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Streamline and kinetic transfer at the moment of rising and their relationship to achievement among long jumpers

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Abstract

The purpose of this paper is to streamline and movement at the moment of advancement and achievement among long jumpers, and the relationship between streamline, kinetic transport, and achievement among long jumpers. The researchers used the descriptive approach as it was the appropriate approach to solve the research problem. The research community was determined by the players of the Al-Qadisiyah Governorate team for the long jump event for the sports season 2023-2024, who numbered 8 jumpers. As for the sample, the part represents the community of origin on which the researcher conducts the entirety and focus of his work. It was chosen randomly by (5) jumpers, which represented A percentage of (62.5%) of the research community. As for the remaining (3) jumpers, they were chosen as a sample for the exploratory experiment. One of the most important results reached by the researcher is that: There is a positive relationship between the streamline index at the moment of rising and the achievement of long jumpers, and there is a positive relationship between the kinetic transport index and achievement among long jumpers. One of the most important recommendations recommended by the researchers is that: Relying on the streamline index at the moment of rise for long jumpers, and reliance on kinetic transport at the moment of ascension among long jumpers.

Keywords: Jumpers, kinetic transfer, streamline

Introduction

Modern scientific fields express the extent of interconnection and scientific overlap between various sciences, such as the intersection of biomechanics with other sports sciences, such as training, learning, physiology, and other sciences, to obtain advanced positions in all sporting events, including athletics, because it is a standard in many countries interested in sporting activities, as it has become a cultural interface. It reflects the extent of progress for those countries.

Each science is concerned with many characteristics of skill and the connection of these characteristics with streamline and kinetic transfer for any activity that aims at integration through correct work based on scientific foundations to solve all the interrelated problems of all sports sciences. Athletics is one of the activities that researchers have included in many studies with the aim of developing the results of the athletes and their improvement. The long jump event is one of the events that is fun and exciting for spectators in terms of competition. The long jump event is one of the events that requires physical and kinetic preparation, which requires physical, kinetic and mechanical preparation, especially in the ascent stage, especially since the harmony between the body parts during the ascent is related to streamline. And kinetic transport, which reflects the ability and efficiency that the jumper possesses during the rise, and the coordination between the parts of the body, which the more the jumper is able to apply it, it has a positive effect on reaching the highest levels in order to achieve the best achievement, and the presence of the scientific devices and methods used in diagnosis led to the ease of the function of clarifying the athlete's movement, no matter how different the possibilities are. As it is known that a person's naked eye is not sufficient to obtain accurate scientific information and facts for some sports movements, and judging the validity of a movement based on the general evaluation is considered an inaccurate case of scientific

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research to comprehend the subtleties of the movement and determine its errors, and because the effectiveness of the long jump is performed in several overlapping stages that cannot be separated from each other. The other, and each stage has its own requirements that affect and influence the other stages and thus on achievement, prompted the researcher to delve into this study and identify the percentage of contribution of the jumping stages to achievement.

Hence the importance of research lies in studying streamline and kinetic transport to try to find out the extent of their connection through speed in approaching and rising, which helps researchers and coaches in predicting the results of their athletes, as well as determining the priority and importance through photographing them in order to reach the best achievement for long jumpers.

Research problem

Through the researchers' continuous follow-up of athletics championships and races, and the fact that the researchers are former athletics players, they noticed that there is a slowdown in the process of linking speed and advancement, and this is known through streamline and movement during the moment of advancement when the jumper performs the event, and this led to a decline in the level of achievement in local championships and during The current period compared to the previous period, as most of the exercises that are formulated in training programs are concerned only with the physical and physiological aspects without emphasizing the mechanical aspects, which are the key to raising the level of development of these aspects through the use of biomechanical analysis to detect errors and then evaluate and modify the technique through a streamlined manner. Movement in each stage of the long jump is accomplished.

Therefore, the researchers decided to identify the nature of the relationship between the streamline index, kinetic transport, and the stages of the long jump and the achievement of long jumpers.

Research objective

- Streamline and movement at the moment of advancement and achievement among long jumpers.
- The relationship between streamline, kinetic transport, and achievement among long jumpers.

Research hypotheses

- The researchers assume that there are statistically significant differences between streamline, kinetic transfer, and achievement among long jumpers.

Research fields

- **Human field:** Al-Qadisiyah Governorate long jump club players
- **Time field:** (1/10/2023) to (20/3/2024)
- **Spatial field:** College of Physical Education and Sports Sciences Stadium University of Al-Qadisiyah

Research methodology and field procedures

Research Methodology

The nature of the problem to be studied determines the research methodology followed, and the method is the path that the researcher follows in his study to solve the research problem (Wajih Mahjoub. 1993) ^[1, 2]. Therefore, the researchers used the descriptive approach as it was the appropriate approach to solve the research problem.

Community and sample research

The research community was determined by the players of the Al-Qadisiyah Governorate team for the long jump event for the sports season 2023-2024, who numbered 8 jumpers. As for the sample, it is the part that represents the community of origin on which the researcher conducts the entirety and focus of his work (Wajih Mahjoub. 1993) ^[1, 2]. It was chosen randomly by (5) jumpers, which represented A percentage of (62.5%) of the research community. As for the remaining (3) jumpers, they were chosen as a sample for the exploratory experiment.

Means of collecting information, devices and tools used in research

Means of collecting information

- Testing and measurement
- Personal interviews (see appendix 1)
- Observation and experimentation

Devices and tools used

- High-speed fixed video camera, 300 images/second, Canon type.
- Camera holders (1).
- One (1) DEEL computer.
- Kinetic analysis programs (Kinovea).
- A textile measuring tape, 50 meters long.
- Adhesive tapes.
- Manual stopwatch.
- Red and white flags.
- Legal field for jumping.

Field procedures

Imaging procedures

The research variables were measured using a camera to visualize the variables (streamline index / kinetic transport index / achievement). As in Figure (1)

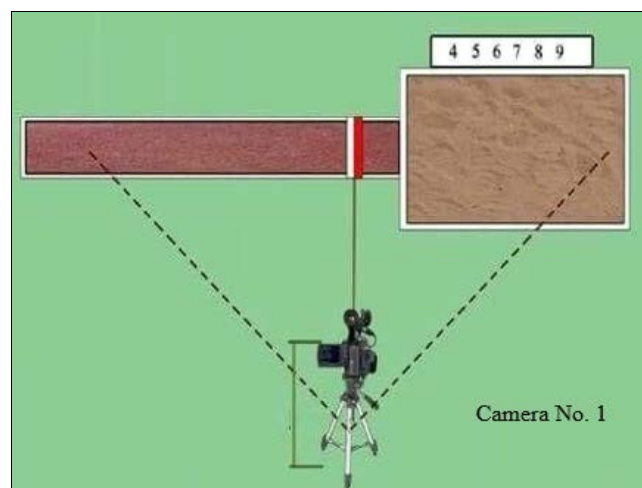


Fig 1: Shows the camera

The researcher used one camera to the left of the jumper, 5m away from the center of the rising board and 1.25m high. The imaging field was 7m, and the drawing scale was determined by the leg length of each jumper.

Defining and measuring research variables

1. Streamline index.
2. Kinetic transport index.
3. Achievement.

The streamline index: It was extracted through the momentum difference, that is, through the following law:
 Streamline = Momentum at the moment of pushing - Momentum at the moment of support.

Unit of measurement (kg/m/s)

Momentum = mass x velocity.

Kinetic transport: Extracted through the law (Hashem Ali Hassan. 2018)^[3]

Kinetic transport = angle of launch ÷ momentum difference (momentum at the moment of propulsion - momentum at the moment of support). As shown in Figure (2)



Fig 2: Shows one of the sample members

Exploratory experience

The researcher conducted the exploratory experiment on Monday, January 8, 2024, at ten in the morning, at the stadium of the College of Physical Education and Sports Sciences at University of Al-Qadisiyah, in practical training to identify the negatives and positives that he might encounter while conducting the main experiment in order to avoid them (Qasim Al-Mandalawi. 1989)^[8].

The researcher conducted this experiment on the players of the Al-Qadisiyah Governorate athletics (long jump) team, who numbered (3) jumpers, and they represent part of the research community and were outside the research sample. Its purpose was: -

1. Training the assistant work team.
2. Identify all the negatives and obstacles that the researcher may face while conducting the main experiment.
3. Identify the sufficient time to conduct the test.
4. Identify the validity of the camera and the dimensions for its placement.
5. Identifying the readiness of the approach field and the jumping hole.
6. Identify the appropriate number of assistant work staff.
7. Adjusting the location of the force platform in the ascent area.

Table 1: Shows the values of the arithmetic mean, the standard deviation, the calculated (t) value, and its statistical significance for measuring the streamline and achievement index.

Variables	Measuring unit	Arithmetic mean	Standard deviation	T value calculated	T value Tabular	Type Sig
Streamline	kg/m/s	14.113	0.997	0.833	0.805	Sig
Achievement	meter	6.542	0.146			

Below the level of significance (0.05) and the degree of freedom (3)

Table (1) shows the value of (T) calculated for the sample, which was below the level of significance (0.05) and the degree of freedom (3) for the variables (streamline and achievement).

8. Qasim Al-Mandalawi. 1989^[8]. Tests and Measurement in Physical Education, Higher Education Press, Mosul, p. 107.

The results of the exploratory experiment were as follows

The suitability of the devices and how to operate them was confirmed, the auxiliary work team was distributed to their tasks, the testing time was known, and the obstacles and difficulties facing them during the experiment or main experiment were diagnosed.

Test used in the research

Long jump performance test (Shehata and Bariqa. 1998)^[4].

- **The aim of the test:** To measure the index of streamline and kinetic transport at the moment of rising and completing the long jump.
- **Description of the test:** The jumper stands at a distance of no less than 35 metres, and when a white flag signal is given, the jumper performs an approximate run, then rises to the board, flies, and then lands in the pit.
- **Registration:** Each jumper is given three attempts, and the best one is chosen in terms of completion. Each attempt is filmed through a video camera, and the camera is placed next to the ascent area and at a distance of (5 m) in order to ascend and extract some of the variables that enter the law of streamline and kinetic transport. The completion distance is extracted from Through the use of a measuring tape (i.e. the measurement is made from the beginning of the ascent line to the last trace left by the jumper from any part of the body close to the ascent line) and this distance is measured by the assistant work team.

Main experience

The researcher conducted the main experiment on Thursday, January 18, 2024, at ten o'clock in the morning, at the stadium of the College of Physical Education and Sports Sciences, University of Al-Qadisiyah, on members of the research sample, and the researcher was keen to measure the research variables.

Statistical methods

The researcher used statistical laws

1. Arithmetic mean.
2. Standard deviation.
3. Pearson correlation coefficient.

Results and Discussion

Presentation and analysis of the results of measuring the streamline and achievement index and their correlation and analysis.

The results showed that the calculated (T) value (for streamline and achievement) was greater than the tabulated (T) value, and this is what indicated the level of significance through the statistical law (T), as it was less than an error rate (0.05), which indicates the presence of a significant difference between the two variables.

Presentation and analysis of the results of measuring the kinetic transport index and achievement and their

correlation and analysis.

Table 2: Shows the values of the arithmetic mean, the standard deviation, the calculated (t) value and its statistical significance for measuring the kinetic transport and achievement index.

Variables	Measuring unit	Arithmetic mean	Standard deviation	T value calculated	T value Tabular	Type Sig
Kinetic transport	d/kg/m/s	1.826	0.104	0.961	0.805	Sig
Achievement	meter	6.542	0.146			

Below the level of significance (0.05) and the degree of freedom (3)

Table (2) shows the value of (R) calculated for the sample, which was below the level of significance (0.05) and the degree of freedom (3) for the variables (kinetic transfer and achievement).

The results showed that the calculated (t) value (for kinetic transfer and achievement) was greater than the tabulated (t) value, and this is what indicated the level of significance through the statistical law (t), as it was less than an error rate (0.05), which indicates the presence of a significant difference. Between the two variables.

Discussing the results of measuring the fluidity and kinetic transport index and their correlation with achievement

Through the presentation and analysis of the results obtained by the researchers, it became clear that there are significant differences between the variables in the test results.

The relationship between the variables (streamline, kinetic transport, and achievement) was a positive relationship indicating the presence of significant differences, and this was shown by the results of using Pearson's statistical law. The variables that were studied have a significant relationship with achievement, and these variables are:

First: streamline

The variable of kinetic streamline is one of the aspects of movement that is inferred according to biomechanical indicators. It is the change in momentum between two moments, and it expresses a change in the speed of the body while the mass remains constant (at the moment of support and the moment of pushing).

Researchers believe that there is a positive relationship between kinetic streamline and achievement, as the more positive the results of kinetic streamline are, the better the achievement.

Since streamline represents the change in momentum, whenever the momentum at the moment of support is slightly greater than the momentum at the moment of propulsion (minimum negative value), the streamline is high. However, if the momentum at the moment of propulsion is greater than the momentum at the moment of support (positive value), then streamline is ideal. The momentum at the moment of support and the moment of thrust were equal (value is zero), then the streamline is constant, otherwise the streamline is minimal, and this is confirmed by "When the value of the momentum change is positive between the moments of time that make up the performance, the value of the streamline is Ideal, as these movements require increasing speed, and if the momentum change is at a small negative value (i.e. whenever the value is as small as possible and with a negative sign), this also indicates high fluidity, especially at the moments linking the approach and the jump in the long jump, and vice versa if something other than what we have indicated appears above, as this indicates weak streamline." (Al-Fadhli. 2011)^[5].

Second: Kinetic transport

It is one of the variables that is measured based on biomechanical foundations and is related to linear momentum and the angle of launch, and this is confirmed (Hashem Ali Hassan. 2018)^[3]. Through the use of the mechanical law which states that (kinetic transport index = angle of launch ÷ change in momentum). Momentum represents the speed of the jumper multiplied by his mass, and since the jumper's mass is constant, the development is for speed, and when the movement of parts of the body in the beginning is slow and in the next part its movement is faster, the better the kinetic transport is, and this is what is confirmed "When executing an effective movement while the acceleration of one part slows down and the next part increases, the process of transfer from one organ to another is charged with fulfilling the kinetic duty, the person resorts to it until the movement is completed perfectly." (Haider Nawar Hussein. 2008)^[6]

The researchers believe that knowing the values of kinetic transport at the moment of advancement and the extent of its relationship to achievement was aimed at improving the level to achieve the best achievement at the level of effectiveness.

Third: Achievement

This variable has a relationship with the parts of the body through which the appropriate positions are taken for the jumper's kinetic performance, and this variable is affected in the process of linking between the stages of approach and ascension, and this link is represented by both (streamline and kinetic transport at the moment of ascension).

The better the linking process between approaching and rising, i.e. the movement takes place without stops and intersections in the parts of the body, the greater the achievement. On the contrary, the achievement is less, and this is what was confirmed through the variables that were discussed previously, and this is what is confirmed " This means that development which accompanied all the variables gave an indication of increased efficiency and coordination of work between the body's joints and working muscles, thus producing greater force, which leads to increased achievement achieved" (Ammar Makki Ali. 2005)^[7]

Conclusion and Recommendation

Conclusion

1. There is a positive relationship between the streamline index at the moment of rising and the achievement of long jumpers.
2. There is a positive relationship between the kinetic transport index and achievement among long jumpers.
3. There is a connection between approaching and rising through streamline and movement among long jumpers.
4. Achievement in the long jump event is greatly affected by the streamline and movement of long jump players.

Recommendation

1. Relying on the streamline index at the moment of rise for

- long jumpers.
2. Reliance on kinetic transport at the moment of ascension among long jumpers.
 3. Emphasizing the process of linking approach and elevation in the long jump.
 4. Taking into account the results of measurements because of its major role in achievement.
 5. Conducting similar studies that show the relationship between the streamline index, kinetic transport, and achievement of other events (such as high jump, pole vault, or javelin throwing).

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