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Lecture Title

High Jump - 1

Script

Welcome to the episode of Physical Education. Friends, today we will be learning about one of the game in athletics i.e. High Jump

High jump, sport in athletics (track and field) in which the athlete takes a running jump to attain height. The sport's venue includes a level, semicircular runway allowing an approach run of at least 15 meters (49.21 feet) from any angle within its 180° arc. Two rigid vertical uprights support a light horizontal crossbar in such a manner that it will fall if touched by a contestant trying to jump over it. The jumper lands in a pit beyond the bar that is at least 5 by 3 metres (16.4 feet by 9.8 feet) in size and filled with cushioning material

History
The first recorded high jump event took place in Scotland in the 19th century. Early jumpers used either an elaborate straight-on approach or a scissors technique. In the latter, the bar was approached diagonally, and the jumper threw first the inside leg and then the other over the bar in a scissoring motion.
Around the turn of the 20th century, techniques began to modernize, starting with the Irish-American M.F. Sweeney's Eastern cut-off. By taking off as if with the scissors, but extending his back and flattening out over the bar, Sweeney achieved a more economic clearance and raised the world record to 6 feet 5.625 inches (1.97 m) in 1895.
Another American, M.F. Horine, developed an even more efficient technique, the *Western roll*. In this style, the bar again is approached on a diagonal, but the inner leg is used for the take-off, while the outer leg is thrust up to lead the body sideways over the bar. Horine increased the world standard to 6 feet 7 inches (2.0 m) in 1912. His technique predominated through the Berlin Olympics of 1936, in which the event was won by Cornelius Johnson at 2.03 meters (6 ft 8 in). American and Russian jumpers held the playing field for the next four decades, and they pioneered the evolution of the straddle technique. Straddle jumpers took off as in the Western roll, but rotated their (belly-down) torso around the bar, obtaining the most economical clearance up to that time. Straddle-jumper Charles Dumas broke the elusive 7 feet (2.13 m) barrier in 1956, and American John Thomas pushed the world mark to 2.23 meters in 1960. Valeriy Brumel took

over the event for the next four years. The elegant Soviet jumper radically sped up his approach run, took the record up to 2.28 meters and won the Olympic gold medal in 1964, before a motorcycle accident ended his career.
American coaches, including two-time NCAA champion Frank Costello of the University of Maryland, flocked to Russia to learn from Brumel and his coaches.
However, it would be a solitary innovator at Oregon State University, Dick Fosbury, who would bring the high jump into the next century. Taking advantage of the raised, softer landing areas by then in use, Fosbury added a new twist to the outmoded Eastern Cut-off. He directed himself over the bar head and shoulders first, sliding over on his back and landing in a fashion which would likely have broken his neck in the old, sawdust landing pits.
After he used this Fosbury flop to win the 1968 Olympic gold medal, the technique began to spread around the world, and soon floppers were dominating international high jump competitions. The last straddler to set a world record was late Vladimir Yashchenko, who cleared 2.33 meters (7 ft 8 in) in 1977 and then 2.35 meters (7 ft 9 in) indoors in 1978.
Among renowned high jumpers following Fosbury's lead were: Americans Dwight Stones and his rival, Franklin Jacobs of Paterson, NJ, who cleared 2.32 meters an astounding 0.61 m over his head height; Chinese record-setters Ni-chi Chin and Zhu Jianhua; Germans Gerd Wessig and DietmarMögenburg; Swedish Olympic medalist and world record holder PatrikSjöberg; and female jumpers Iolanda Balaş of Romania, Ulrike Meyfarth of Germany and Italy's Sara Simeoni.
Today all the best high jumpers in the world prefer the Fosbury technique. However, the last men's world record with the straddle was 2.35 m in 1978, which would still be an absolute top performance today. It is clear then that the dominance of the Fosbudry flop originates in an easier-to-learn basic form rather than in fundamental biomechanical advantages. Beginners have better results with the flop and improve faster.

General Information about High Jump

The high jump consists of a sequence movement aimed at clearing a vertical obstacle. In this action**,** gravity is off-set by a powerful push-off, which sends the jumper "flying" across the obstacle. In this flight**,** his body's CG follows a steep, relatively short parabolic flight curve, which is predetermined by the take-off speed (v_o), the take –off angle (a_o) and the take-off height (h_o) and cannot be altered by any kind of movement on the part of the jumper in the air. Some special points of technical interest are:

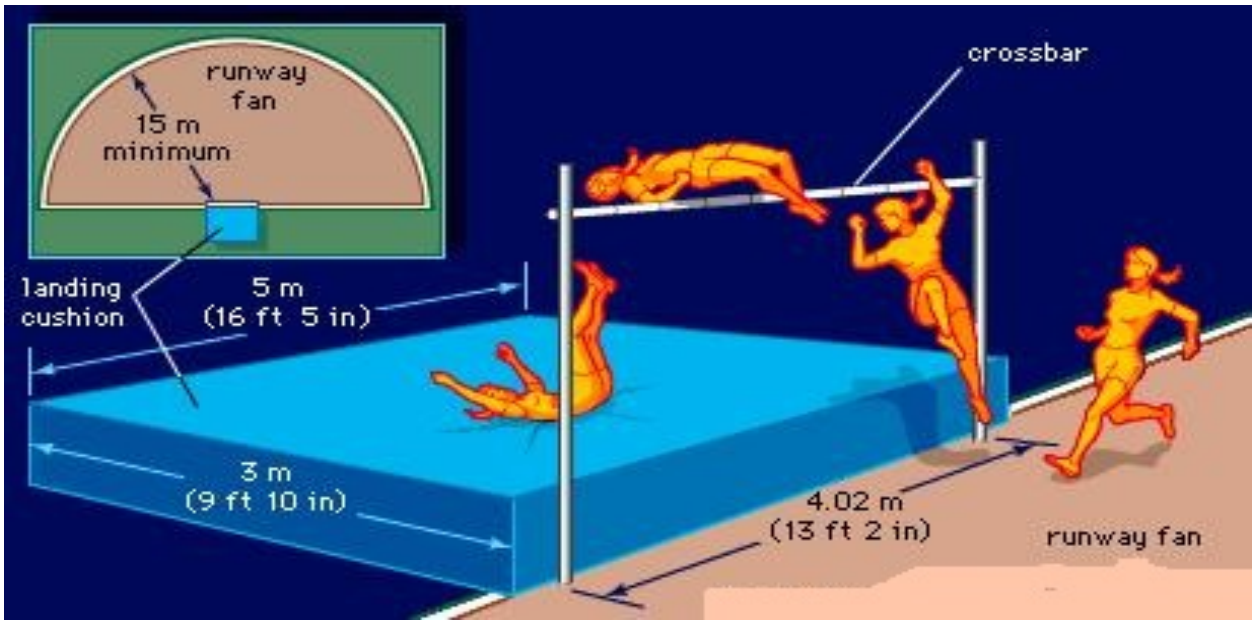
1. That every movement in the air cause a reaction movement in the opposite direction;
2. That certain phase in the jump, particularly with the straddle, and flop style, require rotating moments, which must be generated during take-off and
3. That the rotation movements generated at take-off can be accelerated or delayed by corresponding movements of parts of the body in the air.

For a better understanding of some difficult aspects of the high jump, essential points of a more general nature will be dealt with in detail in various paragraphs referring to the straddle.

Measurement and Specifications

In this event the upright should not be moved during a competition unless the referee thinks that the take-off and landing area has become unsuitable. This should not be done during a round. Competitors may place markers (which must not leave any indelible residue) to help them in their run-up and take-off.

Competitors are judged to have failed if they;
Take off from both feet;
Dislodge the crossbar so that it falls the supports (pegs) on the upright; or **touch** the ground, including the landing area, beyond the plane of the uprights (either between or outside them) with any part of the body without first clearing the bar (unless the judge considers no advantages has been gained).
Competitors may not wear shoes with a sole thickness of more 13 mm ($^{1/2}$ in) or a hell thickness over 19 mm ($^{3/4}$ in).
The minimum length of the runway should be 15 m (16yds) (or 20 m for more important competitions), and the landing area should measure not less than 5 m ($5^{1/2}$) in length and 3 m ($3^{1/2}$yds) in width. The take-off area should be level although there may be a maximum overall inclination in the direction of the centre of the crossbar.



(Approach Run)

- 40 meter length, 1.22-1.25 meter breadth

(Take-off)

- Take-off board 1.21-1.22 meter length
- 20 centimeter (±2 centimeter) breadth
- 10 centimeter thickness maximum

(Over the bar)

(Landing area/pit)

- Length 9 meter
- Breadth 2.75-3.00 meter
- Depth 38 centimeter

The Technique

For analysis**,** the complete movement is sub-divided into several phases: the run-up, the take-off, bar clearance and landing. All the phases are so closely interrelated, that it is only theoretically possible to define the end of one and the beginning of the next. Thus an effective take-off will

chiefly depend on the approach pattern and the rhythm and speed built up during the approach. All the subsequent explanations refer to a jumper who takes off from the left leg.

The Approach

The purpose of the approach is:

1. To produce an optimum convertible horizontal momentum, permitting the jumper to achieve a favorable take-off anle ($a_{o=}$ 60 to 65 degrees) at the greatest take-off velocity possible;
2. To prepare for the take-off by a proper rhythm of approach in relation to the structural change of the last strides;
3. To obtain an advantageous angle of flight to the bar (angle between the bar and the projection line of the flight curve), which is roughly determined by the angle of approach in relation with the style of jump used.

This purpose can be achieved by using the following approach pattern. The approach-run must be in a straight line-usually some seven to nine hard running strides, frequently after two or three strides of easy walking. The speed at the end of the approach must be controllable, permitting the jumper to convert the horizontal plane of motion into an almost vertical one. An approach velocity of some 7m/s has been recorded for top jumpers. The direction of the approach, i.e. the approach angle, will vary according to the jumping style and the leg the athlete uses for the take-off. In the western roll, in which the different parts of the body cross the bar almost simultaneously, the flight path across the bar will be kept short. In this case steep approach angles are more advantageous than flat ones. The approach to the bar on a diagonal line serves only to provide a favorable position for the swinging leg action. As a rule the approach angle in the western roll is between 40 to 60 degrees.

In the straddle different parts of the body clear the bar one after the other. Near to the bar**,** the flight path must therefore be longer to avoid the last parts of the body, and particularly the swinging leg, touching the bar. For this style**,** a flatter angle of approach should be chosen. It varies, as a rule, between 25 and 45 degrees.

In these two kinds of jump**,** the approach is performed from the side of the take-off leg; in the eastern cut-off and scissors, from the right side. This means that the left-footed jumper does the approach from the left side in the straddle and western roll and from the right side in the Eastern cut-off and scissors. For the scissors we recommend approach angles between 25 and 45 degree**s**.

A few remarks regarding this speed pattern and approach rhythm:

Investigations have shown that there is no uniform acceleration in the approach. The rate of acceleration varies in all cases. It has been further found that in all successful jumps, acceleration stops at the penultimate stride, while any further acceleration invariably result in failure. What is the reason for this?

The approach has two parts. In the first**,** art emphasis is on the development of speed, three strides; serve the preparation of the clearly reflected in the structure of the strides. A distinct rhythm is generated which shows itself in different lengths and durations of the strides. The preparation for take-off is upset if **t**he jumper, in place of a smooth rhythm, suddenly accelerates his movements.

There are different ways of achieving an effective approach rhythm in which, however, the following demands must be satisfied:

1. The body's CG must be low before take-off in order to obtain a longer path of acceleration.

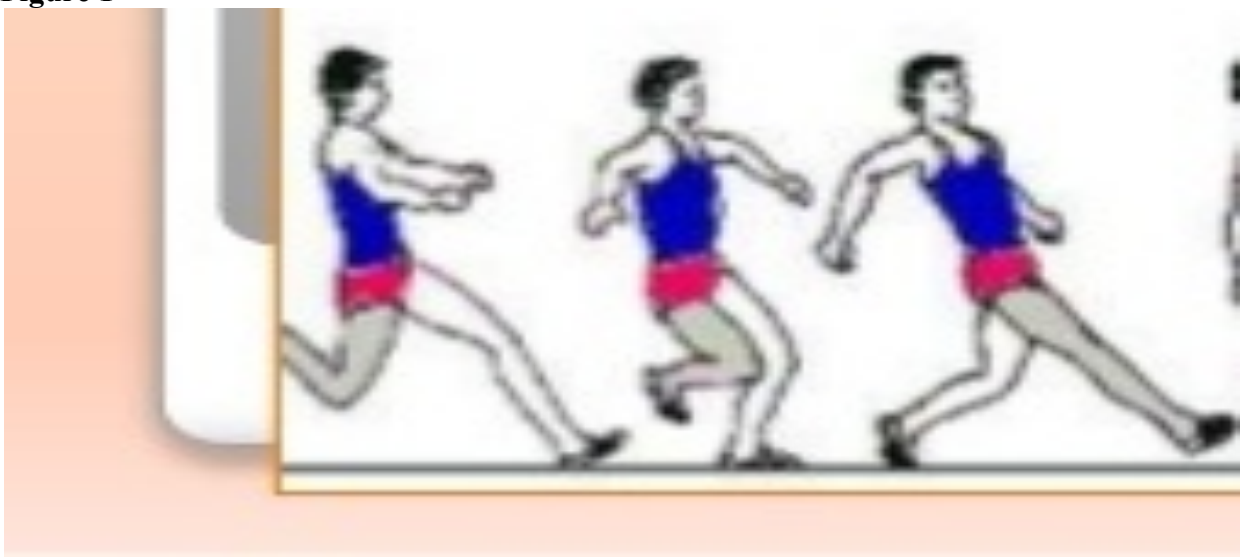
2. Favorable condition for the best possible utilization for the best possible utilization of the swinging masses (swinging leg and arms) must be created, so that the velocity and amplitude of movements can be increased to the maximum.
3. The reacting forces developed in the muscles and ligaments must be fully be utilized for increasing the take-off velocity. The pattern of rhythm in the approach for the high jump, and has substantiated six variations, of which the one outlined below is known by experience to be the best.

The fluent by increase of velocity and length of strides in the approach-run is replaced by a marked push-off and greater amplitude of motion in the penultimate stride; this stride is hence the longest. Simultaneously a gradual lowering of the body's CG as the jumper approaches the take-off, leads to a reduction in time, as well as to a shortening of the length of the last stride in spite of the advanced position of the take-off leg. Because of this**,** during the last stride**,** the foot dwells longer on the support. As has been shown by an analysis of the structure of the last approach strides, the prolongation of the support phase over the last strides has a positive influence on increasing the amplitude of the swing with the free leg in the take-off proper."

The Take-off

The beginning of the take-off is marked by the foot plant of the jumping leg on the take-off point. This point can only be fixed theoretically, because practically it begins with the last strides.

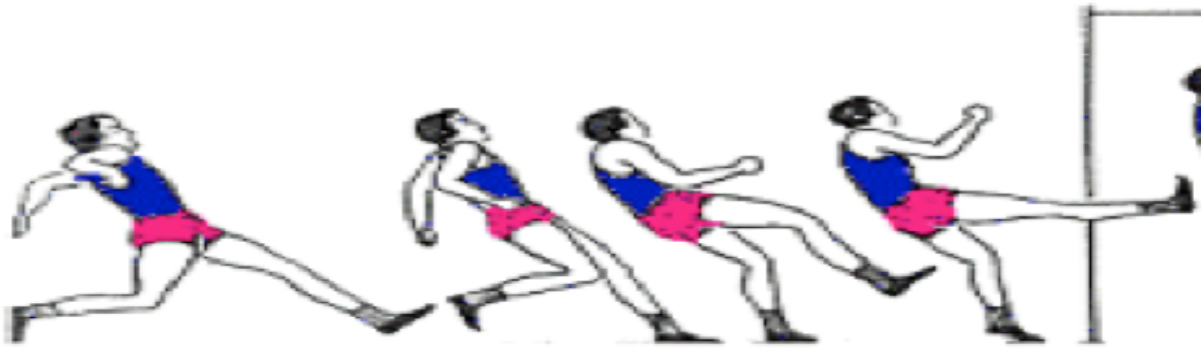
Figure 1



In paragraph "the approach-run" we stated that the last strides prepare the take-off and that they are subject to a change in structure, speed and length. Normally the jumper performs the last two strides over a relatively deeply bent knee**(figure 1)**and reduces the flight phase in favor of the support phase.

According to the most recent findings(**,**) the penultimate stride should be about 1 foot longer than the last stride, which blends with the take-off proper. The swinging leg is now pushing more in the forward-up-ward plane, thus accelerating the pelvis considerably, so that it gets ahead of the shoulder girdle, giving the jumper the extended backward lean before take-off which is typical of the high jump **(figure 2).**

Figure 2



Just one point concerning the arm action in the high jump. Two forms of arm movements are known in the high jump: the normal alternating arm technique. On the last step the arm of the free-leg side is kept behind the trunk, while the arm of the take-off side is brought back to join it. In this position both arms are behind the trunk.

Purpose of the take-off:

1. Check the horizontal run-up speed and convert the horizontal direction of movement into a relatively steep vertical plane.
2. Develop a high take-off speed and optimal take-off angle.
3. Produce the rotating moments required for clearing the bar.

Although take-off is an action which occurs in a very short time (0.15 to 0.25 sec.) it has two fundamental phases: the checking and the acceleration phase.

The checking Phase

It begins with the foot plant of the jumping leg, which is in the straddle at about 70 cm (an arm's length leg, lending heel first, is immediately slapped down, which renders the ankle joint into a lever mechanism that will become effective subsequently. At the same time**,** the knee is straightened, while the hips continue their forward and upward movement, thus increasing the backward lean of the body to its maximum (120 ton127 degrees). The thigh and the upper body now form almost a straight line **(figure 2)**.

The knee extension which we have just mentioned is vital. The jumping leg acts first as a lever, which immediately introduces the conversion from the horizontal movement. By this extension the leg extensors are pre-tensed. Through their elasticity they react positively against the forces of inertia produced by the body weight and the swinging masses which force the knee to bend. This triggers the reaction forces of the muscles which are attempting to regain the former position.

There forces will then assist the conscious stretching movement and are one of the determining factors for achieving a high take-off and hence projection speed. If the two first phases merge, I. e. if the knee bends immediately after the heel plant, the desired effect cannot be obtained.

During the slapping down of the foot, the arms and the swinging leg continue their previously started forward movement. The swinging leg is still well bent at the knee-joint. The bracing phase is ended, as soon as the curve of the body's CG has reached its lowest position. Now the positive acceleration phase begins.

Conclusion

The **high jump** is a track and field event in which competitors must **jump** unaided over a horizontal bar placed at measured heights without dislodging it. In its modern most practised format, a bar is placed between two standards with a crash mat for landing.The training stage is characterized by the systematic training of different elements and their various relationships**,** and may be regarded as special training, which should result in the coordinated execution of the sequence of movements.