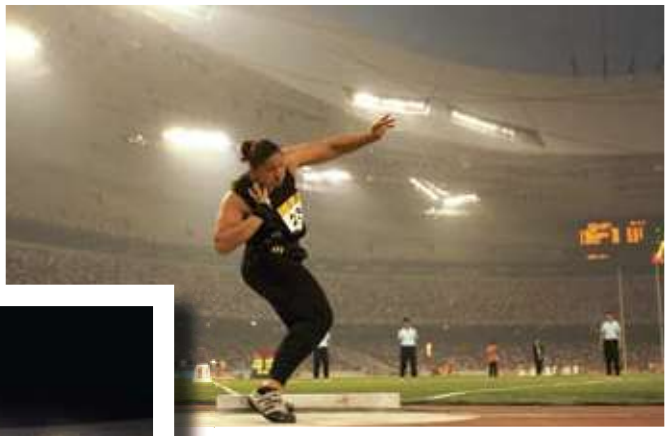
INTERNATIONAL ASSOCIATION OF ATHLETICS FEDERATIONS

THROW!

IAAF Coaches Education and Certification System

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FUNDAMENTALS OF THROWING

1. INTRODUCTION

Each of the events has a specific set of restrictions including (a) the characteristics of the implement used (size, weight, shape and aerodynamic qualities), (b) space limitations (the Shot Put ring, the length of the Javelin Throw runway, the throw sector lines) and (c) technique requirements dictated by the rules which influence the sequence of movements and make them unique. However, there are a number of very important commonalties among the different throws, the understanding of which will help the coach working with athletes in any of the events.

Aims

The goal in the throwing events is to maximize the measured distance covered by the implement.

Biomechanical Aspects

The distance that any thrown object travels is determined by a number of parameters. For the athlete and coach the most important are the three release parameters: (a) ***height*** (b) ***speed*** and (c) ***angle*** and, in the cases of the Discus Throw and Javelin Throw, the (d) ***aerodynamic qualities of the implement*** and (e) ***environmental factors*** (wind and air density due to relative humidity and or altitude).

The release height is determined by the athlete's body height though it is influenced by the athlete's position at release. The release velocity and release angle are both the result of the actions of the athlete prior to and during release. Neither the aerodynamic qualities of the implement nor the environmental factors can be affected by the athlete, though it is possible to make some adjustments to the throwing technique that will maximise the potential distance of a throw.

Movement Structure

The movements of the throwing events can be broken down into four main phases:

1. ***Preparation***
2. ***Momentum building***
3. ***Delivery***
4. ***Recovery.***

Note: The descriptions below apply to right-handed throwers.

In the preparation phase the athlete grips the implement and assumes a position to start the momentum building phase. The preparation has no direct influence on the throwing distance.

In the momentum building phase the athlete and implement initially move together as one unit but then the athlete overtakes the implement during the 'hop' or impulse stage in the javelin, the glide in the linear shot put, the turn in the discus and the rotational shot put and during the single support phase of the hammer turns.

In the delivery phase velocity is stored, increased and transferred from the athlete's body to the implement and the implement is released. The link between the momentum building phase and the delivery phase is the ***power position***, when the athlete has two feet on the ground. With some differences for the Hammer Throw, the common features of an effective power position in the throwing events are:

- Muscular tension throughout the body.
- A balanced stance with both feet on the ground.

- Body weight over the right foot, right heel lifted.
- Right heel and left toe lined up.
- Backward lean against the direction of the throw.

In addition to an effective power position the common elements of effective delivery phases are:

- A well co-ordinated sequence of successive action of all the joints involved in the throw: foot, knee, hip, shoulder, arm and hand.
- A twisting extension of the right leg using the strong muscles of the leg to lift the body.
- A bracing of the left leg to accelerate the right side of the body and produce vertical movement.
- A bow tension or twisted position causing high pretension in the trunk, shoulder and arms which can be used to produce acceleration.
- A blocking action in the upper body in which turning movement of the trunk is stopped with the left side allowing the right side to accelerate.

In the recovery phase the athlete braces against any remaining velocity and avoids fouling.

2. TEACHING THROWING TECHNIQUE

The chaining method is usually used to teach the throwing events. Concentration should be on the following elements in the order given:

- Introduction to the implement (safety and grip)
- Delivery (using front throws)
- Power Position
- Delivery
- Recovery
- Momentum Building
- Preparation Phase

Points to Emphasise:

- Optimum speed in the preparation and building momentum phases in the momentum building phase.
- Increasing acceleration in all phases – finishing as fast as controllable in the delivery.
- Effective and stable power position.
- Successive sequencing of body movements starting from ground level and moving up through the body finishing with maximum speed being transferred to the implement.
- Complete extension of the body in the delivery.
- Developing technique with implements slightly lighter than competition weight.
- A wide variety of exercises, implements, throwing movements and situations.

Points to Avoid:

- Introduction of competition technique to young or beginner athletes who have not reached the appropriate physical stage of development.
- Implements of inappropriate size, weight or aerodynamic qualities.
- Introduction of new technique elements before satisfactory performance of those already learnt.
- Excessive throwing movements for athletes who have not gained the appropriate strength levels in the abdominal and leg muscles.

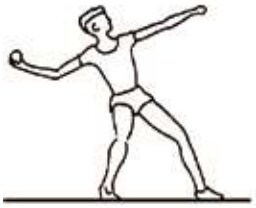
3. SKILL AND CONDITIONING EXERCISES

Note: Many exercises described in the 'Fundamentals of Running' and 'Fundamentals of Jumping' are also useful for throwers.

EXERCISE GROUP 1: WHIPPING ACTION (JAVELIN THROW)

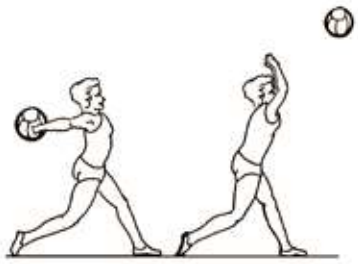
One-handed throws with lighter implements

Variations:
- from standing position
- from knee stand
- with 3-stride rhythm
- with 5-stride rhythm



Two-handed throws with heavier implements

Variations:
- throw-ins
- from sitting position
- from knee stand
- with 3-stride rhythm



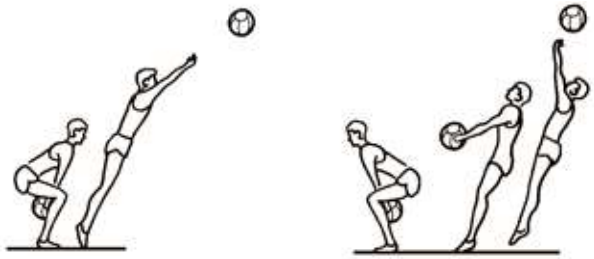
Loading:

Exercise	Weight	Effect	Repetitions	Sets
Standing Throw one handed	1.5-3.0 kg	Strength	5-10	2-4
3-step rhythm one handed throws	1.0-2.0 kg	Strength	5-10	2-4
Standing Throw two handed	2.0-5.0 kg	Strength	5-30	3-5
3-step rhythm two handed throws	2.0-5.0 kg	Strength	5-30	3-5
Standing Throw one handed	200-750gr	Speed	5-10	2-4
3-step rhythm one handed throws	200-750gr	Speed	5-10	2-4

EXERCISE GROUP 2: PUTTING ACTION (SHOT PUT)

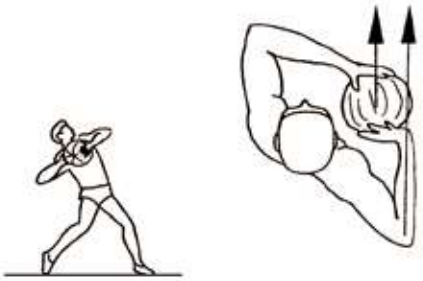
Forward and backward overhead throw

Variations:
- from turning movement (see backward slinging action)
- with different implements: medicine balls, stones, shots



Standing put

Variations:
- chest-pass
- with glide
- with two steps(left-right-left)
- from turning movement



Loading:

Exercise	Weight	Effect	Repetitions	Sets
Forward/backward overhead throw	3.0-4.0 kg	Strength	5-10	2-4
Standing put / with glide/steps	5.0-8.0 kg	Strength	5-10	2-4
Standing put / with glide/steps	2.0-6.0 kg	Speed	5-10	2-4

EXERCISE GROUP 3: SLINGING ACTION (DISCUS THROW)

Throws with light weights

Throws with heavier weights

Variations:
- sitting position
- knee stand
- frontal position (see above on the right)
- power position (see above on the left)
- one-turn throw
- 1½ turns
- with different implements:
  light: sticks, rings, cones, light shots, light stones, disks
  heavy: heavy medicine balls, stones, shots, disks

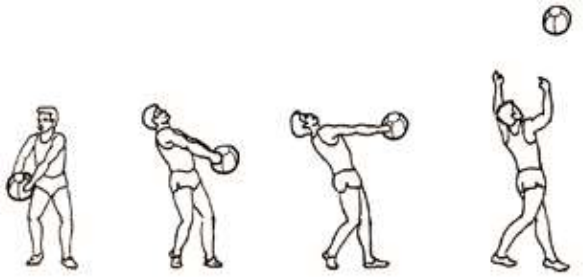
Loading:

Exercise	Weight	Effect	Repetitions	Sets
Exercises with light implements	0.8-1.5 kg	Speed	5-10	2-4
Exercises with heavy implements	1.5-3.0 kg	Strength	5-30	3-5

EXERCISE GROUP 4: BACKWARD SLINGING ACTION (Hammer Throw)

Two handed backward throw over shoulder

Variations:
- lighter implements
- heavier implements
- shorter implements
- with preliminary swings, no turn
- with preliminary swings and turn
- with different implements: medicine balls, stones, hammers



Squat extension jumps

Variations:
- throws for height
- throws for distance

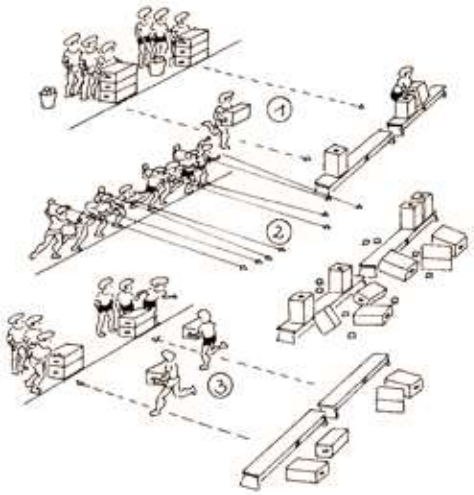
Loading:

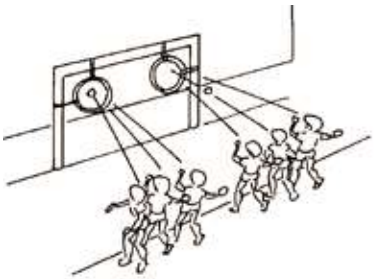
Exercise	Weight	Effect	Repetitions	Sets
Exercises with light implements	2.0-6.0 kg	Speed	5-10	2-4
Exercises with heavy implements	5.0-12.5kg	Strength	5-10	2-4

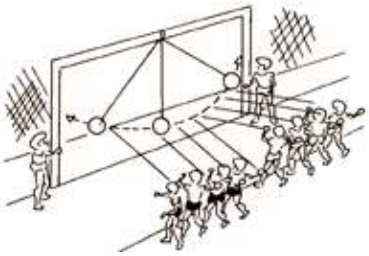
4. GAMES

GAMES TO INTRODUCE THE JAVELIN THROW

"Throwing and sprinting":
Athletes sprint with boxes to set up the targets, then return to the throwing line. After the targets are knocked down they sprint to collect the boxes.



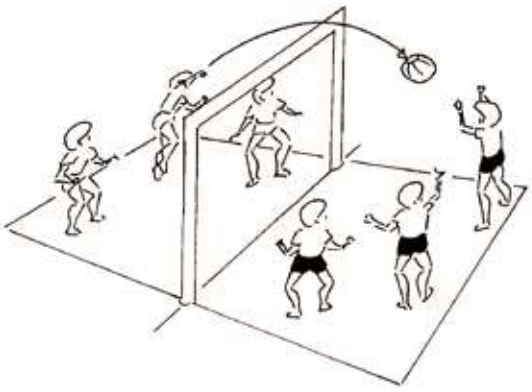


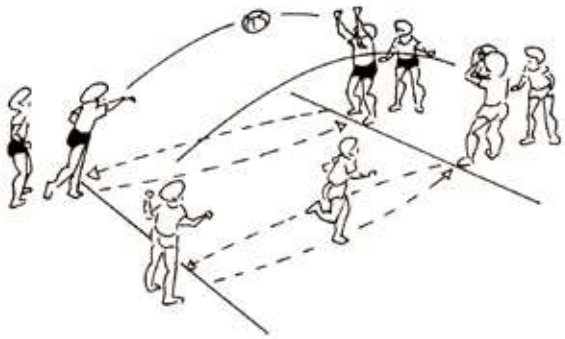


"Hit the targets":
Athletes aim at bicycle tyre hung in the top corners of a football goal or at a ball swinging from the crossbar.

GAMES TO INTRODUCE THE SHOT PUT

"Ball over the cord"
Athletes throw a medicine ball back and forth over a goal, a fence, a cord or a net.
The aim is to put the ball on to the ground inside the other team's area. compete to make the most throws in a set time period.

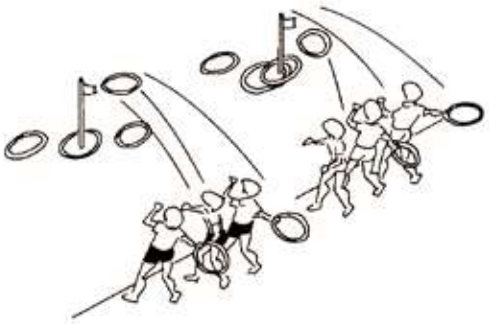


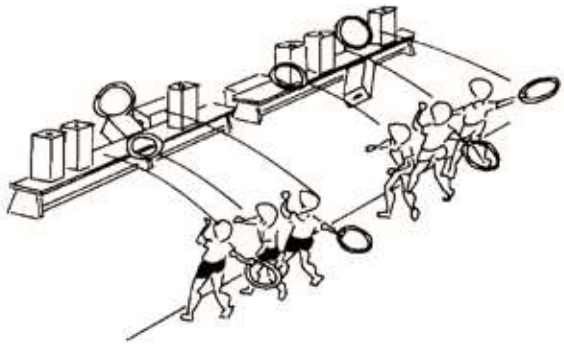


"Follow the ball":
Each athlete throws or puts a medicine ball to an athlete at other end of throwing area then runs after the ball. Teams of three

GAMES TO INTRODUCE THE DISCUS THROW

"Throwing hoops/rings around flagpole"
Athletes throw rings or hoops at a small flag pole, trying to land exactly over it.
A round is finished when one team has achieved a certain number of "hits" or when the teams have thrown all their hoops.





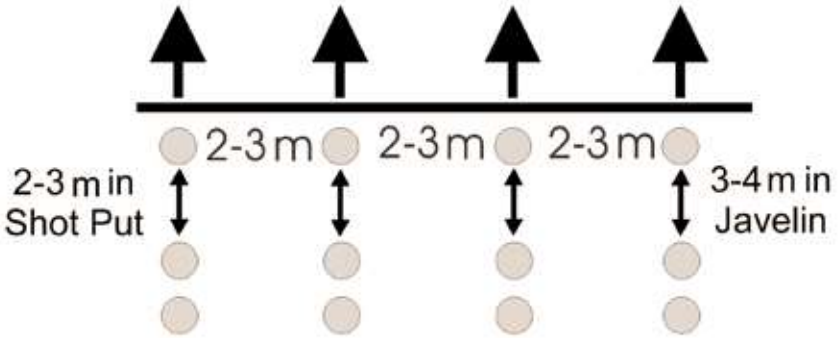
"Knocking down cardboard boxes"
Athletes throw rings or hoops at a row of cardboard boxes. A round is finished when one team has knocked down its boxes or when the teams have thrown all their hoops.

5. SAFETY AND ORGANISATION

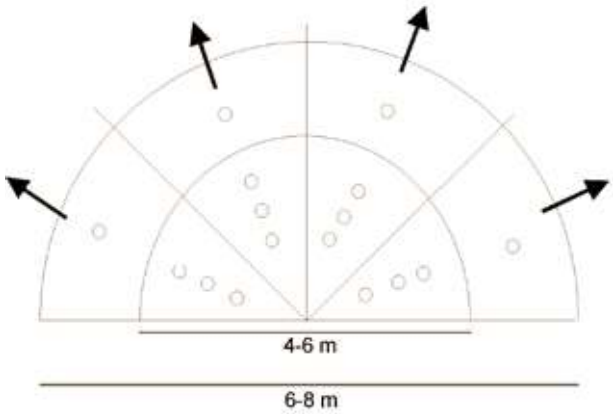
- Equipment should be kept in good repair and stored in a safe place. Test the safety of any improvised equipment before teaching.
- Throwing implements should not be used on the way to or from the throwing area and should be carried safely, javelins must be carried vertically.
- Initially all training should be under the direction of the coach.
- All throwers should stand well back from the throw line when they are waiting their turn.
- The thrower should make sure there is no one in the landing area or probable line of flight of the implement before the throw is made.
- After throwing, the thrower should wait under all have thrown or instructed to collect the implement by the coach.
- Wet conditions increase the chances of accidents and extra caution should be taken, particularly for implements sliding after landing.
- The athletes should keep in 'eye-contact' with the coach.
- Left handed thrower should be placed to left and right handed thrower to the right side of a group.
- Use specific organisation forms (see next page).

ORGANISATION OF GROUPS FOR THROWING PRACTICE

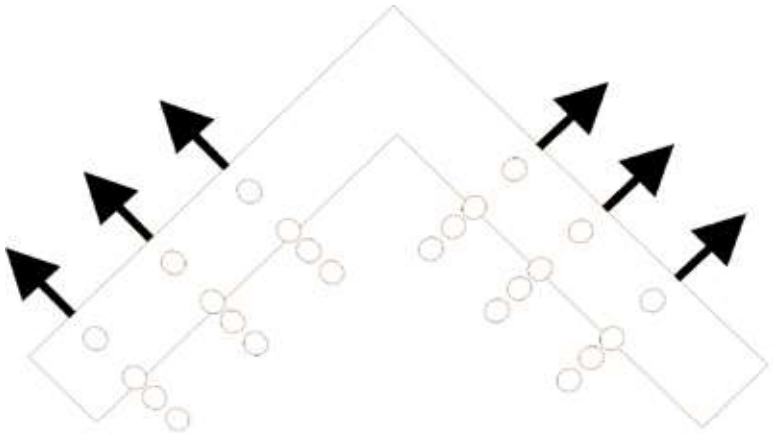
(1) Can be used for Shot Put (Linear Technique) and Javelin Throw



(2) Can be used for Shot Put (Rotational Technique), Discus Throw and Hammer Throw

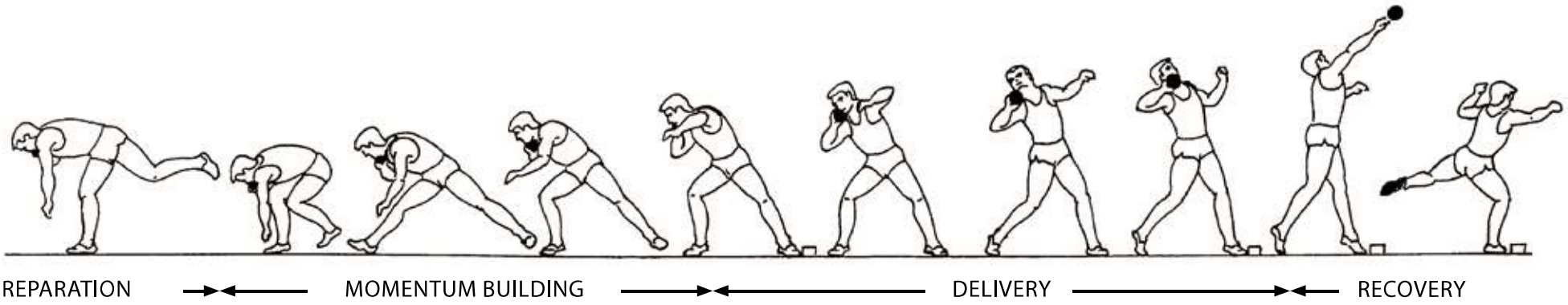


(3) Useful for linear throwing events



SHOT PUT – LINEAR


DEUTSCHLAND
OSAKA 2007

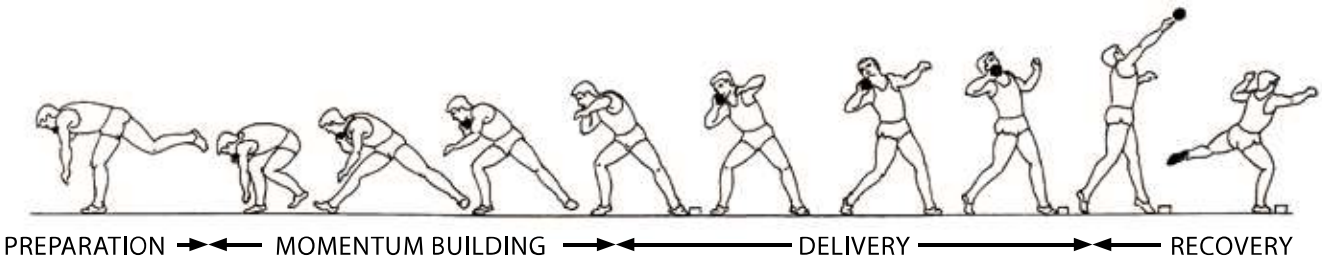


SHOT PUT *LINEAR TECHNIQUE* – Whole Sequence

Phase Description

The Linear Shot Put Technique is divided into the following phases: PREPARATION, MOMENTUM BUILDING, DELIVERY and RECOVERY.

- In the preparation phase the thrower is positioned for the start of the glide, the momentum building phase.
- In the momentum building phase the thrower and the shot are accelerated as the thrower prepares for the delivery phase.
- In the delivery phase additional velocity is produced and transferred to the shot before it is released.
- In the recovery phase the thrower braces and avoids fouling.



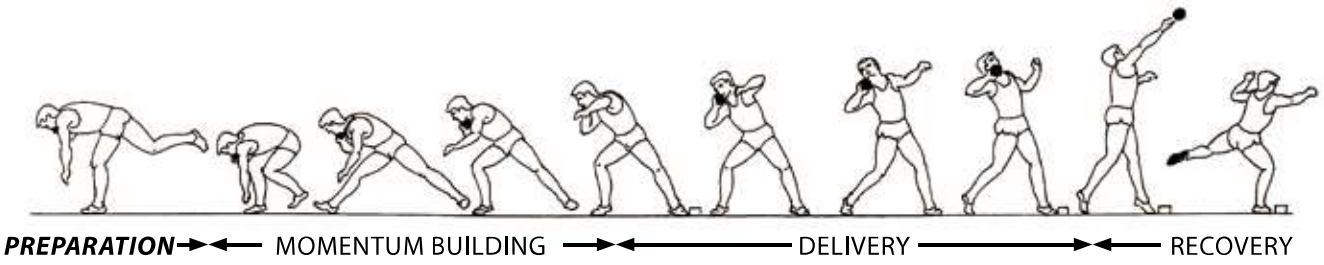
GRIP

Objective

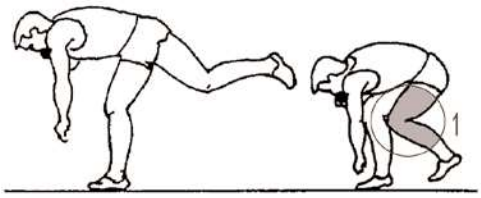
To hold the shot firmly.

Technical characteristics

- Shot rests on the fingers and the base of the fingers.
- Fingers are parallel and slightly spread.
- Shot is placed at the front part of the neck, the thumb on the collarbone.
- Elbow is out at a 45° angle to the body.



PREPARATION PHASE



COACHES SHOULD:

- Create and maintain a SAFE environment.
- Allow enough time for athlete to become familiar with the grip.
- Observe the body and limb positions and stability through the phase.

Objective

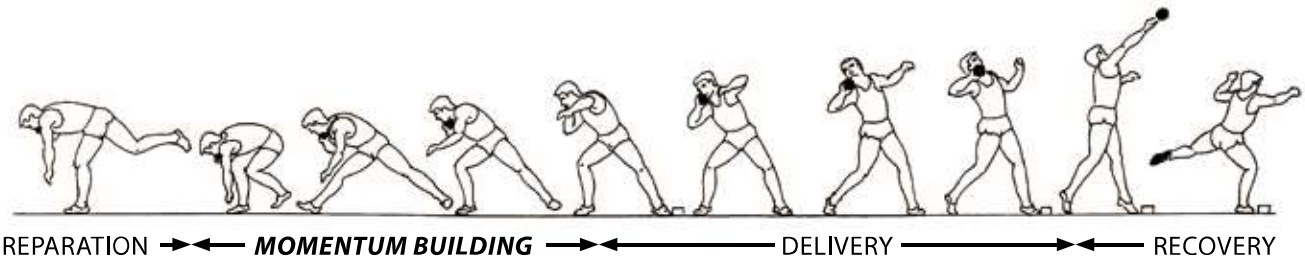
To prepare for the glide.

Technical characteristics

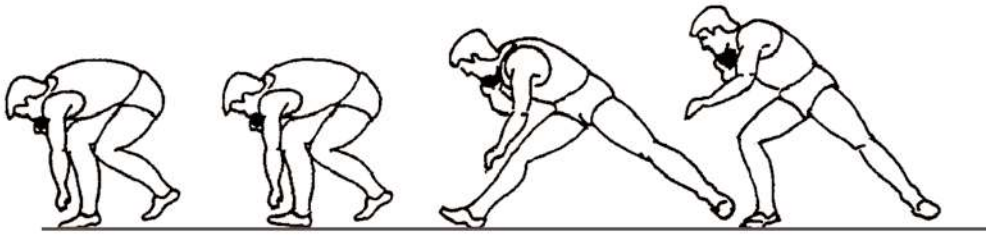
- Thrower starts upright at the rear of the circle with back to the stopboard.
- Trunk is bent forward parallel to the ground.
- Body is balanced in the single support.
- Support leg is bent while the free leg is drawn towards the back of the circle. (1)

HELP ATHLETES TO:

- Look to ensure the throwing area is clear before commencing the preparation phase.
- Remember for the grip and placement, "Clean palm, dirty neck"
- Develop the balance needed for the phase.



MOMENTUM BUILDING OR GLIDE PHASE



Objective

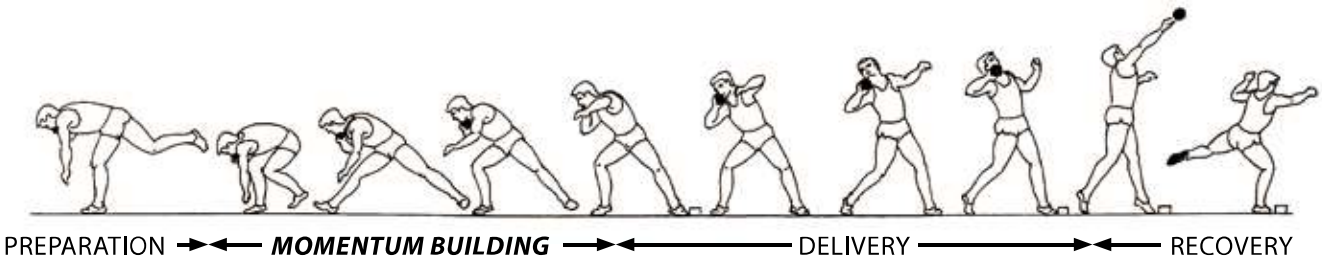
To initiate acceleration and position the body for the final putting action.

Technical characteristics

- Body moves from the forefoot on to the right heel, unseating the hips.
- Free leg is driven low towards the stopboard.
- Support leg extends over its heel.
- Support leg maintains ground contact through most of the glide.
- Shoulders are kept square to the rear of the circle.

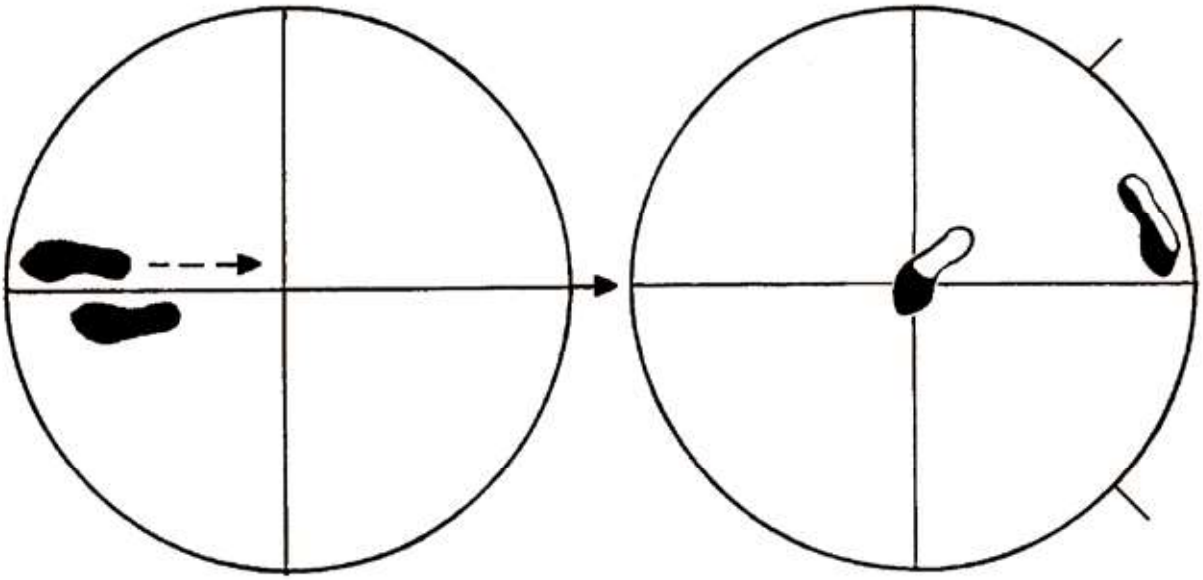
COACHES SHOULD:

- Observe the limb positions and the extension of the left then right legs.
- Ensure that acceleration is maintained through the phase.
- Ensure a glide rather than a hop.



GLIDE PHASE

Foot Placement



Power Position

Objective

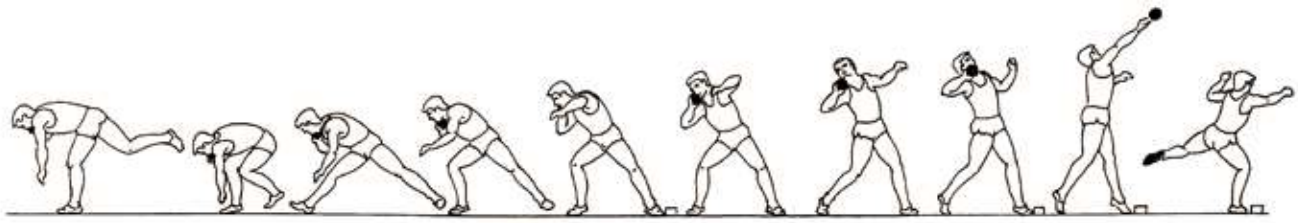
To initiate acceleration and position the body for the final putting action.

Technical characteristics

- Right foot glides off its heel and lands on the ball of the foot.
- Right foot is placed in the centre of the circle.
- Feet land almost simultaneously, right foot first.
- Left foot lands on the ball and inside of the foot.
- The delivery phase begins when both feet land on the ground after the glide.

HELP ATHLETES TO:

- 'Fall back' while driving off the right heel.
- Pull the right foot quickly under the body.
- Keep the shoulders facing the rear.

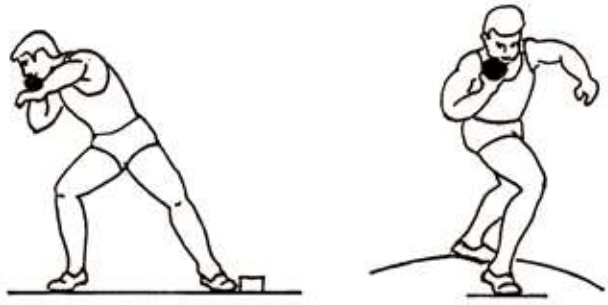


DELIVERY PHASE

Part 1: Power Position

HELP ATHLETES TO:

- Gain a 'chin-knee-toe' vertical alignment in the power position.
- Coordinate the correct timing of, 'big muscles before small'.
- Develop the strength for a braced left side.

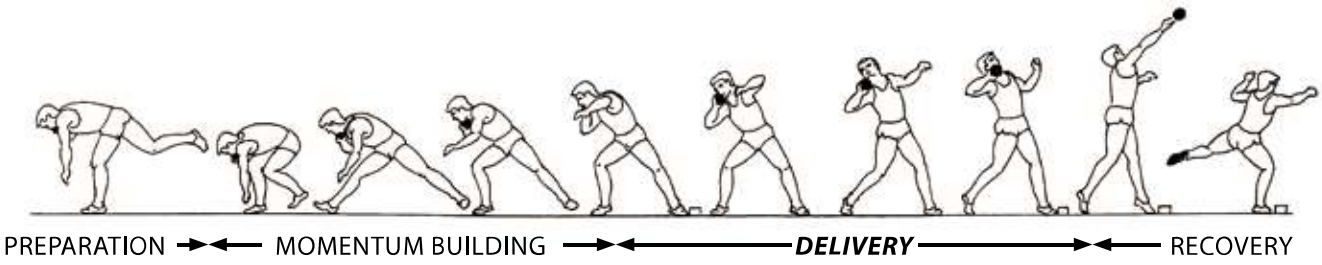


Objective

To maintain the speed of the shot and begin its main acceleration.

Technical characteristics

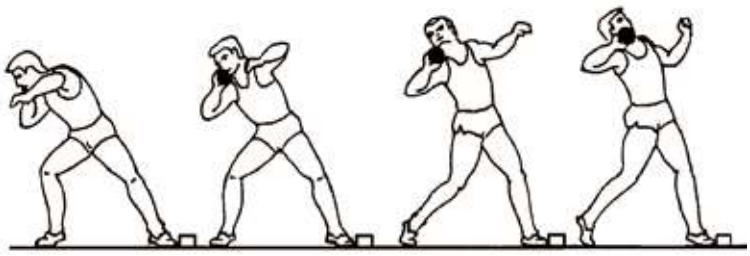
- Body weight is carried on the ball of the right foot, right knee is bent.
- Heel of the right foot and the toe of the left foot are placed in line ('Heel-Toe Position').
- Hips and shoulders are twisted.
- Head and left arm locked back.
- Right elbow is at approx. 90° angle to the trunk.



DELIVERY PHASE

Part 2: Main Acceleration



COACHES SHOULD:

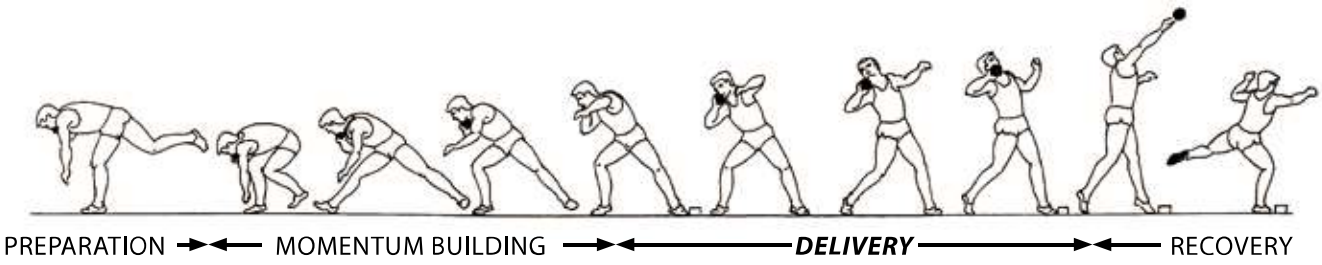
- Observe from side and rear.
- Ensure that the right elbow is kept high.
- Observe the feet, limb and trunk positions through the phase.
- Observe angle of release.

Objective

To transfer velocity from the thrower to the shot.

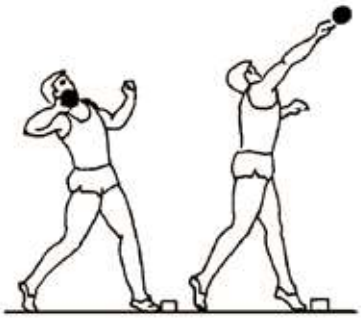
Technical characteristics

- Right leg is extended in an explosive twisting movement until the right hip faces the front of circle.
- Left leg is almost extended and braced, lifting the body (and influencing the angle of release).
- Trunk's twisting movement is blocked by the left arm and shoulder.
- Right elbow is turned and raised in the direction of the throw.
- Body weight is transferred from the right leg to the left.



DELIVERY PHASE

Part 3: Final Arm Movement

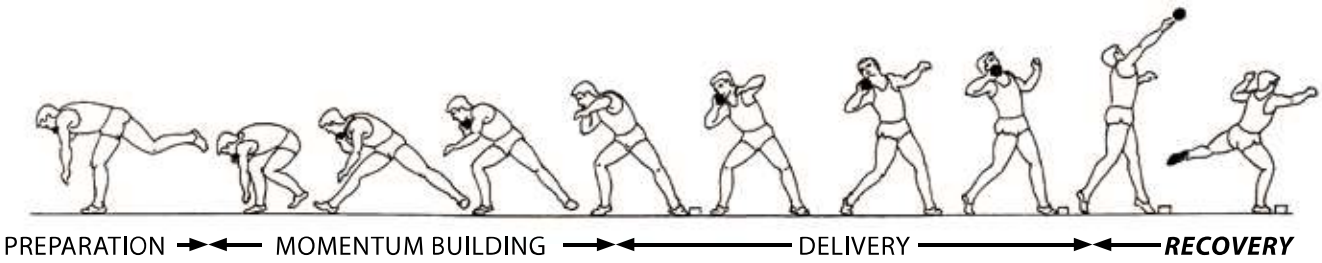


Objective

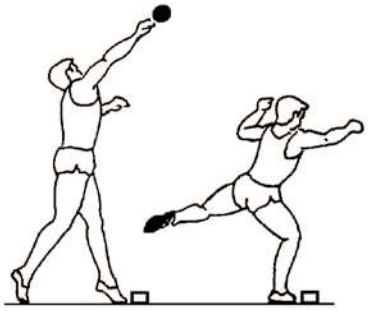
To transfer velocity from the thrower to the shot.

Technical characteristics

- Strike of the putting arm begins after full extension of the legs and trunk.
- Left arm is bent and fixed close to the trunk.
- Acceleration is continued by the pre-stretched wrist (thumbs down, fingers turning out after the release).
- Feet are in contact with the ground for the release.
- Head is behind the left (bracing) foot until the release.



RECOVERY PHASE



COACHES SHOULD:

- Observe from the side and rear.
- Develop practices to time the reverse action.
- Ensure that the athlete has the correct footwear for safety.

Objective

To stabilise the thrower and avoid fouling.

HELP ATHLETES TO:

- Throw, then recover.
- Recover in an active, relaxed way and stay in the circle.
- Leave the rear of the circle under control.

Technical characteristics

- Legs change quickly after the release.
- The right leg is bent.
- Upper body is lowered.
- Left leg swings backwards.
- Eyes look down.

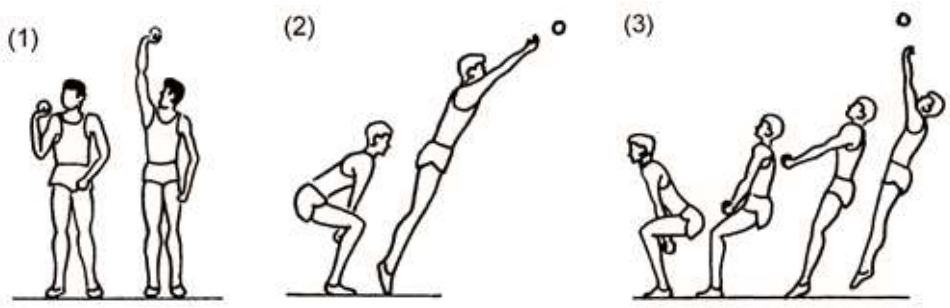
SHOT PUT *LINEAR TECHNIQUE* – Teaching Progression

STEP 1 INTRODUCTION

OBJECTIVES:

To get used to the implement and the basic putting movements.

- Introduce the shot, safety measures and grip.
- Slow extension or push upwards.
- Flicking shot with fingers. (1)
- Forward two-handed toss. (2)
- Backward overhead, two-handed toss. (3)



TIPS:

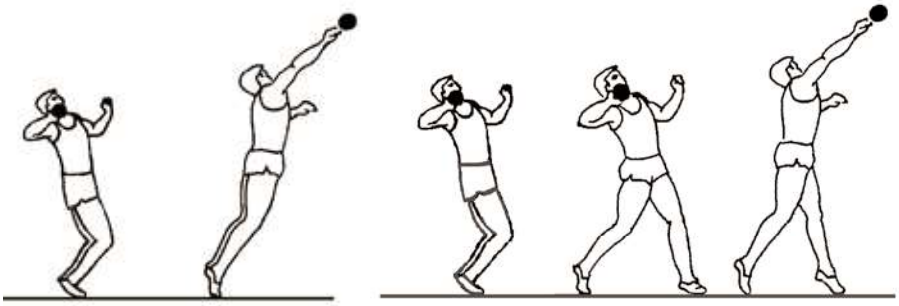
- 'Clean palm' in the grip.
- Legs before arms.
- Slow to fast.
- Finish 'tall'.

STEP 2 FRONT PUTS

OBJECTIVES:

To use legs for acceleration and learn the correct arm strike.

- Stand with feet shoulder-width apart.
- Wind up with bent knees, unwind and throw.
- As for previous drill, but step forwards on to the balls of feet.
- Maintain contact with the ground.



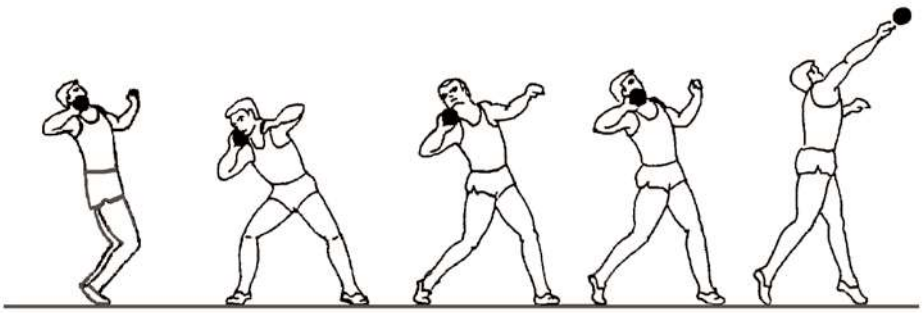
TIPS:

- Keep the right elbow high.
- Use an appropriate weight shot.

STEP 3 PUT FROM A STEP

OBJECTIVES:

To develop the activity of right leg and blocking of left side (leg and trunk).



TIPS:

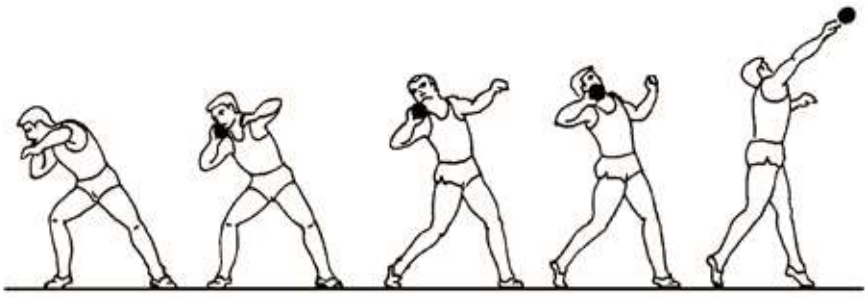
- Use the legs and twisting action to initiate the throw.
- 'Block' the left side and keep left shoulder high.

- Stand with feet shoulder-width apart.
- Step backwards, turning hip and shoulder against direction of throw.
- Continue with an immediate, forwards twisting extension of the legs and hips.

STEP 4 PUT FROM POWER POSITION

OBJECTIVES:

To develop the activity of right leg; turn of legs, hips, trunk and blocking.



TIPS:

- In the power position the alignment should be 'chin-knee-toe'.
- 'Punch a hole in the sky'
- Practice the recovery.

- Start with feet in the power position.
- Turn shoulders away from the direction of the throw, weight over the right foot
- Begin the put with the right leg and hip.
- Transfer weight from right to left.

STEP 5 GLIDE

OBJECTIVES:

To develop the glide action of the legs and link it with the delivery.

TIPS:

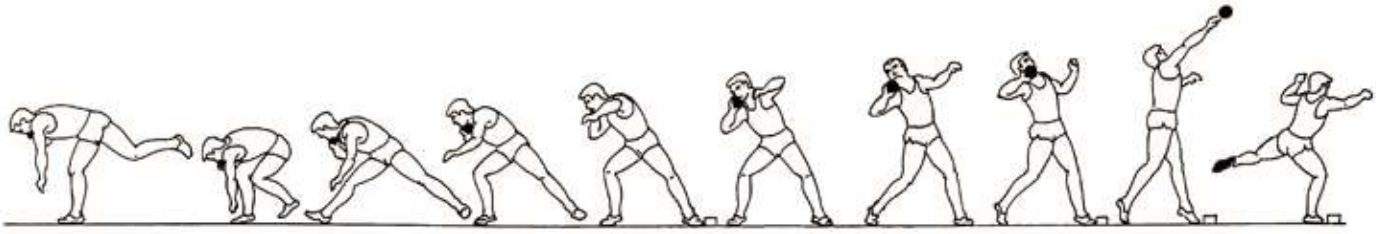
- Keep your shoulders to the rear in the glide.
- Don't hop, pull the right foot back under the body.
- Keep hips 'open' with correct right heel, left toe alignment.

- Glide with a partner holding the free arm. (1)
- Continue glide along a line, stop in power position (without/with release). (2)

(1)

(2)

STEP 6 WHOLE SEQUENCE



TIPS:

- Develop the speed and rhythm of the put.
- Be explosive through the delivery and release.
- Think of the whole sequence.

OBJECTIVES:

To link the phases into a complete movement.

- Perform without and with the shot, controlling and correcting the power position.
- Perform on different surfaces, with eyes closed, different implements (e.g. medicine balls) and different shot weights.