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## **The contribution of some kinematic variables to the stages of the triple jump performance at the level of achievement**

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**Abstract**--The significant development and high achievement that occurred for Olympic and world athletics in the late twentieth century and the beginning of the second millennium in recording advanced records for all events, including (throwing, jumping, and running short, medium and long distances) came as a result of continuous training, experience and field practice, and reliance on the latest Scientific techniques and applied sciences, including biomechanics, "the science that is concerned with studying human movements and analysing them quantitatively and qualitatively to increase the efficiency of human movement, and to identify the causes of action and its phenomena. The triple jump is one of the field activities in addition to the effectiveness of the long jump, which requires performance from The contestant must perform, according to the competition law, the technical stages (approximate run - hopscotch - step - jump) on the jump field. As a result of the digital development of this event, the importance of this study came to identify which kinematic variables have an impact and a significant contribution to the level of achievement and for each stage of performance Triple jump among the best riders of the World Championships that took place in Berlin 2009.

**Keywords**--kinematic variables, triple jump performance stages, achievement level.

### **Research problem**

The technical (technical) differences between the world champions in athletics are very specific in achieving digital achievements, which made the increase in the intensity of competition and at various levels, including the effectiveness of the

triple jump, among the things that emerged at the global and Olympic levels, and the world record reached (18.29 meters) in the name of the British (Roles) Through the researchers' experience in the field of training in athletics, measurement and evaluation, the research problem emerged to develop this study to identify the most critical kinematic variables that contribute and have a significant impact in achieving achievement and for each stage of performance represented by the approach run, the hop, the step and the jump for the best participating triple jump contestants At the World Championships in Berlin 2009, so the researchers decided to delve into that study and know the technical method used by them for the purpose of diagnosing and identifying those variables with impact and benefiting from them in our training programs in developing the level of Iraqi achievement in comparison with what the world has reached.

### **Research aims**

The researchers aim to:

- Identifying some of the kinematic variables in the stages of performing the triple jump for each contestant.
- Identifying some of the kinematic variables in each stage of the triple jump performance and the percentage of contribution to achievement for each contestant
- Identifying some of the kinematic variables in each attempt and achievement for each contestant.

### **Practical part**

#### **Research Methodology**

The researchers used the analytical study style survey method suited a problem.

#### **Research sample and community**

In each analytical study of the survey studies, each researcher should obtain a sample representing the original community, the most faithful representation, so the researcher relied on that the model of her community represents all the characteristics of the origin from which it was derived. Their number is (8) competitors in the triple jump.

### **Results**

Table 1

It shows the mean, error, and standard deviation of the study variables

Variables		mean	standard error	standard deviation	skewness
Achievement		17.28	0.10	0.29	-0.01
stride length (meter)	Penultimate	2.58	0.07	0.19	0.40
	The last	2.41	0.05	0.13	0.47
	Hopscotch	6.35	0.07	0.19	-1.03

	Step	5.29	0.10	0.28	-0.12
	The jump	5.79	0.05	0.14	0.67
relative distance (%)	Hopscotch	36.50	0.50	1.41	-0.81
	Step	30.38	0.50	1.41	0.34
	The jump	33.13	0.30	0.83	-0.28
horizontal speed m/s	Penultimate	10.13	0.08	0.23	0.45
	The last	10.14	0.07	0.21	0.93
	Hopscotch	9.38	0.07	0.20	0.40
	Step	8.29	0.05	0.14	0.90
	The jump	6.99	0.08	0.22	-1.59
loss of horizontal velocity m \ s	Hopscotch	0.76	0.05	0.15	-0.40
	Step	1.19	0.09	0.25	2.06
	The jump	1.42	0.19	0.52	2.53
vertical speed m \ s	Hopscotch	2.48	0.05	0.13	0.10
	Step	2.06	0.07	0.19	-0.15
	The jump	2.63	0.08	0.23	1.57
lift angle (Degree)	Hopscotch	14.75	0.37	1.04	-0.39
	Step	14.00	0.53	1.51	0.33
	The jump	20.63	0.84	2.39	1.85
Approximate average sprint speed for the last distance from the climbing board	from 6-11 meters	10.06	0.09	0.25	-0.14
	From 1-6 meters last	10.14	0.08	0.22	0.60

Through Table (1), the study variables appeared in the achievement level with arithmetic mean (17.28) and a standard deviation (0.29) and in the length of the step with (the penultimate stage) with an arithmetic mean (2.58) and a standard deviation (0.19) and for the last step with arithmetic mean (2.41), and a standard deviation (0.13) for (hop) stage with arithmetic mean (6.35), and standard deviation (0.19), for the (step) stage with arithmetic, mean (5.29) with a standard deviation (0.28), and for the jumping stage with arithmetic mean (5.79) and with a standard deviation (14). While variables (relative distance) for the (hopscotch) stage appeared with a mean (36.50) and standard deviation (1.41) and for the (step) stage with a mean (30.38) with a standard deviation (1.41), and the jumping stage with a mean (33.13) and standard deviation (0.83)

As for the (horizontal velocity) variables, they appeared for the penultimate distance with arithmetic mean (10.13) and standard deviation (0.23) and the last space with arithmetic mean (10.14) and deviation (0.21) and for the (hopscotch) stage with arithmetic represent (9.38) and a standard deviation (0.20) and for the location (step). ) with arithmetic mean (8.29) with a standard deviation of (0.14) and for the jumping stage with a mean (6.99) and with a standard deviation (0.22). While the variable (loss of horizontal velocity) appeared for the stage of (hopscotch) in an arithmetic mean (0.76), with a standard deviation of (0.15) and for the stage (step) with an arithmetic mean. (1.19) with a standard deviation of

(0.25) and for the jumping stage with an arithmetic mean (1.42) and a standard deviation (0.52).

As for the variable (vertical velocity), it appeared for the (hop) stage with a mean (2.48) and standard deviation (0.13) and the (step) stage with arithmetic mean (2.06) with a standard deviation (0.19) and the jumping stage with arithmetic mean (2.63) and standard deviation (0.23). In contrast, the variable (vertical speed) The ascent angle appeared for the (hop) stage with arithmetic mean (14.75) and standard deviation (1.04) and for the (step) stage with arithmetic mean (14.00.) with a standard deviation (1.51) and for the jumping stage with arithmetic mean (20.63) and a standard deviation (2.39). In the approximation of the last distance from the ascent board, the arithmetic mean of space (from 11 meters to the previous 6 meters) appeared with arithmetic mean (10.06) and a standard deviation (0.52) and for play (6 meters to the last meter from the ascent board) with arithmetic mean (10.14), with deviation and deviation Standard (0.22)

Table 2

It shows the relationship between the correlation coefficient and the coefficient of determination for the study variables

Variables		Correlation	Coefficient of determination	Strength of the relationship
stride length (meter)	Penultimate	0.01	0.00	No relationship
	The last	-0.51	0.26	Moderate
	Hopscotch	0.15	0.02	Weak
	Step	0.66	0.44	Moderate
	The jump	0.51	0.26	Moderate
relative distance (%)	Hopscotch	-0.34	0.12	Weak
	Step	0.43	0.19	Weak
	The jump	-0.15	0.02	Weak
horizontal speed m/s	Penultimate	0.15	0.02	Weak
	The last	0.26	0.07	Weak
	Hopscotch	0.31	0.10	Weak
	Step	0.41	0.17	Weak
	The jump	-0.46	0.21	Weak
loss of horizontal velocity m \ s	Hopscotch	-0.08	0.01	Weak
	Step	0.46	0.21	Weak
	The jump	0.55	0.30	Moderate
vertical speed m \ s	Hopscotch	0.19	0.04	Weak
	Step	0.17	0.03	Weak
	The jump	0.31	0.10	Weak
lift angle (Degree)	Hopscotch	-0.01	0.00	No relationship
	Step	0.12	0.01	Weak
	The jump	0.34	0.12	Weak

Average sprint speed for the last distance from the dashboard	from 6-11 meters	0.12	0.01	Weak
	From 1-6 meters last	0.16	0.03	Weak

Through Table (2), the study variables appeared as follows:

There is no relationship between achievement with the step (before the last), moderate with (the previous step), weak with (hopscotch) and average with both (step and jump). Achievement, as there was a fragile relationship of achievement with the horizontal speed variable for the stage (penultimate, last, hop, step and leap), while a weak relationship with the flat speed loss variable appeared with (hop and step) and moderate with (jump), the achievement relationship also appeared with the vertical speed variables (The hopscotch - step - jump) is weak. At the same time, there is no relationship between the ascent angle variable (hopscotch) and soft with (step and jump). The relationship with the approximate running speed variables for the last distance from the ascent and achievement board was weak.

### **Discuss the results**

Table No. (2) shows us the data of some kinematic measurements on the best attempts of (8) competitors in the men's triple jump final. These measurements unexpectedly showed us that there are no significant differences between the recorded values. From these results, the fluctuations in the achievements recorded in this competition may be related to other variables that the researchers attribute to the physical and psychological aspects. When looking at the skill side among the eight contestants, we see that possibilities are similar In the level of all the kinematic variables for the stages of performance, starting from (the last distance from the board of ascent to the hopscotch, step and the jump). When we noticed a level of achievement among the contestants, it was close to sixth place if they passed a distance of more than (17) meters. As well as the physical and physical differences between the first contestants, achievements in Beijing Olympics (2008) increased the retention of the same level of achievement and some for the better as that sample maintained the same rank achieved in Beijing.

Where we can explain it as a result of the high speed (horizontal and vertical) (and the lift angle) that is associated with the performance of most of the runners who focused on the hopscotch stage, which is known as the Russian method, their average relative distances were (36-37-34-38-35-37-38-37) Compared to the step and leap stages. The researchers attributed the focus of the sample to obtaining the most significant space in the hopscotch stage due to their high rate of speed. We find that the element of speed is the basis of the motor performance of the approach stage, where the horizontal speed resulting from the approach is transformed into a vertical velocity for the rider to benefit from in gaining advancement. Good result up and forward determines the jump distance. It confirms Muhammed Osman (1990), citing Popov. Popov, the famous Soviet coach, said, "The speed factor is one of the most critical factors that control the

digital level in the triple jump competition. Upgrading is a significant factor in this competition, and we can say that the power of upgrading is closely related to the level of speed. The power factor of upgrading mainly depends on the level and quality of the specific strength training in that event.

Table 3

Shows the achievement of each attempt and the average speed for different distances from the board of the first-place winner

try	Distance	Average sprint speed last distance from the takeoff board m\s	
		From 6 - 11 meter	From 6 - 1-meter last
1	17.51	10.49	10.55
2	17.44	10.36	10.53
3	17.73	10.41	10.49
4	×	10.36	10.05
5	×	10.27	10.32
6	×	-	-

Table 4

Shows the achievement of each attempt and the average speed for different distances from the promotion board for the second-place winner

try	Distance m \ cm	Average sprint speed last distance from the takeoff board m\s	
		From 6 - 11 meter	From 6 - 1-meter last
1	17.54	9.86	9.91
2	×	10.05	10.20
3	17.38	9.88	10.02
4	×	10.14	10.22
5	17.33	9.92	10.06
6	17.55	9.98	10.14

It is evident from the tables (3-4), which show the number of attempts for each player according to the first positions. The contestant who ranked second achieved the best in the sixth attempt (17.55) meters, and the contestant who ranked third achieved the best in the sixth attempt (17.36) meters. The contestant who ranked fourth achieved the best achievement in the fifth attempt (17.32), the contestant who ranked fifth earned the best triumph in the first attempt (17.26), and the contestant who ranked sixth achieved the best accomplishment in the fourth attempt (17.23), and the contestant ranked seventh He performed the best action in the second attempt (16.91) meters, and the contestant who ranked eighth earned the best triumph in the second attempt (16.84) meters, and the accomplishments of the contestants can find as in Figure (1)

## Conclusions

Through the results, the researchers concluded:

- The kinematic variables of the triple jump performance stages were close among the competitors.
- There is no relationship between the study variables and the level of achievement.
- Most of the contestants focused on the performance distance in the hopscotch stage.
- There is a difference in achieving achievement in all attempts

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