

This Translation comes from the chapter on Hammer Throwing by A. Bondarchuk from "Text Book of Track and Field Athletics", 1982
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HAMMER THROWING - A BONDARCHUK

Technique of Hammer Throwing

Hammer throwing is one of the most difficult events due to the structure of the movements involved. The technique of hammer throwing contains various elements or phases; starting stance, holding the hammer, swings, turns and final release.

Starting Position

The thrower stands with his feet against the rim of the back of the circle, his back to the direction of the throw. The feet are 50-80cm apart, and the legs are slightly bent. The ball of the hammer is placed on the ground to the right and behind the right foot. The weight of the body is on the right leg, with the body bent forward and to the right, with the arms straight.

Holding the Hammer



Dia. 42 Gripping the Hammer

The handle of the hammer is placed on the last joints of the fingers of the

left hand. The right hand is placed over the left, the little finger of the right hand does not need to be in the handle, depending on the size of the handle (Dia. 42) and the left thumb is placed over the right.

Starting Swings

The swings start from the stationary position at the back of the circle and the speed of the hammer continually increases.

The body moves in a compensatory way, to keep the body and hammer in equilibrium, the body and the hammer work together (P.L. Lemar, 1956). The relationship developed here between the thrower and the hammer, establishes the pattern for the whole throw.

The swings start when you lift the hammer forward and up to the left, to create the path of the hammer. The weight of the body is moved from right to left as the shoulder's axis aligns with the pelvic axis. As the hammer moves to the left, the arms bend and the hammer continues up and over the head (Dia. 43: 1-8). As the hammer passes through the high point the body weight transfers back onto the right leg, the left leg remains bent and the thrower's shoulders move back 70-90 degrees to the

pelvis axis. The movement back of the shoulders depends on the original movements in the swings and on the thrower's body type (flexibility, size, etc). As the arms come to the front of the thrower they straighten; bent arms here cause too much unnecessary tension in the muscles, reduces the radius of the movement and increases instability (E. M. Shukevech and M. P. Krevonosov, 1971). This will influence also the rhythm of the thrower.

Another common fault is having the low point too far to the right. Once the throw is started it is hard to correct the throw. Trying to do this upsets the rhythm of the throw.

Turns (Dia. 43 : 12-13, 17-18, 21-23)

The hammer thrower must: (a) create optimal conditions for the minimal loss of hammer speed; and (b) aid in the maximum rotation for the final delivery.

At this phase the speed of the body must be higher than the speed of the hammer. This is achieved by active movements of the lower parts of the thrower's body, particularly the right leg and a slight lowering of the body just before the right leg completes the single support phase.

The rotational acceleration of the lower parts of the body occurs due to the alignment of the pelvis/shoulder axis. Actively working the muscles of the legs has no influence on the hammer In SSP.

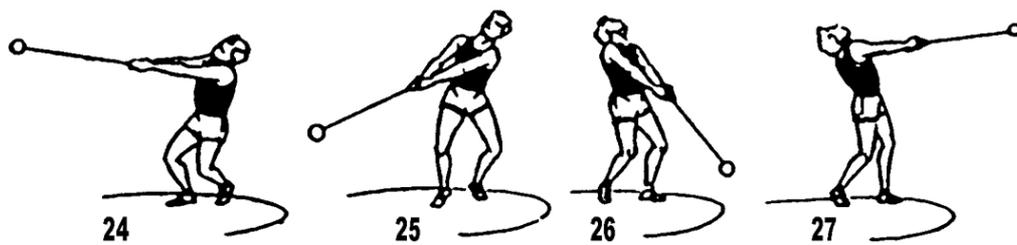
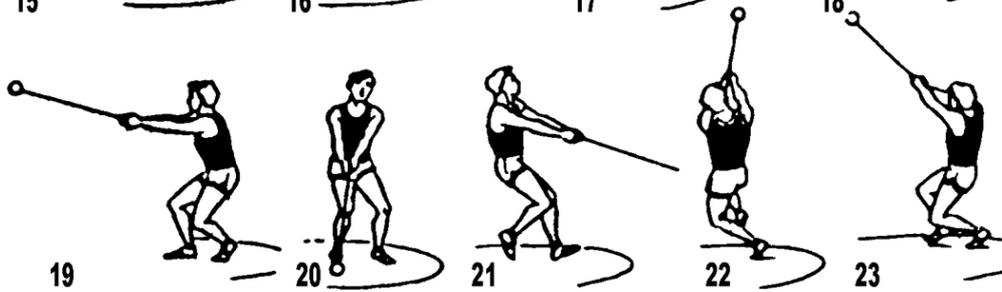
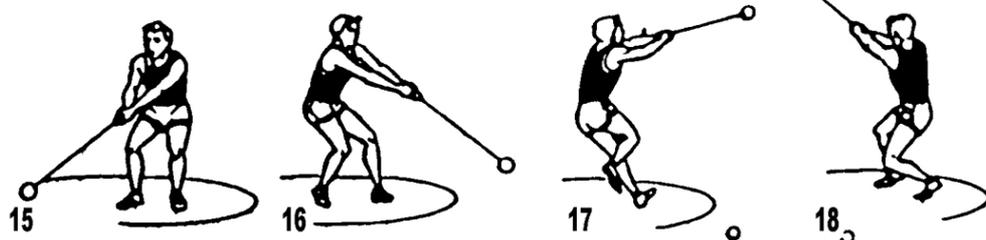
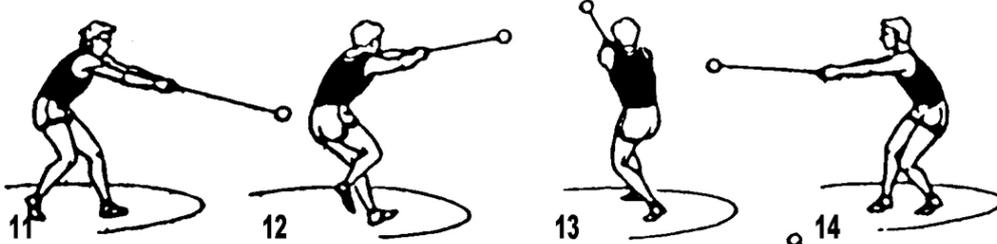
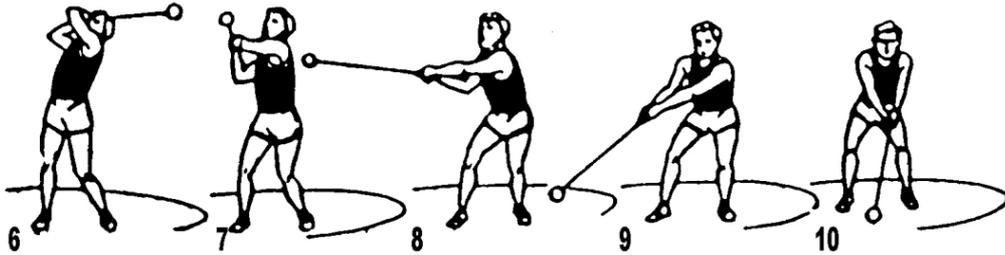
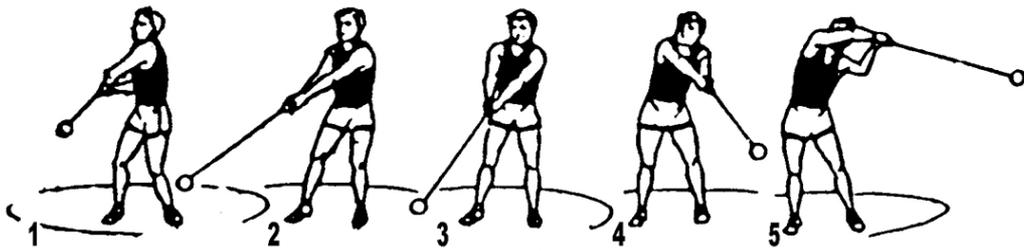
The one leg phase (single support phase) occurs from when the right foot comes off the ground and finishes when it is put back on the ground.

The thrower turns 60-90 degrees on the heel of the left foot and the ball of the right foot. From here the movement continues on the outside of the left foot and then finally to the inside of the ball of the left foot at the time of the start of the double support phase (DSP).

During each turn the thrower's weight moves away from the hammer to counter balance the system. The amount of movement is determined by the speed with which the system is moving, the centrifugal force and the body weight of the thrower.

The most significant part of the SSP is that the hammer travels along its path due to its inertia created in the DSP. The athlete influences the hammer speed until the hip/shoulder axis are aligned together facing the low point.

In the SSP the left leg may bend slightly but should not be emphasised as it can effect the hammer negatively (E. M. Shykevech, 1964) as the muscle tension is being released from the leg. After the high point an active turning and bending of the left leg, lowering of the body will influence the speed of the hammer. The speed of rotation increases even before the right foot is put on the ground.



Depending on the physical makeup of the athlete the amount of lowering varies, with a minimal body speed loss.

This is not a deliberate movement and too much bending will lessen the radius of the hammer (B. H. Tutevech, 1969).

Right leg movement - E. H. Shukevichem (1964) believed that active rotation of the right leg during the SSP negatively influenced the hammer, and caused the bending of the right arm, and nonalignment of the hip/shoulder axis. Bondarchuk on the other hand believes that the right leg is the most active part of the body both in DSP and SSP, due to its activity during DSP. The more active the right leg the greater the speed of turning. He explained the bending of the right arm as being caused by the bottom half of the body turning ahead of the hammer without keeping the hip and shoulder axis aligned, and pulling the hammer as in discus throwing.

The body weight moves from the right leg back onto the left leg as the hammer comes back to the low point. The right leg needs to be placed on the ground not heavily as this will cause an unbalanced position for the thrower, with too much weight on the right leg.

Dia. 43 : 8-11, 14-16, 19-20

The Double Support Phase (DSP) starts when the right leg is put on the ground and finishes when it is taken off the ground. It is during this phase that the thrower accelerates the

hammer, and achieves optimal conditions for the SSP.

Hammer speed is increased with the coincidence of the shoulder and hips axes and the low point. But for effectively making of SSP the thrower/hammer system must work together for some small amount of time, low point to the end of DSP, so that the right leg can overtake the hammer in SSP. During each turn the duration of the DSP and SSP decrease. It is the increase in the DSP time which has caused the increase in the standard of throwing in USSR since the 1960's. The DSP is of particular importance into the first turn and is the hardest part of the throw to achieve, the right leg needs to push harder each turn, but not so much as to affect the rhythm.

Entry into the first turn should be controlled and not carried out at high speed as this may negatively influence the hammer. During the turning of the body to 90 degrees, the muscles of the right side of the body, in particular the right leg, are "switched" on. The body weight moves from the right to the left leg, and an axis of rotation is set up about the left leg, with the hips/shoulder's axes, arms and hammer forming an Isosceles triangle.

Due to the inertia of the hammer/thrower system the hammer thrower turns to 270 degrees. The entry into the first turn is the most difficult element involved in hammer throwing. The entrance into the subsequent turns begins a little earlier than in the first turn and

finishes with the active taking off of the right leg. The low point of each rotation moves left. The first rotation low point is situated opposite the right toe and moves 30-40cm to the left in the second turn and off the left toe in the third.

As the thrower enters each turn the right leg is taken off the ground earlier and earlier, 90 degrees in the first, 80 degrees in the second and 75 degrees in the third (P. L. Lemar, 1965).

A common mistake into the first turn is dragging the hammer around with the left shoulder leftward. Correct this by actively using the hands to the front of the thrower, and making sure the hip/shoulder axis remains aligned until 90 degrees rotation to the left. The taking off of the right leg is determined by the initial stance, shape of the thrower, and the speed of the entry of the swings.

Another major mistake is the straightening of the left leg and shifting of the bodyweight backwards which is the compensatory movement to keep the hammer thrower in balance. The thrower is in equilibrium but the movement is incorrect, caused by dragging into the entry, as described before, and also a premature taking off of the right leg from the ground, or too much uncontrollable speed in the swings.

Straightening of the left leg can also be caused by starting the turning of the legs too early, particularly the left leg, and trying to pull the hammer with the shoulders. Starting the turn

before the hips/shoulder axes coincide, will lead to a less active influence on the hammer, and a significant loss of speed of the system. The angular speed of rotation of the lower parts of the thrower (legs, pelvis) is higher than that of the hammer during SSP as a result of having to overtake the hammer. Also lifting off the right leg too early causes too heavy and too late a landing on the right leg at the end of the SSP. Mistakes that occur in the entry will cause greater problems later in the throw.

Final Release

The final release starts after the SSP at the end of the third or fourth turn (Dia. 43 : 24-27).

The final release is not really different from the previous turns. The only difference is that during the turns the thrower turns leftward on optimally bent legs and during the process of carrying out the final release he gradually straightens his legs. At the time of release of the hammer from the hands, the weight of the body of the hammer thrower is divided between both legs. The weight gradually moves from the right onto both legs. The delivery flows from the previous movements and is not a jerky movement (B. H. Tutevich, 1969) and occurs along the maximum radius of rotation of the hammer.

The thrower after release is left in a balanced position on both feet. The final release velocity is from only rotating movements of the thrower, and loss of speed is due to the

straightening of the body and bending backwards of the body, and stepping backwards. Effectiveness of the thrower can be judged by the balance of the thrower after the hammer is gone.

Improvement of the technique of the hammer throw

Improvement in technique in hammer throwing occurs basically by the same methods as used in education:

- (a) Books, Films, Photos
- (b) Training with qualified sports persons and talking with experts
- (c) Rotations and throwing with many objects eg. Sticks, different hammers, from 1, 2, 3 and 4 turns.

Methodical Instructions

Swings: Attention must be paid to the compensatory movements of the body, which always shifts to the opposite side to the hammer. The thrower needs to carry out swings at various speeds, preventing the low point from moving to the left.

Turns: The entry is the hardest part of the throw to master. The thrower must actively accelerate the hammer with the hands, arms, shoulders and whole body until the moment when the shoulder and pelvis axis coincide. Each turn must be faster than the preceding one. In the SSP the thrower must make little movement of the shoulders and hands but actively work with the right leg and hips. In the process of

improving his technique in general he must pay attention to the rational rhythm of movements as all of these movements carry through the whole of the throw until the release.

Rhythm of Throwing

All of the movements that are carried out should be performed in a set order, or sequence. These movements can be carried out at constant or changing speed; this all has a bearing on the rhythm. Rhythm of movement is explained not by the sum of the total time during the throw, but by the dynamism of the throw.

Throwers can be divided into three groups depending on the rhythm of their throw:

1. Beginning swings slow, gradual acceleration through the turns and a large acceleration in the release.
2. Starting swings are quick, and only a small amount of acceleration through the turns and release.
3. Start with slow swings and accelerate moderately through the whole throw.

The rhythm for each thrower is individual, and it is unwise to tamper with this. The most important aspect of the throwing technique is to have this rhythm. Once the rhythm has been developed, the body of the thrower remembers this very well.

Connection of Technical and Physical Training

All parts of the system of sporting improvement are interdependent, and influence each other. The athlete needs to develop all aspects of the throw to improve, i.e. technique/strength/physical capacity. The programme of the athlete needs to have all aspects included at all times to develop maximally. Training should not be kept at a low level, because some maximal work is required to improve. There is no evidence that the large improvement of one aspect of training will directly improve the actual performance with the hammer. It is difficult to find the exercises which are solely responsible for the development of speed, strength or overall performance.

Strength and its Development

Strength is a particular physical quality of a person. Its main effect will be seen in the capability of the individual to perform a resistance or to counter the resistance due to the force of his muscle. The hammer thrower can develop muscle strength from throwing the hammer, as well as weight training.

There is a difference between Static and Dynamic strength:

Dynamic Strength - where the length of the muscle decreases or increases

Static Strength - where the length of the muscle remains constant

Hammer throwers require both dynamic and static strength, hence the thrower needs to develop both of these. These can be developed with the hammer and weight lifting bar.

Training of the Hammer Thrower

Each training session should be made up of weak, moderate and maximum throws. Weak 50-80%, moderate 80-90% and maximum 90%+, the total number of throws are from 25-30. As the standard of the maximum throws increase, so should that of weak and moderate throws.

The intensity of the throwing session is determined by the combination of weak, moderate and maximal throws. A training session is carried out with firstly weak, then maximum and lastly moderate intensity throws. See table of Intensity below:

Table of Intensity

Maximum	Moderate	Weak
40	32-36	20-32
45	36-40.5	22.5-36
50	40-45	25-40
55	44-49.5	27.5-44
60	48-54	30-48
65	52-58.5	32.5-52
70	56-63	35-56
75	60-67.5	37.5-60
80	64-72	40-64

The use of Hammers of various weight

Training always has some 7.26kg hammer throws present. Each session generally has heavy., standard and light hammers present,

but proportions vary due to the time of the season.

Different weights are used on various days of training. Throwing at first heavy, then standard and then light hammers. The advantages of this as yet are not fully understood but the effectiveness of using such a system is evident from the results of many throwers.

The weight of heavier and lighter implements needs to be chosen for the individual. Small variations suit some throwers whereas others may have a large variation. The optimal weights will also change each year as the thrower becomes technically better and physically stronger.

Weight training with the bar

Throwers always work with the bar to develop body strength. Intensity is important here, just as it is in throwing. Weights need to be medium to near maximal (90-100%) to have any effect per session.

Training in volume (1.5-3T) creates improvement in the neuromuscular apparatus of the body and, as a result, the performance in training will improve. A larger influence will occur when the training load is 5-7T, with maximum and moderate weights, with the best performances coming after 1 day of rest. 7-10T may cause tiring and throwing performance may actually fall, and require two days of rest.

In higher level throwers the monthly cycle goes up to 100T and more,

with most, weights not exceeding 80-90% of maximum.

Maintaining Sporting Form

After the thrower reaches their peak of preparation, they may maintain this form for approximately one month. After reaching their training peak, there are changes to the program to maximise the competition performance. Basic to this is the high level of throwing of the standard (7.26kg) hammer. The volume of throwing will actually decrease slightly, or better still remains constant. Intensity will increase only when maximum competition nears.

Each individual is also very individual in their needs, and the programme needs to be individually planned, but this can only be carried out with the experience of several seasons.

Planning Weekly Cycles

Weekly cycles should be used to develop the athlete; these are part of larger cycles which vary from 2-3 months. Training cycles of throwers of lower qualification is different from that of those of higher qualification.

Low level throwers have no distinct separation from one cycle to the next, but each contain throws, bar work, jumps, sprints, with 3-5 different exercises making up any one training session.

A weekly training cycle for beginners

Variant 1: 4 Training days

Monday: Warm Up 10-15 min
Imitation exercises with the hammer 15-20 min
Multiple turns 15-20 min
Hammer throws 15-20
Weights 2-3T
Tuesday: Warm Up 10-15 min
Imitation exercises with the hammer 15-20 min
Multiple turns 15-20 min
Hammer throws 15-20
Jumps 50 take offs
Wednesday Friday Sunday : Rest
Thursday: Same as Monday
Saturday: Same as Tuesday

Variant 2: 3 Training days

Monday: Warm Up 10-15 mins
Imitation exercises with the hammer 15-20 mins
Multiple turns 15-20 mins
Hammer throws 15-20
Kettlebell throw 15-20 overhead/forward shot throw 20-50
Jumps 50 take offs
Tuesday: Rest
Wednesday: Warm Up 10-15 mins
Imitation exercises with the hammer 15-20 mins
Throwing 15-20
Weights 2-3T
Thursday Saturday Sunday : Rest
Friday: Same as Monday

Training cycle for advanced throwers

4 Training days

Monday Thursday : Throwing hammer 25-30 throws with varying intensity
Tuesday: Weights 5-10T
Friday: Throwing heavy hammer and kettle bell 50-100 times
Jumps : 50 take offs
Wednesday Saturday Sunday : Rest

2 Training day cycle

Day 1: Hammer throws 25-30 varying Intensity
Day 2: Weights 5-10T
Day 3: Rest

3 Training day cycle

Day 1: Day 2: Day 3: Hammer throwing 25-30
Throws of varying Intensity
Weights 5-10T

4 Training day cycle

Day 1: Throwing hammer 25-30 throws varying Intensity
Day 2: Throwing heavy hammer or kettlebell 50-100
Jumps : 50 take offs
Day 3: Same as Day 1
Day 4: Weights 5-10T
Day 5: Rest

The following in the programme of **R. Klim** leading up to the 1968 Olympic Games.

Monday Wednesday Friday :
Hammer throws 25-30 at various intensity
Throwing the 16kg kettlebell
Tuesday Saturday: Weights 5-8T
Thursday Sunday: Rest