MODEL TECHNIQUE ANALYSIS SHEET FOR THE HORIZONTAL JUMPS PART II - THE TRIPLE JUMP

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The approach in the triple jump can be divided into two phases. The first, or acceleration phase, consists of 8 to 16 strides.

The second phase, the take-off preparation, begins between 6 and 4 strides out from the take-off board. It is characterized by an increase in stride frequency and a straightening of the trunk. During the final strides the knee lift is higher (B).

Both the increased stride frequency and higher knee lift lead to an approach rhythm which prevents a lowering of the centre of gravity (CG) during the final strides.

The triple jumper should not — as in the long jump — prepare for a high angle take-off from the board, but instead should concentrate on accelerating well past the board. Any loss in velocity at the take-off board should be kept as small as possible since a low velocity at this point has negative effects on the initial velocity of the two subsequent take-offs.

There are some triple jumpers, for example Khristo Markov (BUL), who add a phase of increased stride length and raised trunk between the acceleration phase and the phase of increased stride frequency. This sudden increase in stride length gives the impression that the jumper has shifted into a higher gear. The subsequent increase in stride frequency is begun with a greater stride length which could lead to a higher final velocity. As shown in Table 1, the final approach velocity is a factor which significantly contributes to triple jump performance.

The data in Table 1 is based on the mean values from hundreds of bio-mechanically analyzed jumps. The statistical correlation between final approach velocity and triple jump performance is not as significant, however, as it is in the long jump. Jumping power and technique have considerably greater influence on final performance in the triple jump than in the long jump.

Table 1

Horizontal velocity of the CM between 6m and 1m in front of the take-off board (in metres per second)	Triple Jump Performance (in metres +/- 0.50 m)
10.50	17.50
10.25	17.00
10.00	16.50
9.80	16.00
9.60	15.50
9.45	15.00
9.40	14.50

2.2 The take-off

Following the take-off preparation phase, the triple jumper begins the jump by planting the foot of the takeoff leg flat on the take-off board. The trunk is kept upright while the arms are moved as in sprinting. A double arm action should be avoided at this point since it would result in a reduction of horizontal velocity.

2.3 The hop

The swing leg is brought forward quickly as a short lever, the knee joint forming an acute angle (D). At the moment of take-off, the knee of the swing leg should have reached hip height (E) where it is held momentarily. When changing the position of the legs, the swing leg is pulled backwards as a long, almost extended lever. Simultaneously, the take-off leg is brought forward as a short pendulum (with an acute knee joint angle) (F) all the way to a high, “reaching out” position (G).

The foot of the extended take-off leg is placed on the ground in a downward and backward “pawing” motion. If one visualizes the ground moving backwards underneath the athlete, the aim is to bring the foot down to the ground moving faster than the ground is moving in order to maintain as much horizontal velocity as possible. The foot of the take-off leg is better prepared for the high impact with the ground if the sole of the foot is tensed by drawing the big toe towards the body.

2.4 The step

At the take-off into the step, the ground is “kicked backwards with the extended leg” while the swing leg is being brought forward quickly and powerfully, the knee angle being more obtuse than during the take-off into the hop. At the moment of take-off, the thigh should have reached a horizontal position and formed a right angle with the lower leg (K). The trunk is kept upright.

Depending on the duration of the different flight phases, the arms can be moved as in sprinting or they can be rotated forwards. A double arm swing is also possible. If, however, the jumps are flat and the flight phases are short, there is no time for using the double arm swing.

During the flight phase, the thigh of the swing leg should be locked beyond the horizontal and form a right angle with the lower leg. When the arms reach backwards in order to perform a double arm swing, the trunk, because of the law of action and reaction, is inclined slightly forward. This inclination can be avoided by moving the arms in a sprinting action.

The leg that has been the take-off leg during the hop and step is bent at the knee and moved far backwards in a relaxed way. The triple jumper should take care that the foot of the take-off leg is not swung backward and upward beyond hip height as this would cause a forward rotation at the moment of the reversing movement (when the leg is brought forward quickly to function as the swing leg during the jump). A forward rotation at this point would have a negative influence on body posture and the potential distance of the jump.

2.5 The jump

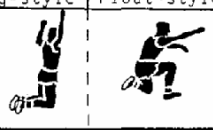
At the end of the flight phase of the step, the take-off of the jump is introduced by placing the foot of the swing leg (which now becomes the take-off leg) on the ground with an active downward and backward “pawing” motion, the knee and hip joints of the take-off leg being extended. The swing leg forms a right angle at the knee joint and is brought forward quickly and powerfully as a long lever (L, M, N).

At the moment of take-off, the thigh of the swing leg should have reached the horizontal position. This is only possible if, during the step, the swing leg has not been kicked up too high at the back. Also at the moment of takeoff, the body is straightened, which is a prerequisite for performing a hang- style jump (5). Many triple jumpers perform a float-style jump. This style is particularly useful if the flight phase is short (F). The running-in-the-air style is very rare since, in most cases, the horizontal velocity at the take-off for the jump is too low.

2.6 The landing

No matter which technique is used during the jump phase, it is important that a “distance-gaining” landing is well prepared for. Shortly before landing the arms are swung far backward so that the feet can be simultaneously lifted higher. At the moment of breaking the sand both arms are swung powerfully forward to counter the tendency to fall backwards. A variation of landing technique is characterized by the movement of only one arm backwards and upwards. This is to introduce a sideways landing. Here the athlete’s trunk is inclined far forward. After completing the landing the athlete leaves the pit towards the front.

ANALYSIS SHEET OF THE TRIPLE JUMP

TRIPLE JUMP	PHASE	REFERENCE	CRITERION ASSESSMENT
	RUN-UP last step	A1 support leg B2 swinging leg B3 trunk B4 arms	no marked flexion (high hip) almost horizontal upright (left hip over-extended) sprinting arm action
	HOP take-off	C5 foot plant CE6 take-off leg E7 swinging leg CE8 trunk CE9 arms CE10 head	flat, actively onto the board backward-downward-extending horizontal, acute-angled upright (right hip over-extended) sprinting arm action (no double arm!) slightly elevated
	HOP change of legs during flight	F11 swinging leg F12 take-off leg G13 take-off leg FG14 arms	almost extended backward move flexed bringing forward lifted beyond horizontal forward rotation or contra-rotation
	STEP take-off	I15 foot plant IK16 take-off K17 swinging leg K18 trunk IK19 arms IK20 head	flat, very active backward-downward-pawing (thrust) horizontal, acute-angled upright (right hip over-extended) double arm (or sprinting arm action) slightly elevated
	STEP flight phase	21 legs in front 22 legs behind 23 trunk 24 arms	beyond horizontal, acute-angled flexed swinging behind (steering function) upright (slight forward lean) moved backward for balance
	JUMP take-off	L25 foot plant LN26 take-off leg N27 swinging leg N28 trunk LN29 arms LN30 head	flat, very active backward-downward-pawing horizontal, acute-angled upright (slight forward lean) parallel double-arm swing elevated more
Hang-style Float-style 	JUMP flight phase	S31 legs H32 legs S33 trunk H34 trunk S35 arms H36 arms	kneeling position bent forward/downward upright slight forward lean upward forward
	JUMP landing	37 legs 38 trunk 39 arms	parallel leg-shoot bent forward moved forward at the turning point