


Final Preparations for Peak Competitions: Observations from the 2009 IAAF World Championships in Athletics

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ABSTRACT

Classic training methodology tells us that there is little athletes can do in the four to ten days before a competition to improve their performance level. But what are the effects, positive or negative, of activities in the period after the last hard training session? From the practical point of view, what is the ideal structure for the final preparations, and even for the warm-up on the day of the competition itself? This article, adapted from a more extensive report of a project conducted under the auspices of the German Athletics Federation (Deutscher Leichtathletik-Verband – DLV) addresses these questions with an informal compilation of observations of world-class athletes going about their preparations for the 2009 IAAF World Championships in Athletics. After outlining the methodology used, the authors present observations of interest to athletes, coaches and team managers preparing for a peak competition. These are supplemented by brief case studies of well-known athletes in each of the main event groups.

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Introduction

In a peak competition, athletes are expected to be in their best possible form and to deliver a top performance, ideally in the shape of a personal best and/or the highest possible placing. The preparation for a season's peak competition is a year-round process and, in extreme cases, it can even involve several years of work.

Classic training methodology tells us that the time period between the last intensive training session and a peak performance should be seven to ten days while recent findings show that for women this time period might be four to seven days. After that, it would seem there is little the athlete can do to increase his/her performance level. At that point it is no longer a question of developing one's form or even fine-tuning, because trying to do so would lead to fatigue, which would then have a negative impact on the performance.

But exactly what are the effects, positive or negative, of the athlete's activities in the period after the last hard training session? This question has long been of interest to coaches of athletes of all levels. From the practical point of view, coaches and athletes are looking for an ideal structure for the activities of the final preparations, and even for the warm-up on the day of the competition itself, or at least a confirmation that the approach they use for peak competitions is a good one. Studying the behaviour of elite athletes during their final preparations and warm-up is interesting in itself as it enables a critical reflection for future preparation.

It is the nature of a peak competition that it represents the athlete's most challenging competition of the season. For elite athletes, this usually means a major event such as the Olympic Games, or a championships at the world or area level. Therefore, the peak competition must first of all be seen as a stress factor that can either enhance or reduce performance. In addition, the procedures necessary at major events are different and more complex than

at smaller competitions. Major events usually mean trips abroad and extended absences from home, long periods of simply waiting for the competition, different sleeping, eating, leisure and training possibilities, longer lead-up times and distances to be covered at the competition venue, tense Call Room stays and tightly controlled conditions in the stadium. Last but not least, the competition conditions (temperature, humidity, rain, wind), at major events are not uniform: they are sometimes good and sometimes bad. All these factors are additional stressors that can affect performance, and they tend to affect younger and less experienced athletes more than experienced athletes with a very high performance level. Experience, therefore, is a valuable component of dealing with the stress at a major event.

Our aim in this article is to share information that will supplement the experience of the coach-athlete team in the hope that it can assist with the realisation of improved performances. In the following, readers will find an informal compilation of observations of world-class athletes going about their final training and warming up for the 2009 IAAF World Championships in Athletics in Berlin. Of course, at such an event it is not possible to follow the activities of all athletes at all times and, therefore, we cannot claim to have produced a comprehensive study. What we tried to do was collect what relevant information we could on the activities in semi-public and public spaces - the official training, warm-up and competition areas for the championships - of athletes we could identify.

After outlining the methodology used, we present a set of general observations on topics that will be of interest to coaches and team managers. This is followed by sections containing specific observations on the training in the days leading up to the competition and the warm-up and final preparations before the start of the competition. These sections include a small number of brief case studies of well-known athletes in each of the main event groups.

This article is adapted from a more extensive report on a project conducted under the auspices of the host federation of the championships, the German Athletics Federation (Deutscher Leichtathletik-Verband – DLV), as a complement to the biomechanical studies conducted at the event.

Methodology

General

Our methodology is presented here to a) provide context for the observations given below and b) as the starting point for the planning of future surveys with aims similar to ours.

Techniques

The techniques we used for our observations included the following:

- Notes on form sheets and sketches
- Dictaphone
- Video recordings
- Unsystematic observation
- Conversations with athletes and coaches

Aspects observed

The aspects we observed, recorded and considered for our final report included the following:

- Training programme
 - In the days before the competition
 - After the early rounds of the competition (training between competitions)
 - Relay training
- Training contents
 - Which exercises? Intensity, volume?
 - Rest intervals
 - Instructions on how to carry out the exercises
 - New exercises
- Physical and physiotherapeutic measures before the warm-up
 - Cooling
 - Passive warm-up
 - Massage
 - Adjustment of joints
 - Taping and bandages

- Warm-up timeframe
 - How many minutes prior to the start does the athlete arrive at the warm-up area?
 - When does the athlete start his/her preparation?
 - When does the athlete start his/her special warm-up?
 - Schedule from the first call until the start of the competition
- Warm-up activities
 - General warm-up (jogging, stretching, running ABC, accelerations)
 - Special warm-up (starts, sprints, jumps, throws, strengthening, tempo runs)
 - Behaviour in the Call Room (stretching, running ABC, etc.)
- Immediate competition preparation in the stadium
 - General behaviour on the track or field (jogging, stretching, running ABC, accelerations, etc.)
 - Test starts (plus acceleration over the first or second hurdles)
 - Warm-up jumps, warm-up throws, imitations
 - Consultation with the coach, type of corrections
- During the competition
 - General behaviour (jogging, stretching, imitations, accelerations, sprints)
 - Communication with the coach
- Competition results
 - Individual results
 - Biomechanical evaluations
- After the competitions and between competitions
 - Duration of the warm-down jog, the complete warm-down, the follow-up treatment
 - Jogging, stretching
 - Passive measures, massage
 - Doing nothing

General Observations

Orientation

The majority of the athletes we observed visited the competition stadium and training facilities in Berlin during the days before the competition. As would be expected, the reasons for these visits were to train, get to know the procedures for the warm-up area and Call Room, do practice starts with the official starters or measure their approach runs. Some throwers performed preliminary swings or gliding movements to make themselves familiar with the throwing circles. Other athletes only watched the procedures on the warm-up field.

Self-assurance

In the days before or immediately prior to the competition, athletes often want to reassure themselves of their performance potential, either in training or the during the warm-up. In Berlin, this was especially the case with the throwers and some of the jumpers. However, in addition to the risk of not reaching the desired performance and being put off by this fact, we found that success in the competition was certainly not guaranteed by a good warm-up. For example, discus thrower Gerd Kanter, who went on to take the bronze medal, and some high jumpers did not replicate observed warm-up performances in the actual competition (Gregorz Sposob for example cleared 2.25m in the warm-up vs. 2.20m in the competition). Sometimes it is problematic when good warm-up performances are achieved by fouling. This was especially the case for the rotational shot putters. For example, we saw that defending champion Reese Hoffa, who took fourth in Berlin, and others achieve over 21.50m in their warm-ups, performances they could not repeat in the competition itself.

Technique corrections

Although they do not normally enter new technical ground, it is known that some coaches try to address old, firmly established faults during the final training sessions and even during competitions. However, this was not the case among the stronger athletes in Berlin.

Instead, in our observations, the coaches of these athletes normally did their best to support and reinforce their athletes' movements during technique sessions in the last days before the competition. Only sometimes was there an attempt to correct movements (see Chinese throwers below).

Preliminary stimulus

The setting of a preliminary stimulus means training done on the day before the competition to activate the functional systems, especially the central nervous system and the muscles (build-up of tension). In the power events, the traditional way to do this is by strength, jumping or throwing exercises; in the jumping events a short intense series of jumps and squats with medium weights, small bending angles and high speed is used. Although for organisational reasons not all athletes could be observed, it seems that the importance of this preparation technique has abated somewhat. Only a few athletes could be observed executing appropriate programmes. More frequently, so-called preliminary sessions could be observed that either included only jogging and gymnastic exercises or consisted of running and jumping-ABC exercises and several acceleration runs. Sometimes, even starts plus accelerations, run-up checks or jumps and throws could be observed during these preliminary sessions.

Warm-up for elite sprinters

Among our most interesting observations was that instead of the classic warm-up starting with easy jogging, many, but not all, of the sprinters from the great sprint nations of the Caribbean and North America had a different approach. Used in both their training and pre-competition warm-ups, it started with six to eight acceleration runs over 80 to 100m on the grass, interspersed with walking breaks. After this, they did gymnastic exercises and passive mobilisation activities as described below. Against the background of the many single starts of some sprinters (eight in the case of Usain Bolt (this behaviour should not be underestimated. In such a situation, relieved or assisted warm-up work is probably quite economical.

Passive mobilisation

Many of the athletes we observed spent a lot of their time working on flexibility and mobility, either immediately before they competed and or in the days before their competitions. We noted that some used the traditional means, i.e., gymnastic and stretching exercises, while others used rubber bands to assist their exercises. However, athletes from the great sprint nations and China tended to use exercises assisted by the coach or physiotherapist, sometimes on the massage table, sometimes in a standing or sitting position, often with stretching their legs up to or even beyond the split position (Chinese hurdlers and shot putters). Most of these athletes did flexibility exercises for their back, hips, knees, upper- and lower- ankle joints. When doing so, they demonstrated a great (passive) flexibility.

Behaviour during the competition

We observed that between their attempts, the throwers and high jumpers generally moved about only a little: getting up, walking around (especially the throwers), short jogging, light mobilisation exercises, imitations and only rarely running or jumping-ABC exercises. Only in the horizontal jumps and pole vaults, events with long, fast approach runs, did the athletes do warm-ups that also included acceleration runs after longer breaks (i.e. qualifications in all horizontal jumps, where there were a lot of participants).

Training between rounds

Some athletes trained between the qualification rounds and the finals. Most athletes that we observed performed warm-up exercises with subsequent tension exercises (short starts plus acceleration, jumps, strength).

Physical applications

Large vats of ice water were available in the warm-up and the training stadiums. These were used by some of the athletes after intensive training loads. Other athletes contented themselves with rubbing their legs with ice packs. During training, we did not see any cooling jackets being used and during competition such a jacket was only used by a German decathlete.

Warm-down

We noted that after both training and competition, many, but not all, of the top sprinters gave the warm-down much more emphasis than just the standard short jog. The elements and the order seen most regularly among North American and Caribbean athletes were as follows:

- Five minutes of warm-down walking with limbering movements.
- Immediately after this, the flexor-extensor chain as well as the hip flexors and extensors are lightly moved and stretched; slight loosening and massage by a physiotherapist.
- Ice baths.
- Jogging on the grass.

For the jumpers there was a variation in approach. At the end of their training sessions, some did warm-down jogging others did not. As with the sprinters, in some cases one could observe jumpers being treated with ice.

Weather conditions

When evaluating the warm-up behaviour and unexpected approaches, such as the replacement of the warm-up jog by acceleration runs, the weather conditions should not be disregarded. Due to the very high temperatures in the early days of the championships, the starting temperature of the athletes was already raised even before beginning their sports activity. Since many of the athletes from the Caribbean and Central America region have such a heat all year, they can do without the non-specific and, in some cases counterproductive, jogging warm-up.

Organisation

It was pleasant to watch the relaxed, helpful and friendly organisational staff, which included the marshals on the competition and training fields, the drivers and the helpers in the accreditation offices and the hotels. Of particular note was the behaviour of the judges, who in the technical competitions permitted as much warm-up jogging, throwing and jumping as was possible during the time period available (which often led to a 10-15 min break between the last warm-up attempt and the start of the competition or the presentation).

Training Observations

When we speak of training in this context, we mean the application of loads up to and including the day before the competition. With few exceptions most of the top athletes known to us were not seen in the training areas during the days before the competition; only some could be observed doing general warm-up sessions, probably to activate their functional systems.

Of course, training programmes must really be analysed individually but we can say that for those athletes we could observe training during this period, the sessions normally were, as described in the textbooks, of low volume but highly intensive and specific. This was the case for sprinters, jumpers and throwers.

For each group we saw highly intensive sessions introduced by a warm-up and characterised by a specific content (sprint drills and runs over very short distances, approach run-up checks, jumps, submaximal throws). Many jumpers carried out a technique-related training session. This normally consisted of a warm-up, strides, technique jumps of varying intensity followed by general exercises or weight training, and more or less warm-down jogging. Here, one could see a two-day cycle with some athletes (e.g. Maggi), but not with others. Interestingly, we did not observe any of the throwers carrying out intensive strength loads but there was a variation in the number of throws taken during this period and some athletes completed very intensive programmes.

Table 1: Selected case studies – Sprints and Hurdles

Alyson Felix (USA) - 200m	
Competition result: 1 st , 22.02 sec	
<u>August 8 (11 days before heats)</u>	
<i>Warm-up:</i>	5 min stretching, 8 x 80m (rest intervals: 80m walking, sometimes backward)
<i>Mobilisation:</i>	12:15 min dynamic mobilisation and stretching
<i>Sprint drills:</i>	30-40m - knee lift: left-left-right-right, long legs, hops with bringing the rear leg up to the front leg
<i>Loading:</i>	1x 80m, 1x 60m - stride pattern: from short to long, from powerful to relaxed (rest interval: 3 min), run-off: 1 x 50m
<i>Tempo runs:</i>	200m – 23.0 sec, 250m – 29.5 sec, 100m -11.4 sec, (rest intervals: 10 min)
<i>Warm-down:</i>	400m easy jogging, massage by physiotherapist
<u>August 15 (4 days before heats)</u>	
Start of training:	18:00h
<i>Warm-up:</i>	5 min stretching, 10 min warm-up jogging
<i>Mobilisation:</i>	15 min stretching: first statically for only a short time, then longer into the movement using a band
<i>Therapy:</i>	Ice bath, knee-joint check, 10 min massage
<u>August 16 (3 days before heats)</u>	
Start of training:	14:00h
<i>Warm-up:</i>	8 x 100m tempo runs (rest intervals: 2 min)
<i>Mobilisation:</i>	20 min stretching and trunk-strength exercises
<i>Loading:</i>	3 x 80m acceleration runs (rest intervals: 4 min)
<i>Warm-down:</i>	10 min massage

August 17 (2 days before heats)

Start of training:	13:30h
<i>Warm-up:</i>	8 x 80m (rest intervals: 80m)
<i>Mobilisation:</i>	20 min physiotherapy, mobilisation exercises, and stretching
<i>Loading:</i>	2 x 100m, 2 x 60m (rest intervals: 5 min)
<i>Tempo runs:</i>	2 x 150m tempo at about 85% (rest interval: 12 min)
<i>Warm-down:</i>	5 min jogging on the grass, ice bath, massage from physiotherapist

August 18 (day before heats)

Start of training:	15:15h
<i>Warm-up:</i>	800m jogging on the grass, 10 min static stretching, 20 min relaxation and listening to music
<i>Sprint drills:</i>	6 x 40m, easy
<i>Loading:</i>	2 x 30m (rest interval: 3 min)
<i>Warm-down:</i>	20 min relaxation, 10 min massage

Tyson Gay (USA) - 100m

Competition result: 2nd, 9.71 sec (NR)

August 14 (day before heats)

Start of training:	10:00h
<i>Warm-up:</i>	6 x 100m low intensity (walking the curves, running the straights)
<i>Exercises:</i>	Intense stretching of all major muscle groups assisted by physiotherapist
<i>Sprint drills:</i>	20m, knee lift, knee lift with gripping movement, skips with gripping movements
<i>Run-offs:</i>	80m, 60m, 50m, 40m
<i>Warm-down:</i>	600m jogging
<i>Physiotherapy:</i>	15 min massage, then mobilisation assisted by physiotherapist

Wei Ji (CHN), Dongpeng Shi (CHN), Jing Yin (CHN) – 110m hurdles

Competition results: Ji 8th, 13.51 sec (13.41 sec (SB) in semi-final)

Shi 3rd in semi-final, 13.42 (SB)

Yin dns

August 14 (4 days before heats)

<i>Warm-up:</i>	10-15 min jogging
<i>Exercises:</i>	30 min intense stretching exercises, sometimes assisted by coach (standing split, etc.)
<i>Running ABCs:</i>	In combination with many swinging exercises
<i>Run-offs:</i>	3 x 50-70m easy
<i>Hurdles work:</i>	With 4 hurdles: 4 x trailing leg exercise, 2 x 5-step rhythm, 5-8 starts and runs up to the fourth hurdle, in one case the eighth hurdle, rest intervals: 5-10 min
<i>Warm-down:</i>	10 minutes jogging

(Total duration of the session: 2.5 hours)

Table 2: Selected training case studies – Middle & Long Distance

<p>Jennifer Barringer (USA) - 3,000m steeplechase <i>Competition result:</i> 5th, 9:12.50 (AR)</p>	
<p><u>August 14 (day before heats)</u></p>	
<i>Warm-up:</i>	15 min jogging
<i>Exercises:</i>	10 min general stretching exercises, 10 min hurdle exercises with hurdles
<i>Run-offs:</i>	4 x 80-100m, walking breaks
<i>Trunk Strength:</i>	15 min, each exercise repeated 40 times
<i>Warm-down:</i>	Nothing
<p>Pamela Jelimo (KEN) – 800m <i>Competition Result:</i> dnf semi-final (2:03.5 in first round heat)</p>	
<p><u>August 14 (2 days before heats)</u></p>	
<i>Warm-up:</i>	About 45 min of jogging, fast
<i>Exercises:</i>	10 min swinging and stretching exercises
<i>Accelerations:</i>	2-3 x 60-80m
<i>Tempo runs:</i>	400m (ca. 58 sec), 200m walking break, 200m (27-28 sec), 100m walking break, 100m (13.5 sec), 50m walking break, 80m (11 sec)
<i>Warm-down:</i>	20 min jogging
<p>Shannon Rowbury (USA) – 1500m <i>Competition result:</i> 3rd, 4:04.18</p>	
<p><u>August 14 (4 days before heats)</u></p>	
<i>Warm-up:</i>	45 min jogging
<i>Exercises:</i>	10 min dynamic stretching assisted by physiotherapist
<i>Running ABC:</i>	10 x 25m
<i>Accelerations:</i>	1 x 200m, 1 x 80m
<i>Run-offs:</i>	2 x 5 x 100m, fast with jogging intervals, 3 min rest between series
<i>Exercises:</i>	Leg swings: 2 x 4-10
<i>Warm-down:</i>	No jogging

Table 3: Selected training case studies - Throws

Lijlao Gong (CHN), Meiju Li (CHN), Xiangrong Liu (CHN) – Shot Put	
<i>Competition results:</i> Gong 3 rd , 19.98m (PB)	
	Li 7 th , 18.76m
	Liu 10 th , 18.52m
<u>August 14 (2 days before the competition)</u>	
<i>Warm-up:</i>	10 min jogging
<i>Exercises:</i>	15 min stretching exercises, sometimes assisted by the coach
<i>Standing puts:</i>	6-8 puts (4-16m) in quick succession
<i>Gliding puts:</i>	20-23 puts (around 16-18m), only few corrections by the coach
<i>Strength:</i>	Half squats, 140-160kg, imitations (in weight room)
<i>Warm-down:</i>	No warm-down activity observed
Xuejun Ma (CHN), Amin Song (CHN), Shaoyang Xu (CHN) – Discus	
<i>Competition results:</i> Ma 11 th , 58.79m (63.38m (SB) in qualification)	
	Song 5 th , 62.42m
	Xu 13 th in qualification, 61.02m (SB)
<u>August 15, 4 days before qualification round</u>	
<i>Warm-up:</i>	15 minutes jogging, with walking breaks
<i>Exercises:</i>	15 min stretching, 10 min preparation of the shoulder using an elastic band
<i>Standing throws:</i>	6-8 throws, about 45-50m
<i>Rotational throws:</i>	20-25, about 53-60 m (a few corrections by the coach, mostly by using short gestures)
<i>Athletic exercises:</i>	Medicine ball throws 20-30m, five sprint and multi-hop series over about 20-25m each
<i>Exercises:</i>	5-10 min stretching, with assistance
<i>Massage:</i>	30 min treading massage on the back and legs (by female fellow athletes), foot massage
(Duration of the session: At least 2.5 hours.)	

Maureen Higa Maggi (BRA) – Long Jump

Competition result: 7th, 6.68m

August 17 (4 days before qualification round)

Warm-up: 10 min jogging
Exercises: 15 min intense stretching
Running ABC: 6 x 30m
Accelerations: 60m and 80m
Jumping ABC: 4 x 30m
Technique: 2x run-up checks, three competition jumps
Bounding runs: 40 and 60m
Exercises: 5 min stretching
Warm-down: 5 min jogging

August 19 (2 days before qualification round)

Warm-up: 10 min jogging
Exercises: 20 min intense stretching
Running ABC: 4 x 30m
Accelerations: 60m and 80m
Bounding runs: 40m and 60m
Technique: 3-4 run-up checks
Standing long jump: 5 attempts (weak impression, 2.50m)
Exercises: 5 min stretching
Warm-down: 5 min jogging

Table 5: Selected warm-up case studies – Sprints and Hurdles

Usain Bolt (JAM) - 100m	
<u>August 15, heat</u>	
<i>Getting into the mood:</i>	60 min hanging out on a massage bench
<i>Warm-up running:</i>	200m jog, 5 x 60m easy accelerations
<i>Exercises:</i>	10 min stretching programme assisted by physiotherapist on the bench
<i>Run-offs:</i>	3 x 40m, rest interval: 4 min each
<i>Competition result:</i>	1 st , 10.20 sec
<i>Warm-down:</i>	10 min stretching assisted by physiotherapist
 <u>August 15, quarter-final</u>	
<i>Getting into the mood:</i>	60 min hanging out on a massage bench
<i>Warm-up running:</i>	5 x 60m easy accelerations, rest interval: 1 min each
<i>Exercises:</i>	10 min stretching programme assisted by physiotherapist on the bench
<i>Run-offs:</i>	3 x 20m, rest interval: 2 min each
<i>Competition result:</i>	2 nd , 10.03 sec
<i>Warm-down:</i>	5 x 50m low-intensity runs, 10 min stretching exercises assisted by physiotherapist
 <u>August 16, semi-final</u>	
<i>Getting into the mood:</i>	60 min hanging out on a massage bench
<i>Warm-up running:</i>	5 x 50m easy accelerations, 50m walking breaks
<i>Exercises:</i>	10 min stretching programme assisted by physiotherapist on the bench
<i>Run-offs:</i>	3 x 50m, rest interval: 3 min each
<i>Competition result:</i>	1 st , 9.89 sec
<i>Warm-down:</i>	10 min stretching assisted by physiotherapist
 <u>August 16, final</u>	
<i>Getting into the mood:</i>	60 min hanging out on a massage bench
<i>Warm-up running:</i>	5 x 50m easy accelerations, 50m walking breaks
<i>Exercises:</i>	10 min stretching programme assisted by physiotherapist on the bench
<i>Run-offs:</i>	2 x 30m, 2 x 40m on command, rest interval: 4 min each
<i>Call Room:</i>	Sitting around with some hopping
<i>Competition Result:</i>	1 st , 9.58 sec (WR)

Asafa Powell (JAM) – 100mAugust 15, heat

<i>Warm-up running:</i>	5 x 80m with slight acceleration, 3 x 50m run-offs, various drills
<i>Exercises:</i>	5 min stretching
<i>Accelerations:</i>	2 x 80m fast
<i>Run-offs:</i>	30m, 30m, 40m, 50m from the blocks
<i>Competition result:</i>	3 rd , 10.38 sec (relaxed)
<i>Warm-down:</i>	400m jog, 10 min massage, mobilisation

August 15, quarter-final

<i>Warm-up running:</i>	2 x 80m accelerations
<i>Exercises:</i>	5 min stretching
<i>Accelerations:</i>	2 x 60m fast
<i>Run-offs:</i>	2 x 50m, 2 x 30m, 3 x 40m, rest intervals 5 min each:
<i>Competition result:</i>	1 st , 9.95 (relaxed)
<i>Warm-down:</i>	400m jogging, 10 min massage, mobilisation

Sanya Richards (USA) - 400mAugust 15, heat

<i>Warm-up:</i>	Easy jogging and skipping alternately, limbering up, and walking (one lap), eight very easy accelerations down the straight, walking through each curve
<i>Exercises:</i>	35 min swinging exercises, stretching and intense stretching (passive stretching assisted by physiotherapist)
<i>Run-offs:</i>	1 x 30m, fast and relaxed, 1 x 50m, 1 x 80m (10.1 sec), then to the Call Room
<i>Competition result:</i>	1 st , 51.06 sec
<i>Warm-down:</i>	2 laps warm-down jogging

Table 6: Selected warm-up case studies – Middle and Long Distance

Jennifer Barringer (USA) - 3,000m steeplechase	
<u>August 15, heat</u>	
<i>Warm-up:</i>	25 min, easy jogging
<i>Exercises:</i>	5 min active stretching exercises
<i>Running ABC:</i>	8 x 20m
<i>Technique:</i>	8 x hurdle clearances
<i>Run-offs:</i>	5 x 90m
<ul style="list-style-type: none"> • In the stadium: 	
<i>Run-offs:</i>	3 x 80m at race pace
<i>Competition result:</i>	9:26.81, 3rd
<i>Warm-down:</i>	15 min jogging
<i>Ice bath:</i>	5-7 min
<i>Exercises:</i>	5 min
 <u>August 17, final</u>	
<i>Warm-up:</i>	30 min, easy jogging
<i>Exercises:</i>	5 min active stretching exercises
<i>Running ABC:</i>	6 x 20m
<i>Technique:</i>	4x hurdle clearances
<i>Run-offs:</i>	6 x 90m
<ul style="list-style-type: none"> • In the stadium: 	
<i>Run-offs:</i>	3 x 80m at race pace
<i>Competition result:</i>	5 th , 9:12.50 (AR)
<i>Warm-down:</i>	15 min jogging

Augustino Choge (KEN) - 1,500mAugust 15, heat

Warm-up: 40 min jogging
Exercises: 15 min in combination with running ABC
Run-offs: 1 x 80m easy, 4 x 80m at race pace followed by 10 min inactive

- In the stadium:

Run-off: 1 x 100m
Competition result: 3rd, 3:44.73
Warm-down: 30 min easy jogging, no stretching

August 17, semi-final

Warm-up: 40 min jogging
Exercises: 15 min in combination with running ABC
Run-offs: 1 x 80 m easy, 5 x 80 m at race pace, stretching during rest intervals followed by 10 min inactive

- In the stadium:

Run-offs: 2 x 100m
Competition: 2nd, 3:36.43
Warm-down: 40 min easy jogging, no stretching

August 19, final

Warm-up: 35 min jogging
Exercises: 15 min in combination with running ABC
Run-offs: 2 x 80m easy, 4 x 80m at race pace, stretching during rest intervals followed by 10 min inactive

- In the stadium:

Run-offs: 2 x 100m
Competition result: 5th, 3:36.53

Pamela Jelimo (KEN) – 800mAugust 15, heat

Warm-up: 20 min jogging
Exercises: 10 min swinging exercises
Run-offs: 4 x 80m, easy

- In the stadium:

Run-offs: 2 x 60m into the curve
Competition result: 1st, 2:03.50
Warm-down: No jogging

August 17, semi-final

Warm-up jog: 25 min, easy
Exercises: 10 min swinging exercises
Run-offs: 4 x 80m, easy, 1 x 80m, fast
Exercises: 5 min
Competition result: dnf

Maryia Savinova (RUS) – 800mAugust 17, heat

Warm-up: 20 min jogging
Exercises: 10 min stretching assisted by physiotherapist
Running-ABC: 8 x 25m fast wearing spikes
Accelerations: 3 x 70m fast
Run-off: 1 x 120m at race pace
Exercises: 5 min

- In the stadium:

Run-off: 1 x 100 m at race pace
Exercises: 5 min stretching
Competition result: 1st, 2:03.27

August 17, semi-final

Warm-up: 25 min jogging
Exercises: 10 min stretching assisted by physiotherapist
Running ABC: 10 x 25m wearing spikes
Accelerations: 3 x 70m
Run-off: 1 x 100m
Exercises: 5 min

- In the stadium:

Run-off: 1 x 90m
Warm-down: 20 minutes jogging
Exercises: 5 min stretching
Competition result: 1st, 1:59.30

Mehdi Baala (FRA) – 1,500mAugust 15, heat

Warm-up: 20 min jogging
Exercises: 15 min, followed by 20 min inactive

- In the stadium:

Run-offs: 2 x 60m
Competition result: 1st, 3:42.77
Warm-down: No jogging

August 17, semi-final

Warm-up: 10 min jogging, 20 min inactive

- In the stadium:

Run-offs: 2 x 70m
Competition result: 3rd, 3:37.07
Limbering-up: 15 min assisted by physiotherapists

August 19, final

Warm-up: 15 min jogging
Exercises: 5 min stretching exercises, followed by 20 min inactive

- In the stadium:

Run-offs: 2 x 100m at race pace, rest interval: walking slowly
Competition result: 7th, 3:36.99

Kipruto Kiprop (KEN) – 1,500m

August 15, heat

Warm-up: 40 min jogging
Exercises: 15 min in combination with running ABC
Run-offs: 1 x 80m easy, 2 x 80m at race pace, stretching during rest intervals, followed by 10 min inactive

- In the stadium:

Run-offs: 1 x 100m
Competition result: 2nd, 3:41.42,
Warm-down: 30 min easy jogging

August 17, semi-final

Warm-up: 45 min jogging
Exercises: 20 min in combination with running ABC
Run-offs: 1 x 80m easy, 5 x 80m at race pace, stretching during rest intervals 10 min inactive

- In the stadium:

Run-offs: 2 x 100m
Competition result: 2nd, 3:36.24
Warm-down: 30 min easy jogging, no stretching

August 19, final

Warm-up: 35 min jogging
Exercises: 15 min in combination with running ABC
Run-offs: 2 x 80m easy, 4 x 80m at race pace, stretching during rest intervals, followed by 10 min inactive

- In the stadium:

Run-offs: 2 x 100m
Competition result: 4^{ht}, 3:36.47
Warm-down: 30 min easy jogging, no stretching

Table 7: Selected warm-up case study – Jumps

Nelson Evora (POR) – Triple Jump	
<u>August 16, qualification</u>	
<i>Warm-up:</i>	300m run easy jogging, bouncing jog (including arm circles), 100m slightly accelerating, lunge right + left, reaching and knee-lift exercises, jogging
<i>Exercises:</i>	Passive stretching assisted by a physiotherapist, especially hip joint
<i>Warm-up jumps:</i>	3x easy triple jumps from 3 run-up steps, 1 long run-up (48m) with long jump from the board
• In the Stadium	
<i>Warm-up jumps:</i>	1x approach check with hop, 1x approach check with triple jump (ca 16.50m), 1x triple jump from 11 run-up strides, ca. 16.30m
<i>Competition result:</i>	17.44m
<u>August 18, final</u>	
<i>Warm-up:</i>	600m easy jogging, bouncing jog (including arm circles), including easy triple-jump rhythms
<i>Exercises:</i>	Passive stretching assisted by a physiotherapist, especially hip joint
<i>Run-offs:</i>	2 x 40m with high knee lift and indicated take-off
<i>Warm-up jumps:</i>	3x two-legged jumps, three easy triple jumps from 4, 10 and 12 approach strides, 1x long run-up (48m) with take-off from board
• In Stadium	
<i>Warm-up jumps:</i>	1x approach check with hop, 1x approach check (wearing competition kit), 1 x triple jump from 11 approach strides
<i>Competition result:</i>	2 nd , 17.55m

Table 8: Selected warm-up case studies – Throws

Christian Cantwell (USA), Reese Hoffa (USA), Adam Nelson (USA) – Shot Put							
<u>August 15, final</u>							
<i>Warm-up jog:</i>	Walking, short jogging sections (start 40-45 min before going to the callroom)						
<i>Exercises:</i>	Easy stretching exercises						
<i>Standing shot puts:</i>	3-4 easy puts, 17-19.5m						
<i>Rotational shot puts:</i>	5-8 puts up to or beyond the performance limit (21.5-22m), with fouling						
• In the stadium:							
<i>Rotational shot puts:</i>	5-8 puts up to or beyond the performance limit (21.5-22m), with fouling						
<i>Gliding shot puts:</i>	2-3 puts, distance: around 21m						
<i>Competition results:</i>	<table> <tr> <td>Cantwell</td> <td>1st, 22.03m (WL)</td> </tr> <tr> <td>Hoffa</td> <td>4th, 21.28m</td> </tr> <tr> <td>Nelson</td> <td>5th, 21.11m (SB)</td> </tr> </table>	Cantwell	1 st , 22.03m (WL)	Hoffa	4 th , 21.28m	Nelson	5 th , 21.11m (SB)
Cantwell	1 st , 22.03m (WL)						
Hoffa	4 th , 21.28m						
Nelson	5 th , 21.11m (SB)						
Tomasz Majewski (POL) - Shot Put							
<u>August 15, final</u>							
<i>Warm-up jog:</i>	300 m (start only 30 min before going to the callroom)						
<i>Exercises:</i>	10 min easy, including a lot of hip stretching exercises						
<i>Standing shot puts:</i>	6 x 18-19m						
<i>Gliding shot puts:</i>	4 x 20-21m (easy)						
<i>Exercises:</i>	For hands and shoulders						
• In the stadium:							
<i>Gliding shot puts:</i>	3 x 20-21m (tense)						
<i>Competition results:</i>	2 nd , 21.91m						
Valerie Vili (NZL) - Shot Put							
<u>August 16, final</u>							
Note: Start of the warm-up less than 30 minutes before going to the Call Room							
<i>Warm-up jog:</i>	400m run, dynamic						
<i>Exercises:</i>	10 min stretching exercises, interrupted by jogging						
<i>Warm-up putting:</i>	Only with glide, 3-4 attempts, 18-20m						
• In the stadium							
<i>Warm-up putting:</i>	Two attempts, 18.6m and 20m						
<i>Competition result:</i>	1 st , 20.44m						

Table 9: Comparison of the warm-up routines of top discus throwers for the final of the 2009 IAAF World Championships in Athletics

	Robert Harting (GER)	Piotr Malachowski (POL)	Gerd Kanter (EST)	Virgilijus Alekna (LTU)	Zoltan Kovago (HUN)
18:00					
18:05			Arrival	Arrival	
18:10					
18:15					
18:20	Arrival				
18:25	Stay in the tent	Arrival			
18:30			Jogging		
18:35			Gymnastic exercises		
18:40		Jogging (3 min)	Stretching and limbering up assisted by physiotherapist	Jogging and gymnastics exercises	Arrival
18:45		1 min of gymnastic exercise			
18:50	Jogging (3 min)	Limbering-up exercises		Stretching assisted by physiotherapist	
18:55	Walking, limbering-up exercises		Running ABC		
19:00		2 standing throws: ca 51m, ca 50m	3 standing throws: ca 51m - 56m, imitations		Imitations, standing throws
19:05	No warm-up throws at the warm-up area	2 throws: ca 55m, ca 64m	3 throws: ca 59m, 59m, 72m	Jogging and limbering-up exercises	Standing throw: ca 60m
19:10			3 throws: ca 72.5m, 70m, 73.5m	No warm-up throws at the warm-up area	2 throws: ca 62m, ca 63m
19:15		Limbering-up exercises			18:00
19:20	Call Room	Call Room	Call Room	Call Room	1 throw: ca 64m
On Field		2 throws: ca 62m, 67m	2 throws: ca 67m	2 throws ca 67m	Call Room
Result	1 st , 69.43m	2 nd , 69.15m	3 rd , 66.88m	4 th , 66.36m	6 th , 65.17m

It was noticeable that three groups of Chinese athletes (110m hurdlers, discus throwers, shot putters) did workouts of considerable length (2.5-3 hours) just four or even three days before their competitions started. In addition to highly intensive training in their competition events, some of them did what appeared to be intensive general sprinting, jumping, throwing and strength exercises (see tables for details). Based on this, one arrives at the assumption that in their normal training the loads used must be much higher.

Finally, there is the case of the 2008 Olympic 800m Champion Pamela Jelimo, who was in the middle of a season in which she was generally off form. In Berlin she did not complete her semi-final race. Only two days before her first race, she did what German coach Paul Schmidt calls a classic pre-loading for the 800m, which is normally done five days before an important competition (see Table 2 for details). One assumption could be that she is used to very high training loads and this is her normal procedure; another might be that she was trying to gain a psychological boost by reassuring herself of her fitness.

Warm-up Observations

As with training programmes, the warm-up procedures used by athletes on competition days must be assessed individually. Generally, however, we can say that the majority of the observed athletes demonstrated restraint regarding the duration and intensity of their warm-ups. There were only a few who carried out what we consider complex programmes.

Although in some cases pre-loads could be observed in the warm-ups of long sprinters or middle-distance runners, for example using under-distance runs, one cannot speak of a consistent standard. Even in these events, as with the short sprints, a rather easy warm-up was the rule. In the technical disciplines, we normally saw that after a general warm-up, the throwing/jumping would begin. Here,

the rule of thumb is that the less stressful the competition exercise is for the whole organism (e.g., shot put), the more frequent the repetitions in the warm-up. Often, the throwers threw both on the warm-up field and then again in the stadium, but sometimes they did so only in the stadium. Here, the athletes were always allowed by the judges to do as many attempts as they liked.

Focusing on the sprint events, observations of athletes from the great sprint nations of North America and the Caribbean led us to the following statements:

1. All warm-up programmes and the behaviour during the last few days before the competition are highly tailored to the individual athlete.
2. The classic warm-up jog is often replaced by five to ten sprints or starts plus acceleration runs at low intensity (approx. 60-70%). The length of the sprints is chosen on an individual basis and ranges from 50 to 100m. According to coaches' statements, it is only important during these warm-up sprints to "hit" the steps and to run with little effort
3. In the rest intervals between warm-up sprints, the athletes either walk back to the starting point, or they perform light stretching, mobilisation or core-muscle exercises.
4. After the warm-up sprints, dynamic stretching and mobilising exercises are very popular. The athletes either perform these exercises on their own, with the help of rubber bands or tubes, or they are assisted by a physiotherapist. In some cases, however, static stretching could be seen in conjunction with swing exercises.
5. If sprinting drills are performed, these are used to prepare for fast actions and are done in a deliberately relaxed way. There is a clear differentiation into coordination and frequency drills. Frequency comes

usually after coordination. In most cases, depending on the training or competition, three to six sprint drills are performed.

6. Accelerations are mostly done in such a way that long and relaxed accelerations are followed by short and fast accelerations. During crouch starts and run-offs, the focus is on powerful knee extension (0-20m), followed by hip extension (20-40m) and lifting of one's head (40-60m). The high frequency of the first steps and the slow lifting of the head is a priority.
7. Spikes are only used when the athletes want to run very fast.

In the middle- and long-distance events it was striking that most athletes did their warm-up jogging at very low intensity. Warm-ups were rather short and intense pre-loads as recommended and done in the past could only be observed in a few individual cases. As far as flexibility exercises are concerned, one could see differences by nation. For example, the Kenyans preferred swinging exercises, while the Russians did static stretching exercises.

The jumpers' preparations included warm-up jogging, stretching (active and/or passive assisted by physiotherapists), running ABCs with the use of combinations to a greater extent than was the case with athletes from other event blocks, jumping ABCs, strides, imitations, then, in the stadium, start checks. In the different jumping events, the preparation ended as follows:

- Horizontal jumps: long and triple jumps from shortened run-ups at a moderate intensity.
- Pole vault: performing elements and sometimes the whole exercise, more female than male vaulters actually cleared the bar.
- High jump: jumps over the bar with increasing bar height.

In general, it can be said that the greater the safety and stability of the athlete, the more moderate the warm-up jumps. Hooker's concentration on only a few jumps, due to an injury, shows what is possible with a good mental preparation even without warm-up jumps or a competition with increasing heights. More than 10 intensive run-up and jump combinations, as was observed in a German horizontal jumper, are not only a sign of considerable uncertainty but can also be tiring.

Minimal jogging, gymnastic exercises and only few throws were the hallmarks of the top throwers' warm-ups. In some cases, a passive preparation assisted by a physiotherapist was observed (e.g. Kozmus, Thorkildson, Spotakova). Many throwers, particularly the javelin throwers, also used elastic bands when preparing for their competitions. Intensive preparation with lots of movement and relatively many warm-up attempts were observed in the shot put and javelin. Often, one had the impression that some of these athletes "killed" themselves on the warm-up field. The rotational throwers, i.e., the discus and hammer throwers, were very economical when moving, and some of them did their warm-up throws only in the competition stadium.

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