distance practiced as distributions ratios is dependent with the particle of the independent variables integrate in the model 1,2,3,4. From these results, we confirm the hypothesis that support:

The weakness in the results are due, to the confirmation that Effort distribution decides jumping techniques in different phases especially in the hop and step phases. From that the change in the objective of hop phase to achieve horizontal vertical velocity (going forward and up) of the takeoff board is transmit in the step phase and any less change in the step phase change the angular momentum created by hop phase.

IV. DISCUSSION AND CONCLUSION OF OUR EXPERIENCE

The study was based in the neglect of the dependence on the practice distribution modality from that we confirms:

- Form the model1and the equation Regression line Jump distance = 13.390+.758 Stride length step:

Where the program has shown that it introduces only the Stride length step as the independent variable. We agreed with the confirmation of (Gordon Robertson & all 2004) that any should minimally in the step phase change the angular momentum created by hop, and we recommended instructions of (Boo Schexnayder, 2014) executing the step phase is a physical challenge. Tremendous vertical forces must be generated in the fraction of a second the foot is in contact with the ground. This difficult task demands training.

- Form the model2 and the equation Regression line Jump distance = 4.212+1.185Stride length step+1.089 Stride length hop:

Where the program has shown that it introduces only the Stride length hop as the independent variable. We agreed with the confirmation of Paul Brice and Bing Yu, 1982: the objective of this phase hop is to achieve horizontal vertical velocity (going forward and up) and the conclusion of beer Elisa, that any change in the influential bio–mechanic indicator values (horizontal velocity loss, vertical velocity, take-off angels, time of braking and pushing) infect the Performance.

- Form the model3 and the equation Regression line Jump distance = -1.191+.930 Stride length step+1.220 Stride length hop+1.023 Stride:

Where the program has shown that it introduces only the Stride length Jump as the independent variable. We agreed with the confirmation (Ed Jacoby, 2009) the good transmission is the key to succeeds in Triple Jump were each 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 (Zerf Mohammed, Mokkedes Moulay Idris, Bengoua Ali, Bendahmane Med Nasreddin, 2015).

- Form the model4 and the equation Regression line Jump distance = -1.747+.904 Stride length step+1.175 Stride length hop+1.129 Stride length jump+.025 Angle of take-off hop:

Where the program has shown that it introduces only the Angle of take-off hop phase as the independent variable. We agreed with the confirmations set in models1, 2and3.

- For our research, we record the good Performance in important role of each plays, as the set of (Abeer Eissa, 2014) the jumper must require extremely high forces and maintain of the high level of horizontal velocity. For that, we recommended the Modern measuring instruments, kinematics and kinetics to improve the impact of the momentum needed at the takeoff of the step (Bing Yu, PhD, 1982). That it should be obtained during the support phase of the hop, were any less change in the side-somersaulting angular momentum during the support phase of the step should be minimized.
- Based on the above: we rely with the interpretation of (Ryu, Jae-Kyun ; Yeo, Hong-Chul, 2004):

The impact of the actions of the arms created a side-somersaulting angular momentum about the whole body center of gravity toward the side of the free leg during the support phase of the step, and a somersaulting angular momentum about the whole body center of gravity during each support phase. The action of the free leg created a somersaulting angular momentum about the whole body center of gravity during the support phases of the hop and step. In addition, as a practical recommendation, we recommended instructions of (Boo Schexnayder, 2014) executing the step phase is a physical challenge. Tremendous vertical forces must be generated in the fraction of a second the foot is in contact with the ground. This difficult task demands training.

V. OUR RESULTS AND RECOMMENDATION:

1- That pushes Phrases Takeoffs Angles and the Distributions of Strides Lengths phases are a criterion mean to assess and judge the level of application of elite.
2- Any take-off angel's push phases less change in the step phase change the angular momentum created by hop phase affect the Performance.
3- The transition error in achieved horizontal vertical velocity in hop phase is related in the Performance of the other phases.

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