

Mechanical indicators on the board of the champions of Egypt in the long jump men

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Introduction and problem of research:

The field and track competitions have had a big share in breaking records despite the difficulty of that at the global level, but the Egyptian figures in field and track competitions are constant and even increased the gap between them and the world records; the long jump is one of the field and track competitions affected by this development on World and Olympic level (3: 2)

The stage of elevation is the most important stage of motor performance, since it is complex where the force of the jump is produced, which is equal to the force of the Earth's reaction. This force works in the vertical direction. In order to be effective, both ground strength and friction strength must be less than the force of the reaction Earth action; the elevation angle plays a positive role in directing the body to the elevation line. (6 :261)

Jamal Alaeddin (2000) points out that mechanical indicators are the mechanical state of the biological system. The mechanical condition and the behavior or behavior of the living system are characterized by change. Therefore, the biomechanical properties (kinetics, kinetics) describe the human body as the subject of mechanical movement. (4: 1-3)

In this regard, **Talha Hossamuddin (1994)** emphasizes that the motor indicators reflect in their content the extent of the harmony between the large muscles, and therefore the distribution of power to the stages of performance in proportion to the goal of each stage of performance and to serve the ultimate goal of the movement, For the work of muscle to work on the nature of performance and how to develop and improve it, and to identify both the force causing the movement in each part of the body and the resulting final outcomes of the movement.

(10: 82)

In this way, the researcher saw that the speed of the acquired approach to the performance of the upgrade step and the amount lost by the protagonist at the start of the upgrade process is one of the most important factors on which the jump distance depends. The process of transition from approach to development is the most important part of long jump performance. The researcher is a researcher, player and referee

of the Egyptian Federation of Athletics, and within the limits of what I have seen from studies and references lies the problem of research in the weakness of the digital level of long jump players clubs and various youth centers in the level of the Arab Republic of Egypt compared to the global and international level and the Olympians B.

Therefore, the researcher found the need to identify some of the biomechanical indicators related to the requirements of the stage of upgrading the heroes of Egypt men in the long jump under the age of 20 years, and try to diagnose the shortcomings and strength during the stage of upgrading to develop the digital level of the heroes of Egypt.

Search Goal:

The search aims to identify:

- 1- identification of differences in some mechanical indicators on the board of upgrading and heroes of Egypt under 20 years.
- 2- identify the differences in the long jump distance of the "digital level" of the research sample.
- 3- Diagnosis of the shortcomings and strength points in the members of the research sample during the stage of upgrading and its relation to the digital level of long jump players.

Search Questions:

- 1- Are there any statistically significant differences in some of the biomechanical indicators associated with the stage of upgrading the Egyptian champions in the long jump?
- 2- Is there a correlation between some of the biomechanical indicators associated with the elevation and digital level of the research sample?
- 3- Are there any statistically significant differences in speed loss at entry and exit from the upgrade panel of the research sample?

Related studies:

- 1- A study magda naji, abeer Ramadan (2008) (7) entitled "A qualitative training program according to the biomechanical analysis of the stage of upgrading the long jump competition" in order to improve the digital level of the long jump competition by assigning some biomechanical and biocinetic variables related to fun. The advancement of the long jump competition, the renewal of specific exercises according to the biomechanical analysis in the stage of upgrading the long jump competition on the sample of one of the best three players in the world championship (1998) by **Kirsi**; using the experimental and descriptive method. The most important results Biomechanical contribution to the level of digital achievement of the

long jump is: "horizontal - vertical" payment, the sum of the thrust, the force "horizontal - vertical", the sum of force.

- 2- A study of **Abeer Ramadan Salama (2005) (1)** entitled "The Use of Some Biomechanical Variables to Regulate Training Loads and Their Effect on Biochemistry in the Long Jump Performance of Youngsters", with the aim of employing some biomechanical variables to identify exercises similar to the kinetic performance of the two stages of approach and upgrading. (6) students specialized long jump, and the most important results (the training program was chosen based on the analysis of exercises similar to the dynamic performance of the competitions as basic exercises for the development of explosive capacity has a positive impact on the level of performance of skills and digital compatibility in what is called With the next movements of the upgrade hitch, I helped achieve horizontal displacement with its horizontal speed, which helped to achieve a better digital level of achievement.
- 3- the study of **Ahmed Saad Eddin Mahmoud (1994) (2)** entitled "Improvement of the loss of speed of approach and its impact on some kinetic variables for the long jump distance" in order to determine the effect of kinetic variables on a sample of a (6) The last steps to approach according to the percentage of the normal enemy step of the extracted rider, to improve the kinetic variables of the horizontal and vertical vehicle for the speed of approach and the speed of the approach.
- 4- Stefanshyn **DJ's study. (2003) (9)** entitled "Contributions of the lower ends associated with mechanical energy in vertical jumps and long jump" for the purpose of purely those contributions resulting from the lower ends of the vertical jump and long jump, and determine the contributions of mechanical energy of the thigh, knee and foot to run long distances and vertical jump and long jump (5) males, and the most important results (wrist joint was greater energy and is required for both vertical and horizontal jumps, increase the contributions of hip energy relatively during the long jump.
- 5- The study of the mother of **Wakai, Linthorne (2004) (8)** entitled "angle of climbing in the long jump" in order to determine the angle of the optimal upgrade, which increases the distance achieved in the long jump on a sample (5) players long jump using the curriculum Descriptive, and the most important results (the angle of homogenous elevation is the one that gives the greatest distance to the three components of "elevation - flight - landing"), the elevation angle was close to the homosexuality.

Research Plan and Procedures:

Research Methodology:

The researcher used the descriptive approach, using photography.

Community and Sample Search:

The research community in the players of the long jump competition in the Republic championship for the first class were men in the name of Mr. Ahmed Al-Khadem, which was held at the Olympic Center of National Teams in Maadi during the period from 15-17 / 3/2017.

The research sample:

The sample of the analysis was chosen in a deliberate manner for the best (6) players and achieved the highest result of the imaging and analysis, and each player made (6) attempts, and was chosen the best attempt of them.

Table (1)

Data of the players of the long jump competition in the championship of the Republic of the first class men "sample search"

Registered Number M	Experience Years	Bloc kg	Length cm	Age years	Commission	The name	a series
7.62	12	64	174	19	Nasr City	Hisham Mohamed Abdel Hamid Ali	17158
7.22	10	62	174	18	Ahli	Ahmed Hussein Ahmed Hussein	18577
6.96	10	59	167	19	Pioneers	Ammar Ihab Mohamed Sayed	21679
6.95	11	62	175	19	Ahli	Mohamed Ashraf Abdel Hassib	18836
6.85	10	63	173	18	High-Tech	Mohamed Esmat Mahmoud	18459
6.79	10	63	175	18	The horses	Said Eid Abdel Fattah	19048

Data collection tools:

Tools and devices used:

- 1- Sony camera with its components (holder – memory) .
- 2- A computer with a motion analysis program Motion trackd ^ 2, d ^ 3.
- 3- Long jump field equipped with the Olympic Center in Maadi.
- 4- MEDICAL WEIGHT MEASUREMENT MEASUREMENT FOR PLAYERS.
- 5- Resistameter for measuring length for players.
- 6- Sample data collection form as procedural aspects.

Photography Procedures:

The Olympiad Stadium in Maadi was filmed during the course of the Republic Championship for the first class men, which was held from 15-17 / 3/2017, in order to obtain the best competitive performance and was filmed through the Faculty of Physical Education Lab for Boys - Zagazig University.

Statistical processing:

The mechanical indicators (displacement - speed - wheel) were taken. The researcher abstracted the results and processed them using graphical representation of these indicators and estimating the shortcomings and strength in the stage of upgrading the Egyptian champions in the long jump "men" according to the mechanical indicators of that stage.

View and discuss the results:

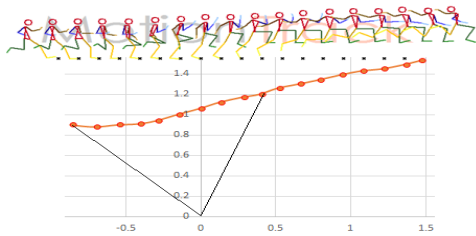
Table (2)

The horizontal and vertical distance of the center of the weight of the body while upgrading - for the heroes of the long jump in Egypt

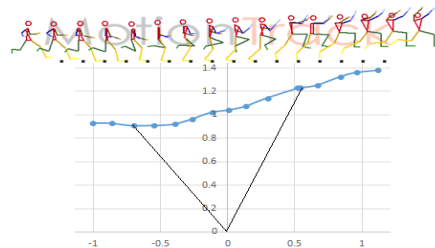
Player 6		Player 5		Player 4		Player 3		Player 2		Player 1		Time	Photos
Vertical	horizontal	Vertical	horizontal	Vertical	horizontal	Vertical	horizontal	Vertical	horizontal	Vertical	Horizontal		
0.86	1.13-	0.84	1.05-	0.94	0.78-	0.94	1.21-	0.90	0.87-	0.93	1.02-	0.00	1
0.85	0.98-	0.85	0.89-	0.90	0.64-	0.93	1.05-	0.88	0.71-	0.93	0.88-	0.02	2
0.85	0.83-	0.86	0.74-	0.93	0.51-	0.94	0.86-	0.90	0.56-	0.91	0.72-	0.04	3
0.87	0.69-	0.88	0.61-	0.95	0.36-	0.97	0.71-	0.91	0.42-	0.91	0.57-	0.06	4
0.88	0.55-	0.90	0.47-	1.00	0.25-	1.01	0.58-	0.94	0.30-	0.92	0.41-	0.08	5
0.91	0.39-	0.95	0.35-	1.03	0.12-	1.04	0.44-	1.00	0.16-	0.96	0.28-	0.10	6
0.95	0.27-	0.98	0.25-	1.09	0.01	1.07	0.27-	1.06	0.01-	1.02	0.13-	0.12	7
0.97	0.13-	1.01	0.10-	1.12	0.13	1.15	0.15-	1.12	0.12	1.04	0.01-	0.14	8
1.02	0.01	1.08	0.04	1.20	0.29	1.21	0.02-	1.17	0.27	1.07	0.12	0.16	9

FollowTable (2)

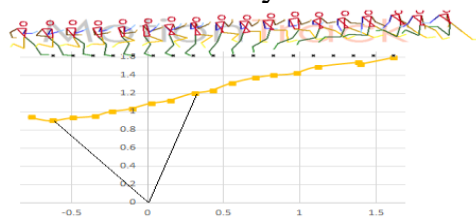
Player 6		Player 5		Player 4		Player 3		Player 2		Player 1		Time	Photos
Vertical	horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal		
1.07	0.12	1.14	0.14	1.23	0.41	1.28	0.12	1.20	0.39	1.14	0.28	0.18	10
1.13	0.27	1.19	0.26	1.31	0.54	1.36	0.25	1.26	0.51	1.23	0.52	0.20	11
1.19	0.38	1.28	0.37	1.37	0.69	1.40	0.41	1.30	0.65	1.23	0.50	0.22	12
1.24	0.51	1.30	0.47	1.40	0.81	1.47	0.54	1.34	0.78	1.25	0.65	0.24	13
1.27	0.66	1.36	0.62	1.42	0.96	1.53	0.70	1.39	0.93	1.32	0.82	0.26	14
1.31	0.80	1.45	0.87	1.49	1.10	1.60	0.83	1.43	1.07	1.36	0.94	0.28	15
1.35	0.94	1.47	0.89	1.54	1.37	1.67	0.96	1.45	1.21	1.38	1.10	0.30	16
1.41	1.09	1.53	0.99	1.52	1.38	1.74	1.11	1.49	1.35			0.32	17
1.43	1.22	1.55	1.10	1.59	1.60	1.81	1.27	1.53	1.46			0.34	18
1.48	1.33											0.36	19
1.49	1.48											0.38	20



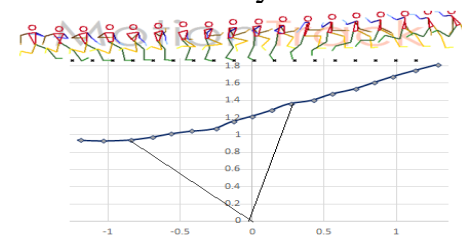
Player 2



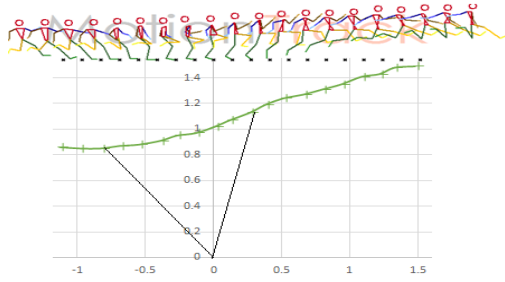
Player 1



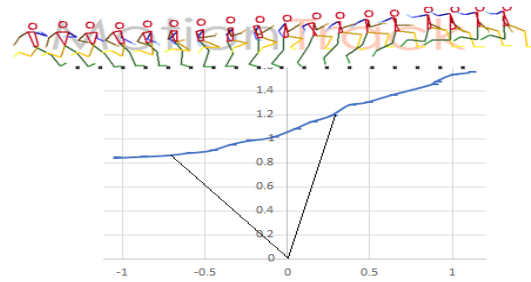
Player 4



Player 3



Player 6



Player 5

Figure (1) The motor track of the center of the weight of the body in the stage of elevation and flight is determined by the moment of putting the foot and a moment before the departure - the heroes of Egypt in the long jump player (1-6)

Table (3)

Abstract of the horizontal distance of the center of the weight of the body from the vertical position of both (the moment of putting the foot and a moment before leaving) on the painting - for the heroes of Egypt in the long pole

Horizontal Range On the board	From the point of focus Vertical until the moment before leaving	From the point of focus Front and even vertical	The player
1.24	0.52	0.72-	1
1.26	0.39	0.87-	2
1.11	0.25	0.86-	3
0.93	0.29	0.64-	4
1.00	0.26	0.74-	5
1.10	0.27	0.83-	6

It is clear from Table (3) that the horizontal distance driven by the center of gravity from the moment the foot is placed on the board to reach the vertical position was (-0.72), -0.87, -0.86, -0.64, -0.74, (0.83), 0.29, 0.26 and 0.27 respectively, respectively.

The horizontal range on the plate was 1.24, 1.26, 1.11, 0.93, 1.00 and 1.10 respectively.

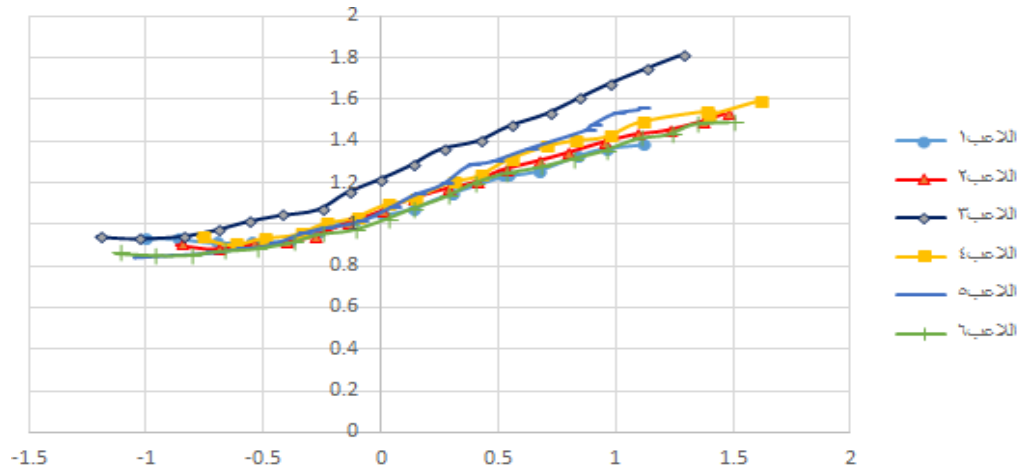


Figure (2) The motor path of the center of gravity of the body - a complex of heroes of Egypt in the long jump

Table (4)

Extract the height of the center of the weight of the body during the moment of putting the foot and a moment before leaving on the board of the heroes of Egypt in the long pole

Vertical range on the plate	A moment before leaving	Instant foot position	The player
0.32	1.23	0.91	1
0.32	1.2	0.88	2
0.42	1.36	0.94	3
0.3	1.2	0.9	4
0.33	1.19	0.86	5
0.28	1.13	0.85	6

Figure (2) and Table (4) show that the height of the center of the weight of the body at the moment of placing the foot on the plate of the player (1), (2), (3), (4), (5), (6) 0.83), 0.88, 0.86, 0.85 m, while the height of the center of gravity was a moment before leaving the plate (1.23), (1.20), (1.36), (1.20), (1.19), (1.13) meters ,(0.28) ,(0.28) ,(0.32) ,(0.32) respectively, were the vertical range of the center of the body weight .

Table (5)

The speed of the center of the body weight while upgrading - for the long jump champions in Egypt

Player 6	Player 5	Player 4	Player 3	Player 2	Player 1	Time	Photos
7.16	8.03	7.38	8.07	7.7	7.33	0	2 <- 1
7.72	7.29	6.71	9.15	7.6	7.72	0.02	3 <- 2
7.1	6.57	7.13	7.84	7.19	7.56	0.04	4 <- 3
6.76	7.12	6.48	6.6	6.35	8.04	0.06	5 <- 4
8.41	6.32	6.43	7.05	7.65	7.03	0.08	6 <- 5
6.29	5.34	6.88	9.11	7.69	7.55	0.1	7 <- 6
6.96	7.84	6.55	7.13	7.16	6.39	0.12	8 <- 7
7.54	7.74	8.65	6.87	7.85	6.53	0.14	9 <- 8
6.23	5.47	6.23	7.85	6.4	8.82	0.16	10 <- 9
8.01	6.99	7.72	7.99	6.79	12.52	0.18	11 <- 10
6.29	6.73	7.86	8.11	6.99	10.2	0.2	12 <- 11
6.87	5.28	6.63	7.11	7.06	7.79	0.22	13 <- 12
7.72	7.98	7.12	8.51	7.84	8.84	0.24	14 <- 13
7.04	8.04	7.88	7.29	7.49	6.34	0.26	15 <- 14
7.38	7.88	8.99	7.67	6.69	8.36	0.28	16 <- 15
7.95	5.74	8.85	8.39	7.37		0.3	17 <- 16
6.88	5.34	7.9	8.74	5.88		0.32	18 <- 17
5.88						0.34	19 <- 18
7.37						0.36	20 <- 19

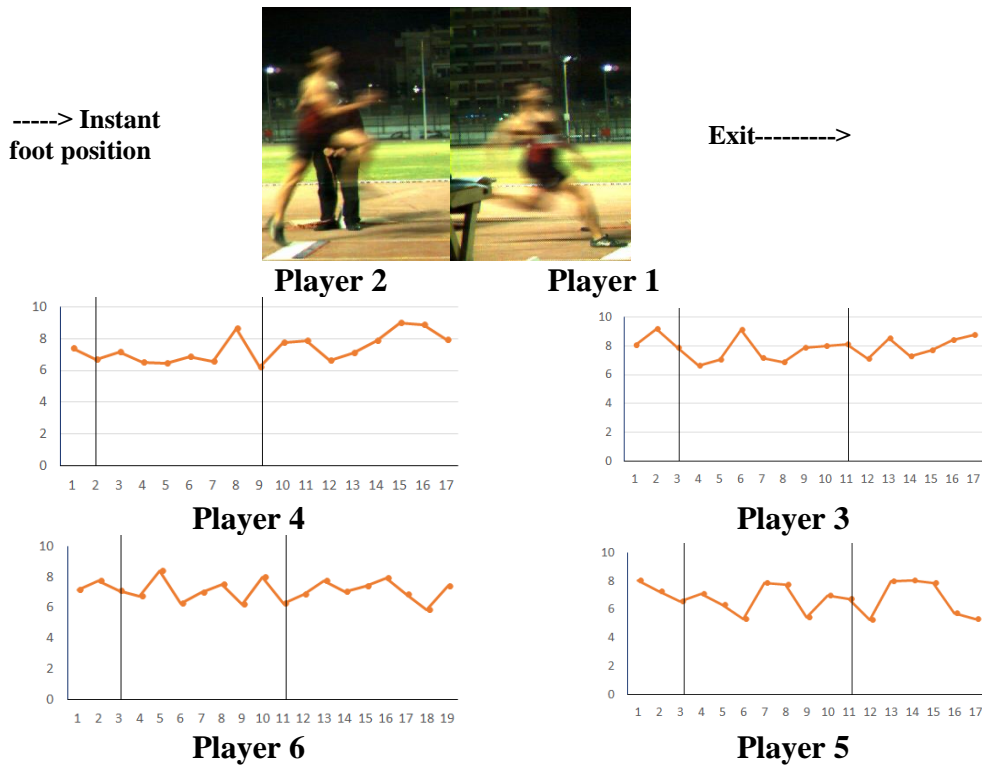


Figure (3) The curve of the speed obtained is determined by the moment of putting the foot up and up to the moment before the departure - the heroes of Egypt in the long jump

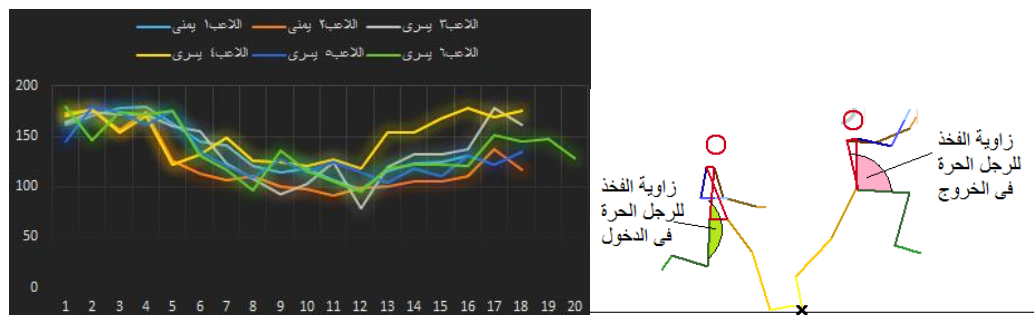


Figure (4) Angular curve of the thigh (free man) during the rise of the heroes of the long jump in Egypt

Table (8)

Extract of the thigh angle of the free man for a moment (the moment of placing the foot - and a moment before leaving) on the board of the upgrade - the heroes of Egypt in the long jump

Angular range of the thigh	Thigh angle (before leaving)	Thigh angle (instant foot position)	The player
63.54	98.32	161.86	1
75.28	98.12	173.4	2
46.93	124.73	171.66	3
52.24	124.55	176.79	4
49.67	124.59	174.26	5
69.23	105.46	174.69	6

Table (8) shows that player 2 was the angular range of the hip joint in the free man, which reached 75.28 degrees, the highest range between the players. Table 8 also showed that the same player lost the speed by 1.30 m / s on the plate.

Table (9)

Angular change of the knee (the man of ascension) during the ascension - for the heroes of the long jump in Egypt

Player 6 left	Player 5 left	Player 4 left	Player 3left	Player 2right	Player 1right	Time	Photos
155.35	155.97	165.01	147.15	155.08	152.72	0.00	1
169.84	160.29	161.02	161.34	156.99	156.29	0.02	2
168.40	164.03	135.52	146.25	145.43	160.63	0.04	3
162.42	152.84	140.24	138.51	131.42	155.60	0.06	4
152.45	146.02	128.65	142.20	130.15	135.71	0.08	5
132.75	147.45	134.07	142.32	128.61	136.64	0.10	6
122.65	131.05	135.17	130.96	139.50	128.27	0.12	7

Follow Table (9)

Player 6 left	Player 5 left	Player 4 left	Player 3left	Player 2right	Player 1right	Time	Photos
138.62	136.05	143.34	147.60	157.22	133.83	0.14	8
135.83	147.98	168.47	136.39	170.13	140.66	0.16	9
150.52	150.55	162.95	167.60	158.34	138.68	0.18	10
161.31	170.76	145.08	168.43	148.06	164.18	0.20	11
142.13	149.26	144.48	155.00	136.64	152.48	0.22	12
133.70	149.39	120.74	138.14	112.41	147.00	0.24	13
133.40	133.10	102.12	120.76	99.92	149.97	0.26	14
123.88	94.72	90.13	107.46	86.12	123.64	0.28	15
102.62	95.95	60.99	80.85	72.73	111.94	0.30	16
89.42	77.73	58.86	83.97	65.39		0.32	17
49.42	65.31	41.23	71.77	54.66		0.34	18
33.86						0.36	19
20.47						0.38	20

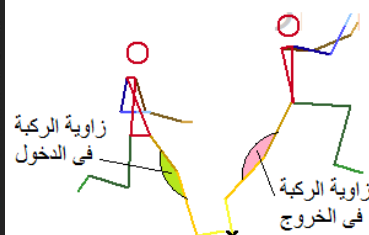
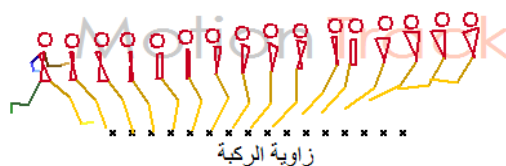


Figure (5) angular change curve of the knee (the man of elevation) during the upgrade - for the heroes of the long jump in Egypt

Table (10)

Knee angle extract (elevation man) (the moment of putting the foot - a moment before leaving) during the ascension - to the heroes of the long jump in Egypt

Angular change	Angular range of the knee	Knee angle (before leaving)	Knee angle (instant foot position)	The player
decrease	8.15-	152.48	160.63	1
a plus	3.26	158.34	155.08	2
a plus	22.18	168.43	146.25	3
a plus	7.45	168.47	161.02	4
a plus	6.73	170.76	164.03	5
decrease	7.09-	161.31	168.4	6

•Angular range of the knee (elevation) = absolute difference between angle of entry and exit.

It is clear from Table (10) that most players 2, 3, 4, and 5 had the angular range of the knee joint in the ascension man was increased by the moment before leaving for the moment of putting the foot, but the player 1, 6 had the knee angle decreased.

Table (11)

Angular change of the foot of the foot (the man of ascension) during the ascension - for the heroes of the long jump in Egypt

Player 6 left	Player 5 left	Player 4 left	Player 3 left	Player 2 right	Player 1 right	Time	Photos
122.94	86.82	110.31	110.19	96.00	94.51	0.00	1
101.85	87.75	115.92	79.72	102.57	97.33	0.02	2
123.42	104.32	99.90	108.39	96.43	95.19	0.04	3
116.25	105.29	98.69	97.57	76.99	100.07	0.06	4
105.16	99.00	92.49	92.83	80.21	91.32	0.08	5
85.12	109.88	102.40	97.41	68.76	83.40	0.10	6
83.31	80.91	93.21	75.31	68.75	71.44	0.12	7
78.86	69.40	92.57	92.36	85.42	75.31	0.14	8
78.78	85.06	133.36	94.35	90.87	70.45	0.16	9
95.03	88.40	139.94	115.69	118.12	78.18	0.18	10
104.71	120.76	127.07	133.85	116.37	125.95	0.20	11
136.54	138.57	141.93	132.64	118.46	137.14	0.22	12
140.05	120.30	132.10	133.92	116.84	125.98	0.24	13
144.71	148.73	125.58	133.74	106.69	136.18	0.26	14
122.83	115.96	133.32	121.13	104.55	130.30	0.28	15
131.12	135.97	126.16	102.63	103.09	127.86	0.30	16
130.82	130.68	79.55	105.21	103.92		0.32	17
101.15	125.98	121.28	104.25	104.07		0.34	18
124.42						0.36	19
108.28						0.38	20

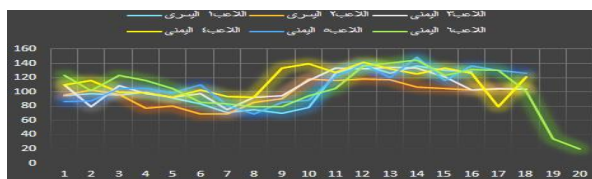
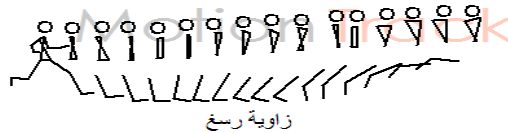


Figure (6) The curve of change of the foot of the foot (the man of ascension) during the ascension - for the heroes of the long jump in Egypt

Table (12)

Extract of the foot of the foot (the man of ascension) (the moment of putting the foot - a moment before leaving) during the ascension - to the heroes of the long jump in Egypt

Angular change	Angular range of the foot	Angle of foot (before leaving)	Angle of foot instep (instant foot position)	The player
Decrease	8.15-	152.48	160.63	1
Decrease	17.01-	78.18	95.19	2
a plus	22.12	118.12	96	3
a plus	25.46	133.85	108.39	4
a plus	17.44	133.36	115.92	5
a plus	16.44	120.76	104.32	6

•Angular range of the foot (elevation) = absolute difference between the angle of entry and exit

It is clear from Table 12 that most players 3, 4, 5 and 6 had the angular range of the foot-joint joint in the upgrade man was up a moment before abandoning the moment of putting the foot, but the player 1, 2 was the angle of the foot in the lower, 1.2 The moment of payment was not able to fully extend the footbone and yet they were the best figures, which meant that if the players were able to extend the foot of the foot may increase the digital level.

Table (13)

Change the center of the body weight around the position of elevation on the board - for long jump heroes

Player 6	Player 5	Player 4	Player 3	Player 2	Player 1	Time	Photos
				45.97		0.00	1
		54.84		51.01		0.02	2
45.58	49.28	61.55	47.45	57.92	51.65	0.04	3
51.62	55.27	69.01	53.86	65.28	57.82	0.06	4
57.7	62.42	76.22	59.95	72.46	66	0.08	5
66.87	69.57	83.33	66.77	81.13	74	0.10	6
74.15	75.61	89.68	76.07	89.25	82.44	0.12	7
82.29	84.47	83.16	82.74	84.05	89.46	0.14	8
89.29	87.89	76.64	89.03	77.18	83.73	0.16	9
83.37	83.18		84.82	72.08	76.26	0.18	10
76.29	77.55		79.42		67.12	0.20	11
					67.76	0.22	12

Follow Table (13)

Player 6	Player 5	Player 4	Player 3	Player 2	Player 1	Time	Photos
						0.24	13
						0.26	14
						0.28	15
						0.30	16
						0.32	17
						0.34	18
						0.36	19
						0.38	20

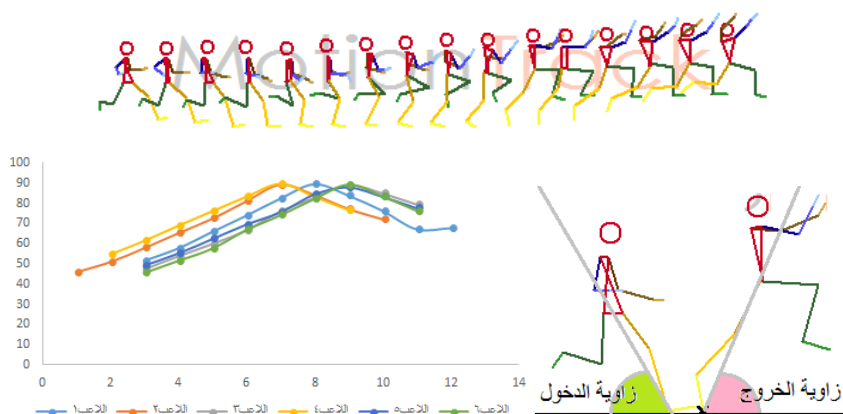


Figure (7) The absolute angular curve of the moment angle change the foot position and exit the center of the body weight around the position of elevation on the board - for long jump heroes

Table (14)

The center of the weight of the body for the height of the foot (the moment of putting the foot - a moment before leaving) during the upgrade - for the heroes of the long jump in Egypt

Angular range of center of gravity	Angle of center of gravity (before leaving)	Angle of center of gravity (moment of foot position)	The player
60.59	67.76	51.65	1
61.95	72.08	45.97	2
53.13	79.42	47.45	3
48.52	76.64	54.84	4
53.17	77.55	49.28	5
58.13	76.29	45.58	6

•Angular range of center of gravity around the elevation point = 180-(angle of moment of foot position + exit angle) .

Table 14 shows that most of the players 1, 2, 3, 4, 5, and 6 were the angular difference of the center of the body weight for the athlete's foot was increased by a moment before leaving the moment of putting the foot, but player 1,

Table (15)

The statistical profile of the movement variable on the board of flight and flight of the heroes of Egypt in the long jump

(N = 6)

Factor Sprains	Deviation Standard	SMA	largest value	less value	Term	Variables
1.433	30924.	7.0650	7.62	6.79	83.	Digital Level
0.49	0.09	0.78-	0.64-	0.87-	0.23	Horizontal distance from foot position to vertical position
1.50	0.11	0.33	0.52	0.25	0.27	Horizontal distance from the vertical position to the moment before leaving
0.10-	0.13	1.11				
0.34	0.03	0.89	0.94	0.85	0.09	Horizontal range of center of gravity
1.40	0.08	1.22	1.36	1.13	0.23	High center of gravity for instant foot position
1.68	0.05	0.33				Elevate the center of gravity for the moment before leaving
0.27-	0.53	7.25	7.84	6.57	1.27	Vertical range of center of gravity
0.61	1.33	8.04	10.20	6.40	3.80	The speed of the instant foot position
0.82	1.06	0.79	2.64	0.00	2.64	Speed out
1.91-	5.29	172.11	176.79	161.86	14.93	Lost speedThigh angle at the moment of foot position
0.15-	13.40	112.63	124.73	98.12	26.61	Thigh angle at the exit
0.32	11.55	59.48				Angular range of the thigh
0.89-	7.72	159.24	168.40	146.25	22.15	Knee angle at the moment of foot position
0.58-	7.13	163.30	170.76	152.48	18.28	Knee angle at the exit
1.68	8.27	4.06				Angular range of the knee
1.92	24.41	113.41	160.63	95.19	65.44	Angle of the foot wrist at the moment of foot position
1.15-	25.03	122.79	152.48	78.18	74.30	The angle of the foot tread at the exit
0.59-	11.01	13.58				Angular range of the foot
0.79	3.59	49.13	54.84	45.58	9.26	Elevation Angle The moment the foot is placed
1.09-	4.27	74.96	79.42	67.76	11.66	Angle upgrade moment before leaving
0.25-	5.16	55.92				The angular range of the center of gravity on the plate

Follow Table (15)

Skewness		Std. Deviation	Mean	Maximum	Minimum	Range
Std. Error	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic
845.	1.433	30924.	7.0650	7.62	6.79	83.

It is clear from Table (15) that the torsion coefficient in all the variables of motion was limited to (± 3) indicating the homogeneity of the motor path in these variables.

It is also clear from the same table that the average horizontal range of the movement of the center of gravity of the body from the moment of putting the foot on the ground to the moment before the departure has reached (1.11 meters), while the vertical range of the center of the weight of the body in the same situation from the moment the foot on the ground to the moment before (0.33 meters), while the loss of speed on the board during the upgrade there is no loss since the average value of the Egyptian heroes at the speed of exit was increasing (0.79 m / s), and the angular change of the thigh in the free man the same stage (59.48 degrees) was the lowest where the average of the largest angle in the free man was the moment the elevation foot was placed (172.11 degrees), and the average And the mean angular change in the man at the same stage was 4.06 degrees. The average height of the knee angle in the lift man was the moment of elevation (159.24 degrees), and the average of the lower value was (The average height of the foot of the foot man in the elevation of the foot of the foot elevation (122.79 degrees), and the average value of the lowest reached (113.41 degrees) The angular angle variable was on the plate at the same stage where the angular range was 25.83 degrees. The average angle of exit was a moment before leaving (74.96 degrees) The entry angle has reached (49.13 degrees) .

Table (16)

Kolmogroff Smironov test for natural performance detection of data extracted from the kinetic analysis of the stage of upgrading the heroes of Egypt in the long jump

(N = 6)

level Significance sig	Values (Z)	Extreme differences			N	The player	Variables
		Negative	Positive	Absolute			
0.778	0.659	0.144-	0.165	0.165	16	1	The vertical distance of the center of the weight of the body
0.882	0.586	0.102-	0.138	0.138	18	2	
0.814	0.636	0.115-	0.150	0.150	18	3	
0.943	0.528	0.118-	0.125	0.125	18	4	
0.831	0.624	0.114-	0.147	0.147	18	5	
0.754	0.674	0.113-	0.151	0.151	20	6	
0.284	0.987	0.255-	0.211	0.255	15	1	The speed obtained by the center of the body weight
0.932	0.541	0.131-	0.117	0.131	17	2	
0.967	0.496	0.083-	0.120	0.120	17	3	
0.179	1.099	0.266-	0.254	0.266	17	4	
0.313	0.962	0.213-	0.233	0.233	17	5	
0.985	0.456	0.084-	0.105	0.105	19	6	

Follow Table (16)

level Significance sig	Values (Z)	Extreme differences			N	The player	Variables
		Negative	Positive	Absolute			
0.692	0.712	0.140-	0.178	0.178	16	1	Angular change of the hip joint of the free man
0.235	1.034	0.145-	0.244	0.244	18	2	
0.768	0.665	0.157-	0.096	0.157	18	3	
0.544	0.800	0.189-	0.179	0.189	18	4	
0.494	0.831	0.122-	0.196	0.196	18	5	
0.810	0.638	0.125-	0.143	0.143	20	6	
0.968	0.493	0.123-	0.071	0.123	16	1	Angular change of the knee joint of the ascendant man
0.416	0.884	0.208-	0.115	0.208	18	2	
0.355	0.928	0.219-	0.120	0.219	18	3	
0.398	0.896	0.211-	0.126	0.211	18	4	
0.200	1.072	0.253-	0.121	0.253	18	5	
0.207	1.065	0.238-	0.147	0.238	20	6	
0.493	0.832	0.208-	0.166	0.208	16	1	Angular change of the articulation of the feet feet
0.642	0.741	0.175-	0.099	0.175	18	2	
0.871	0.595	0.140-	0.103	0.140	18	3	
0.749	0.677	0.160-	0.131	0.160	18	4	
0.832	0.624	0.087-	0.147	0.147	18	5	
0.729	0.689	0.154-	0.102	0.154	20	6	

It is clear from Table (16) that the level of the significance of Sig> 0.05 to collect variables and different parts of the body, and the probability hypothesis is zero, that is, there are no differences between the members of the research sample in the stage of upgrading in the long jump, thus can judge the performance of players from the data extracted from the analysis as normal , And they follow normal distribution.

Table (17)

The correlation between the evolution phase variables and the digital level of Egypt's heroes in the long jump

(N = 6)

Significance	Level of significance	Link	Variables with digital level
Not statistically significant	0.411	0.119-	Horizontal distance from foot position to vertical position
There is an indication	0.001	**0.972	Horizontal distance from the vertical position to the moment before leaving
Not statistically significant	0.056	0.711	Horizontal range of center of gravity
Not statistically significant	0.217	0.398	High center of gravity for instant foot position
Not statistically significant	0.367	0.179	Elevate the center of gravity for the moment before leaving

Follow Table (17)

Significance	Level of significance	Link	Variables with digital level
Not statistically significant	0.493	0.009	Vertical range of center of gravity
Not statistically significant	0.145	0.521	The speed of the instant foot position
Not statistically significant	0.133	0.542	Speed out
There is an indication	0.044	*0.847	Lost speed
There is an indication	0.011	*0.874-	Thigh angle at the moment of foot position
Not statistically significant	0.082	0.648-	Thigh angle at the exit
Not statistically significant	0.247	0.352	Angular range of the thigh
Not statistically significant	0.360	0.190-	Knee angle at the moment of foot position
There is an indication	0.025	*-813.-	Knee angle at the exit
Not statistically significant	0.387	0.152-	Angular range of the knee
There is an indication	0.048	*0.735	Angle of the foot wrist at the moment of foot position
Not statistically significant	0.365	0.183	The angle of the foot tread at the exit
Not statistically significant	0.061	0.699-	Angular range of the foot
Not statistically significant	0.318	0.247	Elevation Angle The moment the foot is placed
There is an indication	0.006	**0.912-	Angle upgrade moment before leaving
Not statistically significant	0.112	0.583	The angular range of the center of gravity on the plate

**There is correlation at the level of 0.01.

*There is a correlation at a significant level of 0.05

It is clear from Table (17) that the variables that have a statistically significant correlation with the digital level in the stage of upgrading the heroes of Egypt in the long jump are (the horizontal distance from the vertical position to the moment before the departure) Of them (0.972 **), (- 0.912 **) where they were at the level of 0.01.

The variables that have a statistically significant correlation with the digital level in the stage of upgrading the heroes of Egypt in the long jump are (loss of speed), (angle of the thigh at the moment of putting the

foot), (angle of the knee at the exit) (0.847 *), (- 0.874 *), (- 813 - *), (0.735) at the level of significance of 0.05.

As for the other variables under study, correlation was not statistically significant, nor was it the importance that could be relied upon when evaluating or using it as an indicator of training

Table (18)

The shortcomings of the mechanical variables on the board of the champions of Egypt in the long jump

Angular range of elevation angle	Angular foot angle	Knee angle	Thigh angle	Outcome of speed	The vertical distance of the center of gravity	Horizontal distance of center of gravity	The player
✓	✗	✗	✓	✓	✓	✓	1
✓	✗	✓	✓	✗	✓	✓	2
✓	✓	✓	✓	✓	✓	✓	3
✓	✓	✓	✓	✓	✓	✓	4
✓	✓	✓	✓	✓	✓	✓	5
✓	✓	✗	✓	✓	✓	✓	6

- The sign (X) means that there is a decrease in out of entry or a loss of speed
- The mark (✓) means the normal performance increases in the exit from entry and there is no loss of speed

It is clear from Table (18) that there are some slight deficiencies in the Egyptian champions in the long jump in some variables, although the players scored advanced levels in the long jump, and the shortcomings of player 1 he had a decrease in the angle of the knee and foot to exit the entry, The player 2 had a decrease in the sum of the speed and the foot of the foot to get out of the entrance, and the player 6 had a decrease in the angle of the knee only to exit entry, and the amendment of these shortcomings during the training will move the player a few centimeters on the current digital level.

Conclusions:

- 1 - horizontal distance to move from the foot position on the board, and even the vertical line is greater than the distance from the vertical position, and even a moment before leaving on the plate.
- 2 - vertical range of the center of gravity from the moment the foot on the plate, and even a moment before leaving on the board ranges between (0.28: 0.42) meters.
- 3 - The researcher returns to increase the speed that the player out of the board to the movement of the movement of the parties, especially the free man.

- 4 - The researcher returns to the low speed that comes out of the player on the board upgrade to increase the time to focus on the painting.
- 5 - the greater the angular range of the movement of the thigh increased the time of upgrading and the latest loss of speed on the plate.
- 6 - angular change of the knee on the board during the upgrade may be increase or decrease.
- 7 - angular change of the foot on the board during the upgrade may be increase or decrease and that the full use of the achievement of the digital level must be increased.
8. The angular change of the center of the body weight around the foot of the scale is only increased.
9. The following variables can be used (horizontal distance from vertical position to moment before departure, angle of elevation before moment of abandonment, loss of speed, thigh angle at the moment of foot position, knee angle at exit, foot angle of foot at moment of foot position) In the stage of upgrading in the long jump on the basis that the respondents represent the best players digitally in the long jump in Egypt.
10. The exit speed should be greater than the speed of entry on the board in the long jump.

Recommendations:

In the light of the researcher's conclusions, **the researcher recommends the following:**

- 1 - Assigning researchers in the field of athletics to conduct a mechanical analysis of all skills of international, international and Egyptian levels in the sport of athletics under the supervision of the Egyptian Federation of Athletics and in collaboration with the units of kinetic analysis in the faculties of physical education.
2. To provide the largest number of auxiliary devices in the long jump in particular and all field and track competitions in general.
- 3- Using the results of the biomechanical research in the teaching of the long jumping skill in question.

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