

Weightlifting in training for athletics – Part II

By Martin Zawieja-Koch

Top performance in most disciplines in athletics requires the athlete to optimise his/her strength capacity. The same, of course, is true in the sport of weightlifting. There, the relatively closed movements and controllable environment that characterise the sport facilitate the study of both biomechanics and training principles and thus the science of the sport is quite advanced. As one result, successful weightlifters recognise the importance of correct technique and focus on this aspect in their training. In this article, the author, an Olympic medallist in weightlifting who now coaches, seeks to make the connection between the contemporary forms of training in weightlifting and athletics, particularly in the area of general strength development. In part I of this article, published in NSA 1/2005 he identified the application of specific exercises and their variations as used by weightlifters to the general strength requirements of the event groups, and even specific events, in athletics. In part II he discusses the application of key training principles and the planning of the training programme.

ABSTRACT

Martin Zawieja-Koch is a German National Coach in weightlifting responsible for the national women's team, the national junior team and the national coach education programme. He has collaborated with the coach education programme of the German athletics federation (DLV) in the area of strength training by giving numerous seminars for athletics coaches. A two-time Olympian in weightlifting, he won a bronze medal in the Super Heavyweight class at the 1988 Games in Seoul.

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Application of training principles

Training principles are generally called a guideline and are only meant as an orientation basis for training (SCHNABEL/MÜLLER 1988). In the following, I will highlight some of the more specific principles from the sport of weightlifting that should be considered in the application to athletics.

In weightlifting, special emphasis is put on the principle of cyclic arrangement of the training load (MARTIN et al. 1991). A decisive pre-requisite for the purposeful and progressive development of performance is the division of the year into stages or periods of training. A multiple periodisation arrangement over the course of the year has been shown to be successful in achieving a high rate of development (ZAWIEJA 1994). This principle is, of course, also well known in athletics.

Elite and serious weightlifters and athletes, both male and female, are normally prepared using a double periodisation (two cycles per calendar year) plan. The two main cycles, are known as macrocycles. A macrocycle is "... a period of time consisting of several mesocycles. This period begins and ends within a long-term training process and is continuously recurring..." (THIES/SCHNABEL 1985). Mesocycles are closed preparatory cycles for main competitions and are normally between three and six weeks in duration.

For younger athletes the cycles have to be accomplished in shorter time periods, so that:

- Main competitions can be identified and planned
- Competitions can be classified and hence carried out well-prepared
- Stimuli can be altered at shorter intervals
- Athletes can set new personal best performances in a planned way
- Further training means can be arranged more effectively (GAMELIN, SPITZ, ZAWIEJA 1999)

A second fundamental principle is that of continuous load demand (HARRE 1979).

For weightlifters in the youth age group who have completed a planned main competition, the transitions between the completed macrocycle and the beginning of basic training part of the next macrocycle are used to blunt or reduce the competition readiness or shape that the athlete has achieved in order to let the new training take effect. This means an athlete moves away from the competition phase by means of high volume and general conditioning training (ZAWIEJA 1994).

For junior age group and senior weightlifters, inserting a general basic training phase has also proven to be very effective prior to the start of barbell training. In this case, a load block with weight-training machines (high repetitions for about 4 weeks) is carried out before barbell training.

Other principles derived from training the-

ory that are important components of the training methods in weightlifting and of value for the effective organisation of a long-term performance build-up in athletics are:

1) *Continuous application of training exercises*

Explanation: The selected training exercises should be applied continuously throughout a macrocycle.

2) *Progressive loading (HARRE 1982)*

Explanation: In a long-term performance build-up the continuous increase of the load components "volume" and "intensity" forms the foundation of progressive development. Within the scope of performance development, a continuous increase of training units must also be organised.

3) *Rhythmic load distribution*

Explanation: The distribution of the load placed on the individual needs to contain periods of higher stress and periods of relief or lower stress. Confirmed findings from the training of elite weightlifters show that a rhythm of 2:1 has gained acceptance. This means that after two weeks of high load there has to be a week of relief. The arrangement of training activities in the week of relief can vary. In the beginning of the macrocycle only the volume is reduced while the intensity continues to rise. Towards the end of a macrocycle, in the specific preparation for performance and competition, both components, volume (c.30%) and intensity (c.10%), are reduced in the week of relief.

4) *Change in stimulus within a macrocycle (dependency between the load components "volume" and "intensity")*

Explanation: The change in stimulus between volume and intensity plays an important role in the formation of sport performance in strength training. The dependency of these two load components to each other is illustrated in the following diagram. After the seventh training week, a further increase in the component volume would inevitably mean an overload and hence overtraining.

Construction of a macrocycle

The construction of a macrocycle can be called fundamental, as it is a first step in setting up a training plan. Having analysed the training data at hand together with the athlete, the design of the macrocycle in terms of contents becomes one of the coach's most important tasks.

The structure of a macrocycle is of decisive importance if one is very demanding in terms of the quality of a focussed performance development. The macrocycle structure comprises all features of load arrangement and load components, plans for all training weeks and plans for the application of training exercises.

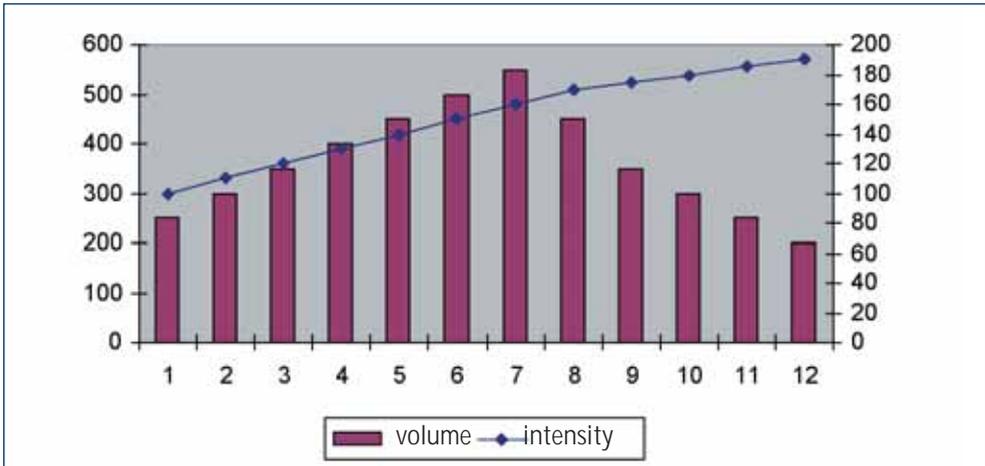


Figure 1: Pattern of change in load within a macrocycle (ZAWIEJA 2002)

Table 1: A model macrocycle

Athlete:											
Elite pool:											
tr.-we.	date	cal.-wee.	loa	LG/WK	volume total	snatch	clean	pull broad	pull narrow	squat back	squat front
1.	19.11-25.11	47.	m	recovery							
A 2.	26.11-02.12	48.	h								
B 3.	03.12-09.12	49.	l								
P 4.	10.12-17.12	50.	h								
5.	18.12-24.12	51.	H								
12.	04.02-10.02	06.	H								
L 13.	11.02-17.02	07.	L								
A 14.	18.02-24.02	07.	H								
P 15.	25.02-03.03	07.	H								
16.	04.03-10.04	07.	L								
17.	11.04-17.04	07.	H								
18.	18.04-24.04	08.	I	JEC							

Load blocks can be classified as high (h), medium (m) and low (l). In a macrocycle plan, the training methodology course for the equivalent training section is clearly marked. All applied training exercises should be listed and described in terms of intensity and volume. Of course, due to unforeseeable reasons (injuries), it is possible to deviate from this course. However, this requires a modification of the plan. As an effective and simplified version this macrocycle can, for example, be set up on club level within the scope of a group training plan. The pre-requisite for this is that the whole group is preparing for the same competitions.

The elaboration of a macrocycle is carried out in the following sequence:

- Fixing of all main and minor competitions including target performance
- Identification of all training exercises to be used
- Distribution of load blocks (high, medium, low)
- Consideration of training camps
- Calculation of target values (personal bests per week) in the various training exercises
- Planning of intensities, starting from the target value backwards to the beginning of the macrocycle, for a steady and systematic performance development
- Fixing of the total volume per training week
- Determining the equivalent volumes of the training exercises per training week

Future developments in training practice

From a certain level of performance, the preparation of weightlifters is focussed on improving technique in the competition exercises and improving the maximum strength in the decisive muscle groups. In athletics, the latter should be a vital component in the further development of strength training. Apart from the confirmed findings and principles of training for maximum strength already described, the following aspects and focuses

are currently being examined and dealt with in the scientific analysis and evaluation of strength training:

Loading and relief within the training process

The question of loading and relief has been dealt with as a central topic in the research of weightlifting in recent years. In training management, this factor is given growing importance. The more individually planned the training planning the more realistic it is for achieving set goals (STARISCHKA 1988). But this is not supposed to mean that already developed training standards, based on longstanding experience from serious sport, are not applied. In other words, it is of decisive importance that the athlete attempts new load demands in the next training unit in a state of good psychic and physical regeneration. These load demands have to be arranged very individually and require a close co-ordination between the coach and athlete.

This has the following consequences on the rhythmic distribution of intensity:

- The athlete has to be prepared for a high load demand. Referring to the design of a microcycle (weekly plan): in the case of a high load in the pull-to-chest exercise on Monday, i.e. a high speed strength effect on the buttocks and leg extension muscles, as well as highly stressed back muscles, reduced pulling training has to be carried out in the next training unit, where the load focuses could be set on the development of leg strength (squats).
- In each training unit the focus should be on one or at the most two training exercises.
- If a training exercise is carried out only once per microcycle, it should be carried out with a continuous slight increase of intensities.
- Within the weekly plan and within each training unit the training exercises have to be well-ascribed and well-classified and they have to be fixed according to a microcycle and mesocycle.

Load Tolerability

In the experience of weightlifters, the topic of load tolerability in maximum strength training shows a relatively wide range. We know from experience that in the anthropometric view, favourable conditions are usually found in those athletes who visually show a wide joint diameter and a small, stocky stature. Over the last 10 years, however, one can see an increase in the body height of athletes. These athletes are no less qualified for a sport, which sees maximum strength as main load factor. This means that even taller athletes with a visually slim muscle and joint structure and high muscle qualities show good aptitude for maximum strength training.

Recent findings show that with this group of athletes load tolerability has to be built up from an early age (13-14 years). The adaptation of this process has to be developed over a period of at least 3 years. This early adaptation partly contradicts the idea of a long-termed performance build-up and seems to indicate an early specialisation. It is, however, necessary not only so that the muscles can adapt, but so the still developing supporting and connective tissue can as well.

To meet medical objections, the use of maximum strength training at this age has to be seen in a differentiated way. This means that in the age group up to 16 years of age there is a performance-oriented training applied without final "intensity" loads, merely with high volume loads. The necessary load tolerability and increase in strength are achieved step by step by:

- Increased applications (more training units in strength training)
- High volumes (no less than 3 repetitions per set)

Intensity is only slightly adapted to the improved level.

Summary

In the two parts of this article, I have present an update of the current thinking on strength

training with the barbell in athletics. My aim was to give a very practical oriented reference. Apart from personal practical experience with serious athletes and observations in training, the ideas expressed are based on conversations with colleagues from athletics coaching and I purposely did not focus on scientific research or strive to present the latest research results.

As experts in the field of strength training, my colleagues and I still take the view that there is acceptance and willingness within the sport of athletics to use the barbell as a main training mean to increase strength. However, we find that in addition to application problems, basic principles are not always followed consistently and therefore the success of such training is not always fully guaranteed. Two striking aspects are:

1 Execution of training exercises (cf. Part I)

As I see it, the execution of training exercises is paid too little attention. The acceleration phase has to be emphasised, especially the second pulling phase in the pull- and snatch movement. Apart from a biomechanically correct path of the barbell, maximum acceleration (not below 180 cm/s in the snatch) plays the dominant role.

The shortcomings and mistakes described in Part I of this article, as well as the advice and corrections for the execution of the training exercises, have been tested over a long period and are applied continuously in weightlifting and other sports. In my work, we make use of biomechanical parameters and a special measuring system (which can be purchased as soft- and hardware through the German Weight Lifting Association) is used in technique training to analyse those movement errors that cannot be detected with the naked eye. Those unable to make use of such a system should at least include video analysis with slow motion in their programme as a method to improve movements.

In this context, it is important to mention that children (10-12 years of age) learn and understand of the movement these lifting

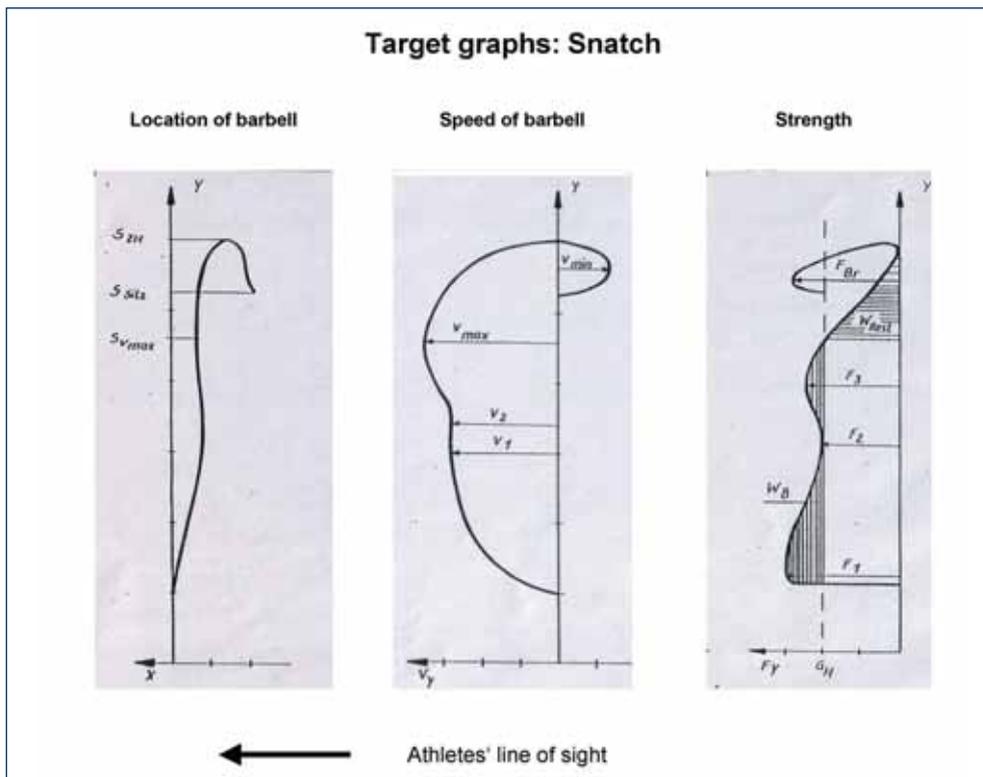


Fig. 2: Biomechanical target graphs (IAT Leipzig 1991)

techniques very quickly. Therefore, we say that the basics of strength training (learning the snatch and the clean) have to be integrated into the training process early. It goes without saying that this approach to barbell training has to be carried out with very low loads (wooden stick – 10kg bar bell). The load and assessment criteria here are technique (coach allocates assessment points from 1-10) and the volume (high repetition numbers 5-10).

2 Planning of training (cf. Part II)

In weightlifting, training planning (including periodisation) is described clearly and unambiguously. As the sport is largely a matter of predictable numbers and stereotypic movements, outside influences are minimal. The planning of maximum strength training has the improvement of the strength values in the training exercises (c.10 kg per exercise and cycle) as its obvious main target. Sport specific demands should not be allowed to

water down this target at any point in the athlete's preparation.

The progressive and continuous course of strength training has to be documented and analysed weekly. Without such an analysis proper organisation of the next week's training is hardly possible. One issue to be addressed is the discrepancy the plans for a mesocycle and a possible non-fulfilment of those plans in the elapsed training week. In these cases, the experience and the feel of the coach are in demand and the challenge is to apply the components of a mesocycle, planning and training condition in a performance supporting way.

After completion of the mesocycle and the fulfilment of the targets, strength training with the barbell should be continued. The training in the course of the season and the compensation of the strength abilities connected to it, play a dominant role in this context. We see that trust in successfully applied strength training is often lacking but we stress

that the positive effects should be considered even while sport specific demands are increasing. In my view, maximum strength training should be continued throughout competition programme in a reduced, suitable form.

Once again, the already described need for great care in planning is of importance. The pattern of load change finds the same application here as in the preparation phase. The question of de-training and tapering and the compensation of maximum strength and speed strength connected with it have specific implications in terms of time. However, the effects cannot be compared with the scientific findings from the field of research (SCHLUMBERGER/SCHMIDTBLEICHER, 1998). The selection of the training exercises is the reason for the low correlation. While science merely focuses on maximum strength tests in exercises such as

bench press and leg press (very simple movements), the experience of weightlifters is based on complex movements like the pull to chest, snatch or squats. In our experience, the desired effects of maximum strength training (improvement of strength abilities in the main muscle groups and improvement of speed strength) can be detected in their optimal development individually c. 7 to 14 days after the last maximal stimulus. Experience has also shown that the strength level can afterwards be compensated for c.10 to 14 days on a high level. After that a pause in training, as well as a new cycle have to be planned.

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