CONDITIONING THE THROWS ATHLETE

By Friedhelm Endemann

This article, while written post-Munich '72, offers great insight to the development of training theory and methodology for throwers and presents many concepts and ideas still applicable today.

Conditioning the throws athlete. We must divide this title into "Winter Conditioning" and "Summer Conditioning" We then must subdivide the term "conditioning" and look at what methods of training belong to this term conditioning.

a. General conditioning

b. Special conditioning

There are various methods and exercise belonging to these two areas. Look at the various aspects of winter and summer conditioning for throwers, to know how to build up a schedule for your particular throwers etc.

Winter conditioning. Begin with technique. Some coaches still believe that technique training during the preparation period is not necessary. This is wrong. To emphasize this statement, here is a more detailed table on technique training outlining the required number of throws with high intensity in one year for top level throwers:

- 2000 — 2500 hammer throws
- 3000 — 4000 shot puts
- 5000 — 6000 discus throws
- 8000 —10000 javelin throws

For 17 — 18 year olds I recommend half of the above mentioned number of throws, younger athletes should carry ¾ of that.

According to the frame schedule for top level throwers by Markov, about 35 - 40% of this number of throws should be carried out during the preparation periods I and II. Just as a matter of interest I would like to give you the standards of Russian discus throwers for Montreal 1976: 10,000 - 15,000 throws per year.

For discus and. shot, imitations and standing throws are very important during the winter, in javelin, standing throws and the 3-stride approach should be stressed

during this period. During the preparation period II the whole movement (glide, throw, run-up) becomes more and more important.
We can formulate a principle I for conditioning the throws athlete:

- In modern training, technique must be stressed all year round. The lighter the weight of the implement, the greater the number of throws.

WEIGHT TRAINING

The necessity for weight training is indisputable. Yet uncertainties and differences of opinion occur when one is confronted with the various methods of weight training. Some coaches have absolute confidence in power-training with comparatively light weight which must be performed rapidly. Others regard training for pure strength as the best method, which means heavy loads and only slow movements. In my opinion every group is right. It depends on the age of the thrower, which level he has attained, how long he has been training; not forgetting the different training periods and their different aims.

Let us now consider beginners - boys and girls up to 14 years of age. If they show talent for athletics they should do considerable general conditioning, especially mobility training, strengthening exercises (mainly jumps), and weight training with very light implements (mainly medicine balls).

Table 1:

Preparation			Competition		
General Conditioning	Special Conditioning	Technique training	General Conditioning	Special Conditioning	Technique training
70%	10%	20%	50%	20%	30%

Training should then increase - more in quantity than in quality and a formal weight training with the barbell could begin as soon as the thrower is 15 years of age, provided he has done some prior training. How should weight training be introduced? The following table shows how it should be done:

Table 2:

Age	% of Maximum
15	20 - 50%
16	30 - 60%
17	40 - 70%
18	50 - 80%
19	60 - 90%
20	70 - 100%

It is not absolutely advisable to do tests with maximum loads at the age of 15 -16 (except for bench press). It is important that boy and girls at this stage should be doing weights in the medium range.

From the above table we learn that at the beginning of weight training we must start with light weights, but fast repetitions.

For the older youths (from 17 onwards) there are two different forms of weight training which can be recommended:

1. Sets with the same load, with 60-75% of maximum, 6 - 10 repetitions, 2 - 4 sets in every exercise.

2. The pyramid system; as weight increases the number of reps decrease the highest number of reps is 8.

These are the two traditional ways of weight training for throwers. They can also be applied later in top level training. The younger athletes under 17 should only train according to the first form (except for bench press).

At the beginning, we train for power. Later train for power and strength. At this point I would like to clarify one question which always comes up if there is a discussion on weight training for throwers. This question is:

- Is it absolutely essential that you must increase pure strength in field events? Is it not sufficient to do lighter weights with high speed to gain power, since power is necessary for every field event?

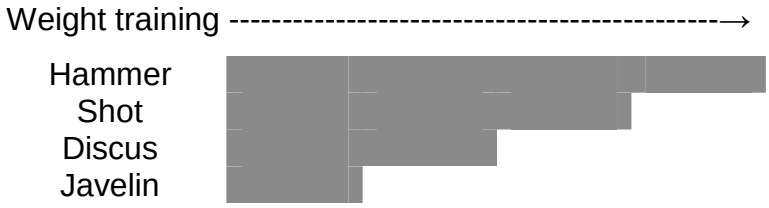
Training for power is sufficient for 15-16 year olds. But, as Heper, the West German shot put coach says, many top level athletes have been given a negative answer to this question. For instance: At the beginning of the competitive season training for power and strength (in pyramids) was replaced by mere training for power The loads became lighter, and the weights lifted only with high speed. The results in the event increased considerably. There was just one question, how this was possible? Training for power was the correct answer and the only way to better results in competitions.

Yet after 3 to 5 weeks performances decreased rapidly and became worse. What had happened? The level of strength in the different weight training exercises had decreased below the level at the end of the winter training and was now 5 to 12.5 kg lower. The answer to our question seems to be this:

Training for power alone is not advisable. Perhaps Javelin throwers are an exception. Up to now we know that weight training should include strength and power. To know this is not enough. If you coach a top level athlete, you should know to what extent strength and power are important for the different throwing events in order to build up training economically. The next table which

illustrates to which extent strength is important far the throwing events is presented:

Table 3:



It becomes obvious that weight training (training for strength in general weight training) must be handled differently in each event. It is impossible to give a single answer for all field events, hammer throwers and shot putters need more strength than discus and javelin throwers, and discus throwers more than javelin throwers. Thus javelin throwers might be an exception.

A coach may be guided by the general rule that the importance of strength decreases with the decreasing weight of the competitive implement.

To realize the next problem in top-level throwing, look once again at table 2. Beginning at age 19, athletes should work between the range of 70 and 100% of their maximum. Once the throwers have attained a high level of strength and power for the event, it becomes more and more difficult to increase this level. They will inevitably come to a point where they stagnate.

Then new methods and new forms of weight training have to be introduced to make sure that performances in the event can still increase.

One form of weight training which can be recommended is isokinetic training with the mini gym or cybex exercise. Another form, very similar to isokinetics, is the locally aimed, auxotonic training with the normal barbell.

The auxotonic method was tested with West German shot putters and sprinters. It is proved to be very useful. It is performed with 50% of maximum, with 3 to 5 sets and 10 reps in each set, and the barbell is moved 5 seconds up and 5 seconds down.

Last year both May Ritchie and Angelica Knoll trained in November and December using this method. Both had surprising performances after 3 weeks of training. In November May’s maximum in the bench press was 60kg. Angelica’s was 62.5kg. After 3 weeks of training with the auxotonic method, both athletes had gained a good standard which was equal to or even better than their former level, although there were still 3 to 4 months left for winter training.

With the auxotonic method the thrower fairly soon regains his old level of strength following the transition period. Thus he can start his isotonic weight training from January onwards from a higher level in as much as the isokinetic and/or auxotonic method should only be applied in November and December, which is in the first part of preparation period 1.

If this method turns out to be so good, why stop it at the end of December? The reason becomes obvious if you compare the movement involved in this method with the actual movements of the event.

Because every throwing movement is done dynamically and explosive this form of weight training would interfere with technique training, which becomes more and more important from January onwards.

Use the auxotonic method only for bench press, half squat, back fly (in discus) and pull-over (in javelin). The psychological stress using this method is very high and requires high motivation; thus it is really only suitable for senior athletes. But an advantage is that athletes won't get sore muscles.

I believe this method will become more and more important in weight training at the beginning of the preparation period 1.

Here is a form of weight training which came from Bulgaria. It seems to have contributed much to the successes of Bulgarian throwers in recent years, such as Ivanka Christova, the bronze medal winner in Munich with 19.35m in the women's shot put competition, Wassilka Stolva who won the bronze in the discus competition with 64.34m, and Lutvijan Mollova who won 4th in the women's javelin with 59.36.

This Bulgarian method is based on the fact that a thrower needs strength, power and to a certain extent — strength endurance. Consequently they invented a method which contains each of these characteristics. The basis of this Bulgarian method is that along with a high quantity of weight exercises, the throwers must also execute sets of special jump exercises. The theory of the Bulgarian method is better understood if one remembers that the functional influence of jump exercises is lower than the influence of exercises with the barbell.

However:

a. due to a higher intensity jump exercises have a positive influence on the speed in movements.

b. numerous impulses to the central nervous system occur that produce reflexes which in turn assist the transfer of pure strength to explosive power.

c. jumps form a sort of “bridge” between weight training with the barbell and exercises of an “explosive” nature.

d. the mixing of a high quantity of weight exercises with jump exercises produces more efficient functional progress in the nerve-muscle-action than jump exercises which are executed on another day.

The Bulgarian training consists of so-called “weight units.” One unit equals 2 reps with 95% of maximum, 4 reps with 90%, 6 with 85%, 8 with 80%, 10 with 75%, 12 reps with 70 or 60%. After every 5th set in the program the thrower 3 sets of jumps with varying quantity according to the training period. After 3 weeks of training the thrower has one week of active recovery with tests. The basic exercises are bench press, half or full squat, clean and snatch.

This method was used by Bulgarian throwers in 1971. From January to March they carried out the following number of “weight units” and jumps:

Table 4:

Month	Vol. of Units	Vol. of Jumps	Intensity
January	134	177	60%
February	180	935	70%
March	233	1665	80%

As a result the top level throwers had an average increase in squats of 32 kg (=34.66%), in snatch 70.75kg (34.75%).

This method seems to guarantee a gradual increase of power and strength. Compared to other methods — (for example our traditional methods) — it seems to be very efficient. I am sure this is a very useful form of weight training.

Apart from these 2 methods which demonstrate that new ways in top level training have to be found, there is another form of weight training for top level throwers. Both Tschiene and Ivanova discovered that variations in the winter program are necessary. The use of only one method of weight training causes disadvantageous physiological adaptation for the nerve-muscle-coordination, and monotony, which inevitably lead to slackness and staleness.

To work against low motivation and staleness, variation is necessary. Moreover, a “linear”, gradual increase in weights, as well as in training as a whole, is not as efficient for an athlete as a considerable increase after a certain period (Harre, p.87). This increase should be lighter than is within the possibilities of the athlete at that moment. It should work against the psycho-physical balance and thus compel the organism to come to new processes of regulation and adaptation.

According to these principles, monthly cycles with constant changes in the training loads are characteristic of modern weight training for top-level throwers during the winter.

The following table illustrates in which way these changes would be achieved in preparation period 1:

Table 5:

November	3 x 85%	Submaximum
December	5 x 60%	Extensive
January	3 x 85%	Submaximum
February	5 x 60%	Extensive

Principle II for top level training would be:

- In weight training for top level throwers a variation of load in intensity and quantity is necessary to achieve maximum results. New ways of weight training have to be found.

Yet new ways of general weight training are not the only key to an increase in performance. It is important to know that there are other trends in modern conditioning.

Assuming an athlete gained strength and power by non-specific weight training and bettered his performances in speed by pure sprint training, an increase in the event performance would not necessarily occur. The next problem is to coordinate the level of conditioning with the technique of the event. In other words, transfer the level of strength and power to technique in the competitive event. This is the basic problem in throwing.

Training for technique and general conditioning would not be sufficient to guarantee a complete transfer. What is needed is a special weight training which has the task of improving reaction and efficiency of the muscles in a certain direction.

To my mind there are a number of exercises for a special weight training which should not be used. What are they? Specific conditioning and special weight exercises are more important in top level training of throwers. Tremendous world records and ever-increasing performances in recent years are due to the fact that general conditioning decreased considerably. The following table illustrates the change in training during the last decade:

Table 6:

Event	Period	Specific Conditioning	Aimed Conditioning Exercises	General Conditioning
Javelin	Beginning of the 60's	5 – 10%	20 – 30%	60 – 70%
Hammer	Beginning of the 70's	50 – 60%	20 – 30%	10 – 20%

A further table shows you the sequence of special preparation in the training process.

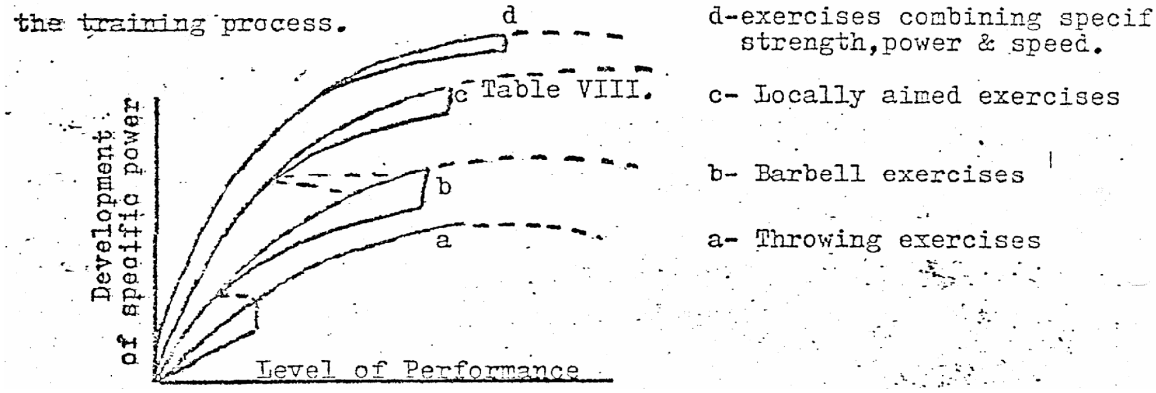


Table VIII.

The traditional methods of weight training with the barbell in top level training are only efficient and economical if they are supplemented or later partly replaced by locally aimed loads and specific exercises which are related to the different muscle actions of the event.

Training was one 3 times a week for 1.5 hours between the month of February and the 25th of May 1971. The results were as follows:

The bench press and squats the control group attained slightly better performances, yet in all exercises aiming at power and specific power the second group improved significantly. Moreover they improved their standing throws results by an average of 1.31m, whereas the control group only attained an average increase of 0.51m.

In summary, these results again illustrate the importance of special weight training exercises for throwers.

Some coaches still believe that weight training for throwers should stop as soon as the competitive season starts. This is absolutely wrong.

It is important to know that weight training should not decrease in the competitive periods by more than 20%. This was documented with discus throwers at the USSR Scientific Institute of Physical Education. It is assumed this result is not only valid for discus throwers but also for other throwers.

How is this 20% (or less) reduction accomplished? Reduce the sets of different weight exercises. If the thrower did 4 sets during the winter, he should now do only 2 to 3. Or, as Ivanov suggests, reduce the repetitions of a set by 2. Reserve one day each week for general weights (Monday would be the best day), and divide the other weight training sessions into smaller parts, which are then carried out after the technique sessions (for 20 - 30 minutes).

There is another difference in weight between winter and summer. During the winter the throwers do more or less heavy weights for arms and legs. During the

summer the weights for the legs should be kept at high quantity. However, the quantity (load) for the arms should decrease considerably. It has been discovered that “the movement speed of the arms and shoulders increased as the load in resistance exercises decreased”. During the tests with Romanian discus throwers it became clear that it is necessary to continue during the competitive season with strength training loads not below those of the preparation phase for the big muscles of the legs. At the same time the tests indicated that a certain decrease in the load is required for best results in the arm and shoulder muscles (Ivanov).

This leads to another aspect of conditioning for throwers, and that is the specific speed training in throws.

Specific speed training means throwing with lighter implements. This has become a very important form of training to improve performance in the event.

Although I cannot offer you too many really definite results of this method at the moment, some interesting aspects should be noted. One thing seems to be clear: the relationship between the lighter implements and the normal implement should be 3 to 1. This means, in training the athlete throws 3 times with the lighter implement as opposed to once with the normal implement of his event, etc. For top level shot putters, G.. (? – Ed.) (USSR) recommended the following number of throws with lighter shots:

- March, 100.
- April, 500.
- May, 700.
- June, 300.
- From July to October, 200 throws each month.
- Total throws with the lighter shots is 2,200.

For discus throwers, Ivanov and Buchanov recommend throws with lighters discoi only in May and June and. state that they used this method for several years. During this period their athletes bettered their persona best by 3 to 4m. The female throwers used 750 gram to 850 gram discoi, the men an 1800 gram implement.

Mattalitig, coach of Janis Lusis, recommends a minimum number of 400 throws with a light javelin and says that 30 - 40 days with this javelin are necessary. Tschiene points out that lighter implements thrown with maximum intensity and with the relationship of 3 to 1 between the lighter and the normal implement should not be introduced before May. The quantity should not be more than 3 times per week with 20 - 30 throws.

The main criterion of this method is the maximum intensity with which the lighter implements have to be thrown. The purpose is to overcome the “speed barrier”. The theory behind all this is very simple. If a thrower trains only with the normal implement the nerve-muscle-coordination adjusts to this implement. This leads to a speed barrier in the acceleration of the arm. The arm and in turn the implement

can only be accelerated to its optimum. To attain maximum acceleration with the normal implement the thrower needs lighter implements in training.

Now to the last aspect. This is the best way of preparation of throwers before championships. The preparation for national championships, important international meetings, etc., has its own rules. Yet again the way to do this efficiently is always a difficult problem. This year the problem seems to have been solved at least as far as throws are concerned.

In Russia tests were made with female shot putters who were divided into 3 groups. Each group trained according to different principles:

Table 7:

1st Variant:	
1st week:	Highest quantity 140% (of the training which had been done before)
2nd week:	Lower quantity (80%)
3rd week:	100% (high quantity)
4th week:	50% (lowest quantity)
2nd Variant:	
1st week:	80%
2nd week:	100%
3rd week:	80%
4th week:	50%
3rd Variant:	
1st week:	80%
2nd week:	140%
3rd week:	80%
4th week:	50%

During the first week all throwers did weight training with medium weights. Training for technique decreased. In the 2nd week training for technique and power dominated. In the 3rd week, technique as well as training for power were stressed. In the 4th week training for Dowel and strength was most prominent.

After these tests it became evident that the variants 1 and 3 are more efficient than the 2nd one, since with these methods you can increase the quantity up to 40%. Moreover, supercompensation as the basis of every increase in performance attains a higher standard in the variants 1 and 3.

Deductions:

The period of preparation for important competitions should not be less than 4 weeks. During this period, training with great quantity can be done, yet there should be sufficient time or recovery. For a preparation of this kind the following microcycles are characteristic:

- A developing microcycle with highest quantity.
- A microcycle for recovery (medium quantity).
- A intensive microcycle (high quantity).
- A pre-competition microcycle (low quantity).

The last session with high quantity should be done 6 to 8 days before the competition.