

The 3rd World Javelin Conference

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Kuortane, Finland

Introduction

Following headline-grabbing performances by throwers from Kenya, Egypt and Trinidad & Tobago in the last few years, “the globalisation of the javelin” was a hot topic for the 91 participants representing 20 countries who attended the 3rd World Javelin Conference at Finland’s Kuortane Olympic Training Centre from 12-13 November 2014.

The conference, the fourth and final event in the 2014 European Athletics Coaching Summit Series, also offered the more traditional theme of “optimising performance” and a carefully selected team of expert presenters to attract

participants to Kuortane, 330km north of Helsinki and widely known as a centre for javelin throwing expertise thanks to its designation as an IAAF ATC (Accredited Training Centre). The facility, which hosts top throwers in training from around the world, features sophisticated performance testing labs and the presence of famous coaches like Kari Ihalainen, Tapio Korjus and rising star, Petteri Piironen.

In addition to seven expert presentations, the conference programme included three training demonstrations and two panel discussions. Summaries of the expert presentations and descriptions of the training demonstrations are given in the following sections.



Frank Lehmann

Biomechanical Feedback for Athletes

Frank Lehmann (GER)

Dr. Lehmann, who works as biomechanist and technical specialist at the IAT (Institute for Applied Training Science) in Leipzig, Germany, opened both conference days with compelling lectures capturing his audience with his sincere appearance and humorous style combined with tremendous amounts of data.

His first lecture was about the biomechanical characteristics of javelin throwing. After introducing the movement analysis system his institute uses to collect data, he said that, while the release velocity of the javelin naturally explains most of the throwing distance, certain technical factors of the throw are a more interesting part of the analysis. Among the findings are comparisons between elite throwers and less accomplished throwers such as:

- Elite throwers carry the javelin with greater speed before the touchdown of the braking leg and increase the javelin's velocity more after the touchdown.
- Elite throwers reduce their body's velocity more after the braking leg touchdown.
- Elite throwers have shorter delivery strides and their hip axis is more perpendicular to the throwing direction.
- In elite throwers the support leg forms smaller angle with ground during the delivery.
- Elite throwers generate higher pre-tension in the trunk and shoulder with:
- greater difference between the hip- and shoulder-axis at the moment of braking leg touchdown,
- greater difference between the shoulder- and upper-arm-axis at the moment of braking leg touchdown
- Greater hip velocities lead to higher shoulder velocities (and further throws).

Interestingly, these findings are very similar to those made by Finnish Research Institute for Olympic Sports (KIHU), which were presented at previous the World Javelin Conference by Riku Valleala¹, who was in the audience.

Dr. Lehmann's second lecture was about the assistance his institute provides to top throwers in Germany. In addition to biomechanical feedback, they give scientific support for the whole training process, which includes motion analysis in competitions, training with measurement systems and physical ability diagnostics. The goal is to detect the throwers' deficits and to identify the reasons behind them: lack of physical abilities or poor implementation of physical abilities. He added that in this process it is very important to work closely with the athletes and their coaches. It is possible to achieve proper implementation of the findings only with proper cooperation.

Dr Lehmann explained that training with measurement systems means throwing the javelin on force plate platforms while movement analysis of the throw is made. Measurements of ground reaction forces and the acceleration of the javelin illustrate the thrower's individual technique and allows for the identification of technical weaknesses. The physical ability diagnostics involve basic tests (like 30m with flying sprint, weightlifting, jumping and shot throws), reactivity tests (drop jumps) and isometric maximum strength tests for the legs and trunk muscles. One of the most interesting tests is the relation between the muscle tension and flexibility of the shoulder joint. The researchers have detected huge differences between throwers in this particular test.

It was interesting to compare the German and Finnish scientific support systems. From the presentations and discussions you got the picture that the Finns may use some more accurate measurement techniques but the Germans are a step or two ahead in implementation of their results. In the audience discussion period, Riku Valleala commented on the video frame rates that Germans are using for movement analysis, 50 frames per second while Finns are using 200 or even 250 fps. Dr. Lehmann pointed that that his team wants to keep their results comparable with older studies so they will be able to exploit the database of nearly 1500 throws they have collected.

Flight Characteristics of the Javelin

Duncan Atwood (USA)

Mr Atwood, a former Olympian and Pan American champion, competed with both javelin models (PBs of 94.06m with the old model and 82.73m with the new model) in the 1970s and 1980s and hence he has great knowledge about differences in the flight characteristics of the two.

With movement analysis equipment it is easy to see if a throw has, for example, too much angle of attack, and researchers have shown that throwers often lose several metres of distance due to a poor quality of the release. However, in Mr Atwood's view, it is also necessary for the coach and athlete to have a visual feedback from each throw that tells them about the throw's postural quality so that the feel of a maximally effective release can be ingrained through practice. He said the current model javelin does not teach athletes to throw to a proper flight posture; it self-corrects its flight, which makes it difficult to see whether the quality of the release was good or bad.

To solve the problem, Mr Atwood suggested the use of more flight-sensitive implements,

such as bamboo sticks, old model javelins and Finnjav, a plastic javelin developed especially for this purpose. People have an inherent skill "to make something fly" he said, and by throwing different implements you enhance this skill. He gave some creative training hints to help increase the quality of throws. For beginners, he suggested attaching a laser pointer to the javelin to tell instantly where the head of the javelin is pointing. For more advanced throwers he recommended using a certain exercise where you try to beat your day's best result by flying the javelin, not by increasing power.

Medical Aspects of Training for Javelin Throwing

Ilkka Tulikoura (FIN)

Dr Tulikoura is one of the world's most respected sport physicians and he has worked with a number of top athletes, including Sergei Bubka (UKR), Jacques Freitag (RSA), Aki Parviainen (FIN) and Mika Halvari (FIN). He gave one of the most closely followed presentations of the conference, using the optimal movement chain and movement control as the starting point for his talk.



Tiina Vilenius

Dr Tulikoura said that with an optimal movement chain you can achieve two goals: get the best javelin results and minimise the risk of injury. The javelin throwing movement is so rapid that you simply can't control it consciously during the throw. Therefore it has to be produced by a motor programme that is stored in the nervous system. In order to produce an optimal chain, the motor programme must generate a specific series of muscle contractions and developing this programme requires plenty of correct repetitions. From this perspective he gave some training suggestions. For example, athletes should avoid throwing with pain because that leads to incorrect movements, which can negatively affect the motor programme, prolong healing and predispose the athlete to new injuries.

Muscle balance is also a very important factor in the attenuating role of muscles. In the javelin throw the body must absorb massive impacts both through the braking leg and stopping the movement after the release. This requires a lot of eccentric work from the absorber muscles, creating major strength requirements for the body's core muscles. If they cannot do their job, the body's other support structures, such as bones and tendons, must bear the loads and this can lead to injuries. Making training suggestions, he pointed out the importance of diverse power training and gave a good example: if you throw overweight implements, you develop the muscles that accelerate the implement but not the muscles that stop the swing of the arm because the speed of movement is much lower. Therefore underweight implements must be used to develop the absorber muscles properly. Other suggestions included:

- Concentrate on antagonist and shock absorber muscles, not only agonist muscles.
- Include both concentric and eccentric movements.
- Throw with less power when the optimal movement chain can't be achieved with full power.

After the presentation, four Finnish javelin champions, Tapio Korjus, Kimmo Kinnunen,

Aki Parviainen and Tero Pitkämäki, honoured Dr. Tulikoura for the lifetime of work he has dedicated to sport and expressed their gratitude for the help he gave them.

The Career Path of a Finnish Javelin Champion

Aki Parviainen (FIN)

Mr Parviainen won the javelin at the 1999 IAAF World Championships in Athletics in Seville and followed up that success two years later with a silver medal in Edmonton. Since 2011 he has coached the 2014 European Champion Antti Ruuskanen, but recently he announced that he would leave coaching to concentrate on his agricultural business.

At first Mr Parviainen spoke about the Finnish system for developing top-level javelin throwers. Typically, Finnish youths take part in many sport activities between the ages of 8 and 14 years and only thereafter do they start to concentrate on a particular sport. After the child has chosen the javelin throw more systematic training starts. Coaches and researchers have noticed that an athlete must have certain physical abilities to be a top thrower including: clean 150kg, snatch 115kg, bench press 150kg, standing 5-jump: 16m, overhead shot (4kg) throw backward 24m and forward 19.5m.



Julius Yego

Young throwers train systematically to get these results to the required level. He said that throwing is a natural talent and you can't make a top thrower from someone who lacks this ability. For this reason, he thinks that coaching for technique is only fine tuning of someone's personal technique. He also emphasised an individual approach to training, saying that there is no programme that suits everyone and makes them into an 85m thrower.

Speaking generally about training, Mr Parviainen said that the annual plan typically contains four separate mesocycles and there is a lot of variation between the cycles. In the season he requires once a week competitions but said these should be part of the preparation and not disturb training too much. He encourages his athletes to train and compete in different weather conditions, because you can never know what the weather will be during a championships. Turning to the final preparations for a major championship, he said that both he and Ruuskanen would start with a four-day rest period, followed with five days of very intense training and then five to seven days dedicated to total rest. The purpose for this is to ensure that the athlete is physically and, especially, mentally ready for the competition.

Later Mr. Parviainen gave a coaching demonstration with the assistance of Mikko Kankaanpää (PB: 83.33m) and two younger female throwers. The demo athletes performed various shot throws (standing throws and three step throws) and short approach javelin throws. These were followed by Parviainen's technical instructions and general recommendations.

Other Training Demonstrations

Olli-Pekka Karjalainen (FIN), the 2006 European hammer throw champion gave the second training demonstration, which was designed to bring new ideas for the javelin coaches and develop cross-talk between the events. His main point was to pay attention to the event's special requirements and develop specific strength. He said that general strength training like weightlifting will not improve throw-



ing results after a certain strength level. You need to strengthen the muscles that are responsible for the movement. In the hammer throw, the easiest way to do this is by throwing overweight implements. For that reason, most of the specific strength training for this event happens in the throwing circle. In the demonstration he introduced some throwing variations and a few core exercises with the barbell and weights for special strength.

The final training demonstration was an outstanding team presentation by javelin coach Petteri Piironen (FIN) and gymnastics coach Tiina Vilenius (FIN) assisted by Teemu Wirkkala (FIN) and Sami Peltomäki (FIN), who are both 80m javelin throwers. The topic was gymnastic training for javelin throwers and the demonstration took place in an authentic atmosphere of the centre's gymnastics hall. Mr. Piironen said that because of reduced physical activity and changes in lifestyles, children nowadays cannot control their bodies as well as those in earlier generations. For that reason they are not

able to properly learn special movements, such as javelin throw. Gymnastics provides excellent general exercises for every athlete to better their motor abilities and body control. Javelin throwing requires rhythm, balance, a strong core, good flexibility and strong supporting muscles and all these abilities are possible to train through gymnastics practice. The demo athletes performed various exercises on the beam, floor, high bar, parallel bars and rings under Mrs. Vilenius's guidance. The demonstration was concluded by Mr. Wirkkala's tremendous feat: brisk giants on the high bar and a peaceful wave for the audience afterwards.

The Globalisation of Javelin Throwing

Mirko Jalava (FIN), Julius Yego (KEN) and Jukka Härkönen (FIN)

After the first day of conference most attentive individuals would have noticed an interesting phenomenon at the sports hall. It was packed with people training and most of them were from somewhere other than Finland. And this was not only because of the conference; foreign throwers are an everyday sight in Kuortane.

On the second day of the conference, Mr Jalava, a well-known athletics statistician, gave an historical analysis of javelin results, gathering all the medal tables from major championships and top ten rankings since 1908 and sorting them by country. According to the data, it is quite rare that a new country appears in the yearly top ten list or takes a medal in a major competition. Throughout the history of the event there have been times of over a decade when no new countries have entered in the top rank, but in the last three years six new countries made an entrance to the top ten list. Mr. Jalava thinks that this is a clear proof of the globalisation of javelin throwing.

One of these new countries at the top is Kenya and after Mr. Jalava's presentation it was time for the person responsible for that to step up on the stage. Mr Yego has had some excellent seasons during which he has achieved first place at the Commonwealth Games, fourth place at the IAAF World Championships in Athletics and improved Kenya's national record over seven metres. He has also earned the nickname "YouTube Man" because he had no coach at the beginning of his career and on-



line videos were the only place he could learn javelin technique. He said his inspiration to become a javelin thrower came when he was 12 years old and saw his older brother throwing in a school competition. At that time he had no access to real javelins, so he had to throw wooden sticks. A few years later he started to watch throwers like Andreas Thorkildsen (NOR) and Tero Pitkämäki (FIN) on YouTube and tried to learn what kind of exercises you should do to become a good javelin thrower. In 2011 he came to Finland with an assistance of an IAAF scholarship and since then he has worked closely with Finnish coach Petteri Piironen.

According to his manager, Mr Härkönen, who was also on the stage, one of the main reasons for Mr Yego's great success is that he had to think by himself how to improve his training and technique. This has helped later cooperation with expert coaches.

Also, a passion for the sport and good health has helped. Mr. Yego has now reached the level where injuries will start to show up if he does not take good care of his body. For this reason muscle maintenance will be a big part of his preparation for the next season.

Reported by Joel Karjalainen

Joel Karjalainen is a student studying law at the University of Eastern Finland and biomechanics at the University of Jyväskylä. A 74.94m javelin thrower, he competed in the 2010 IAAF World Junior Championships and the 2013 European Athletics U23 Championships. He also coaches eight 12- to 16-year old athletes, mainly in the throwing events.

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