



Biomechanics and feedback in Finnish Javelin Throwing

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KIHU

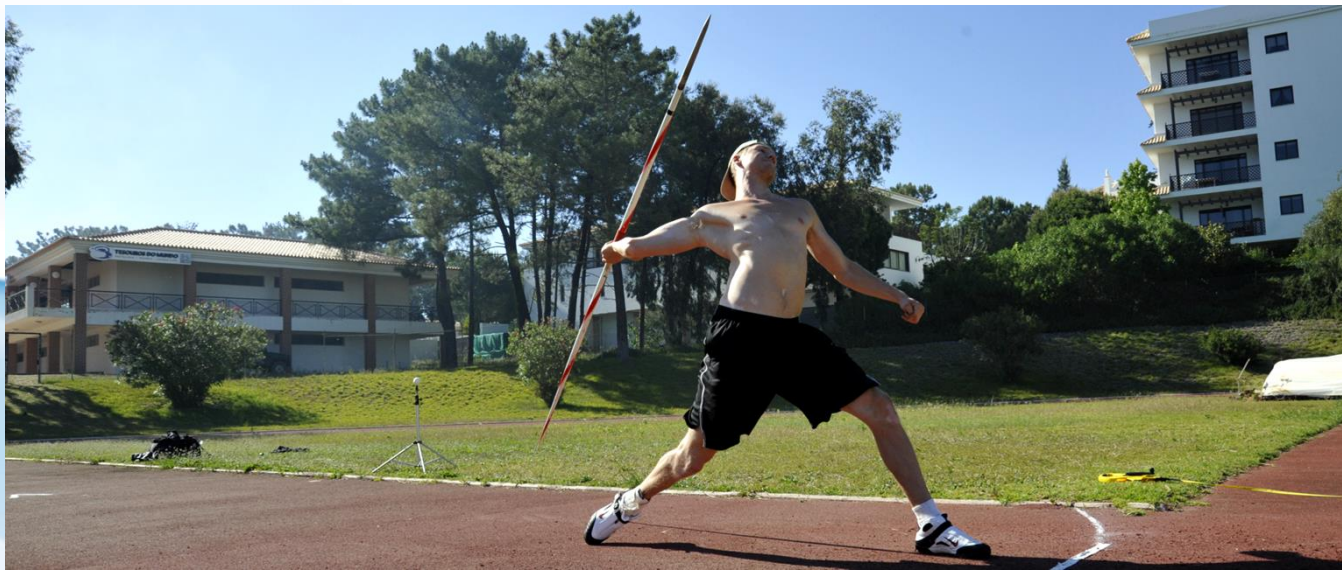
www.sport.fi/kihu

Biomechanics from Basic Research to Practical
Applications, 29 Nov 2013



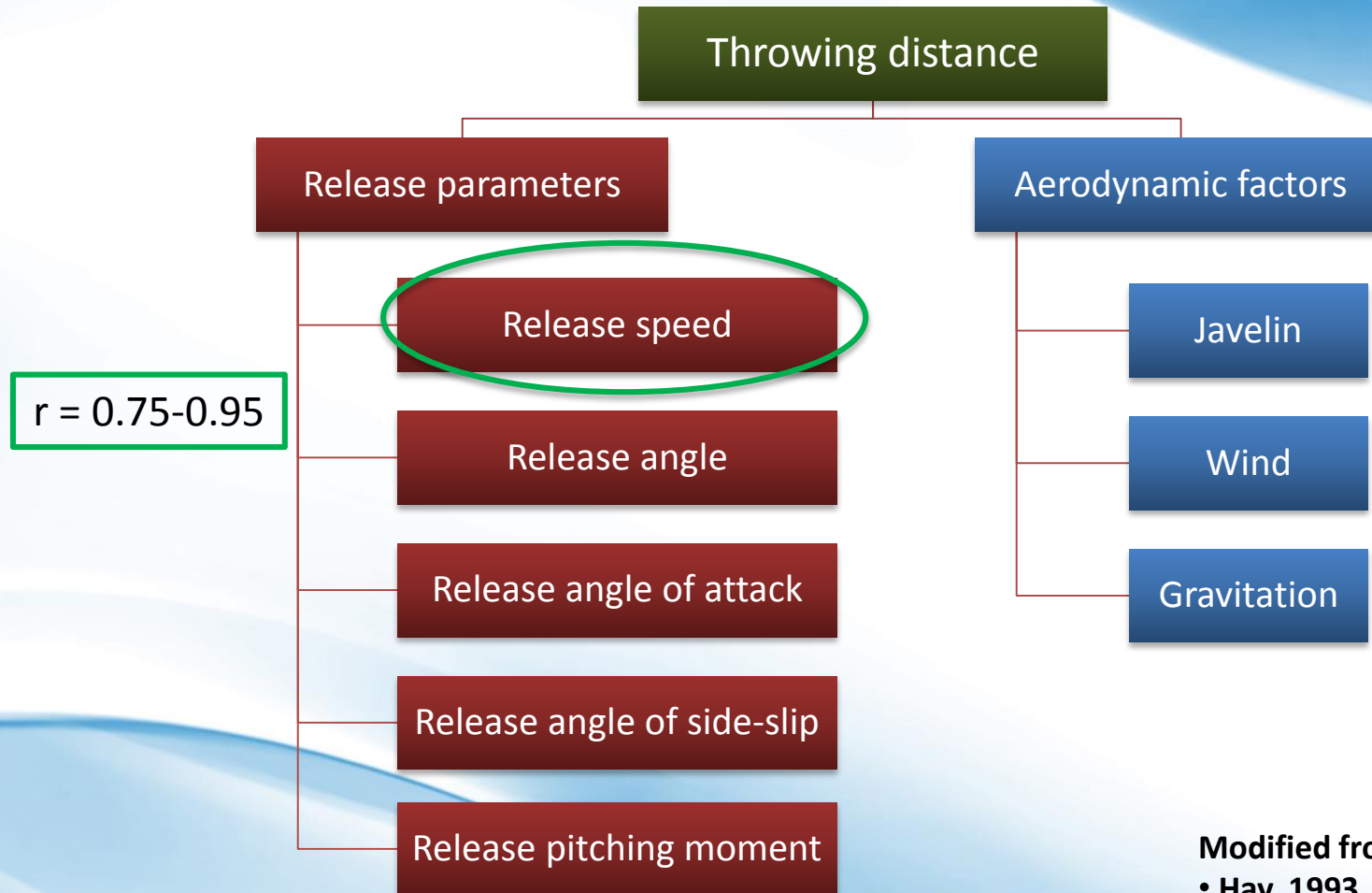
Contents of the presentation

1. Basics of javelin biomechanics
2. Javelin research over 20 years
3. Methods and feedback
4. Way to Rio 2016





Factors affecting to throwing distance



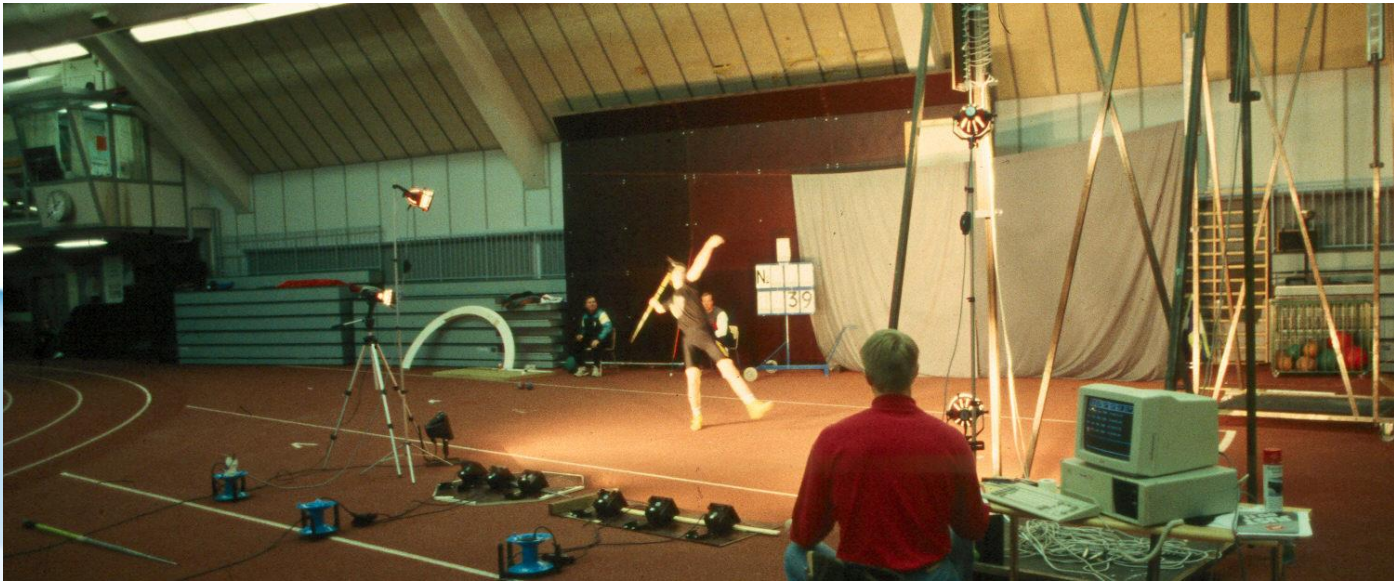
Modified from:

- Hay, 1993
- Morriss and Bartlett, 1996



Javelin research at 1990s

- The whole 90's very active time
- Special project during 1991-1999
- 78 athletes, totally 315 throws analyzed
- 3D motion analyses, "throwing gate", speed radar
- Javelin gun was developed 1995





Javelin research on the 21st century

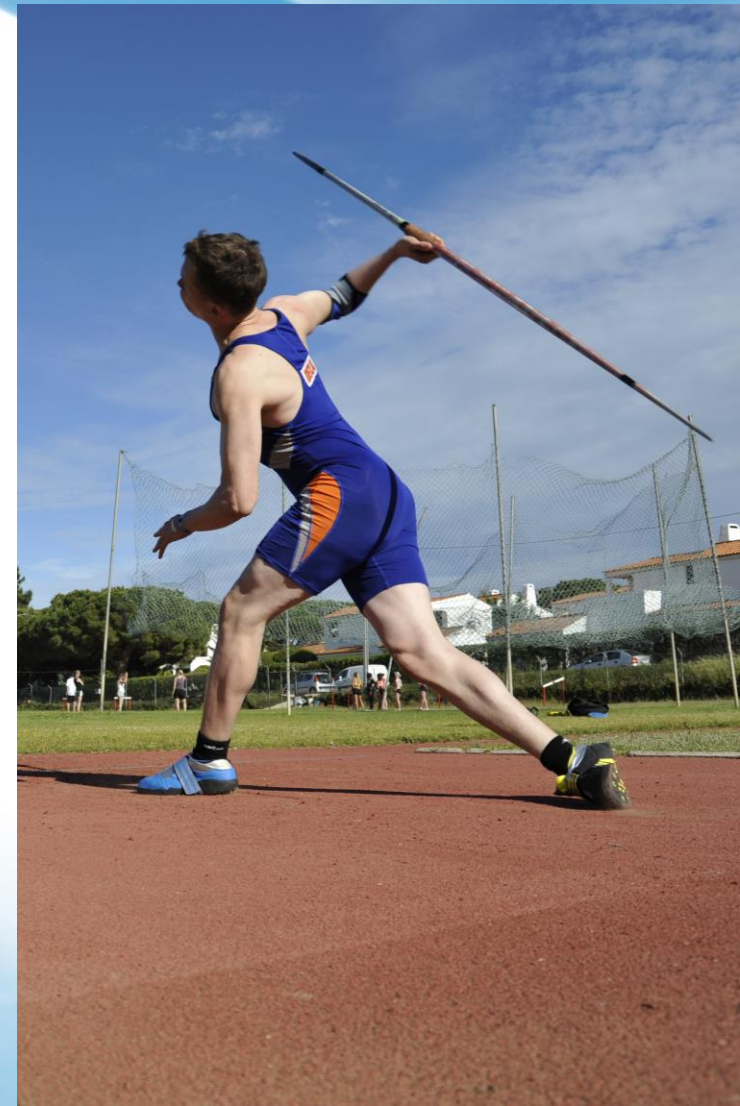
- Technique analyses 2004 ->
 - Gradually increasing year by year
 - Latest years
 - 2 training situations
 - 2 competitions per year analyzed
- During 2004-2013
 - 34 athletes involved
 - Totally analyzed 446 throws
 - 338 training throws
 - 118 competition throws





Methods and feedback: Traditional motion analysis

- Basic 3D motion analyses since 1991
- For measuring
 - Javelin release parameters
 - Body movements during throwing
- Frame rate development
 - 1990s: **100 / 60 fps**
 - 2004-2006 **125 fps**
 - 2008 -> **250 fps**





Methods and feedback: Traditional motion analysis

- In competitions
 - 1-3 throws/athlete
 - Digitizing the whole body landmarks + javelin
 - About 30 different variables
 - Results in 1-2 weeks after competition
- Accurate and systematic info about competition throws
- Coaches wating impatiently release speed values and other results...





Methods and feedback: Traditional motion analysis

- In trainings
 - 4-8 throws/athlete from one training session
 - Digitizing only javelin + some extra points
 - 9-18 different variables
 - Results in 1-3 days
- Fewer variables – better understanding and usability
- Feedback faster, but should be instant





Methods and feedback: Fast motion analysis

- For instant feedback about release parameters
- Tested once in 2013
- Using Simi Motion
- Reflecting markers on the javelin + autodigitizing
- Results for the release parameters in 1-2 min.





Methods and feedback: Fast motion analysis

- Concentrating on the control of the javelin





Methods and feedback: Fast motion analysis

- Concentrating on the control of the javelin





Methods and feedback: Fast motion analysis

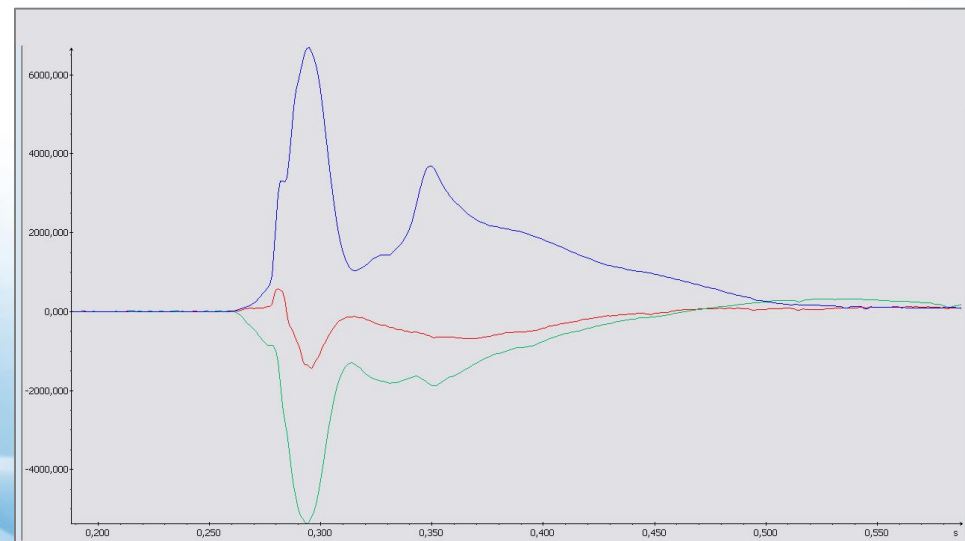
- Concentrating on the control of the javelin





Methods and feedback: Force plates

- For getting accurate information about GRFs during 2 last steps
- Tested once in Jyväskylä 2013
- Encouraging results for training session, when feedback combined to fast motion analysis
- To be continued in 2014...



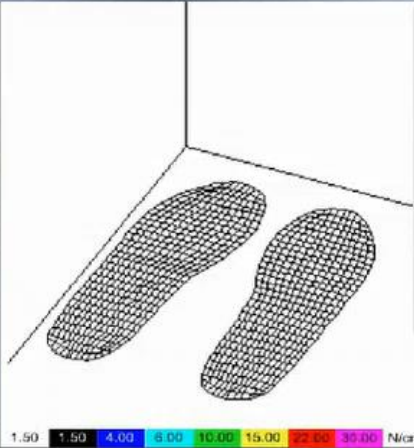



Methods and feedback: Other methods...

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MATERIAALIN JAKO

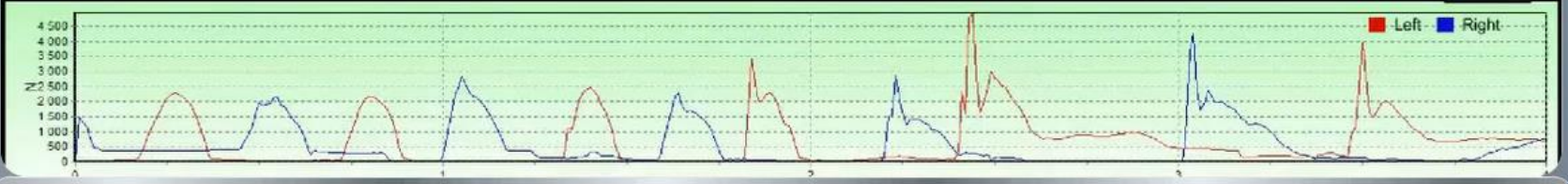
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Kirjoita videoon liittyvä yleiskommenttisi tähän. Mikäli kommentti ei talletu, varmista admin-tilassa määritetyn tiedostokansion kirjoitusoikeudet.

TALLENNNA Muokkaa



Nopeus: 0.25 m/s = 0.90 km/h



Way to Rio 2016

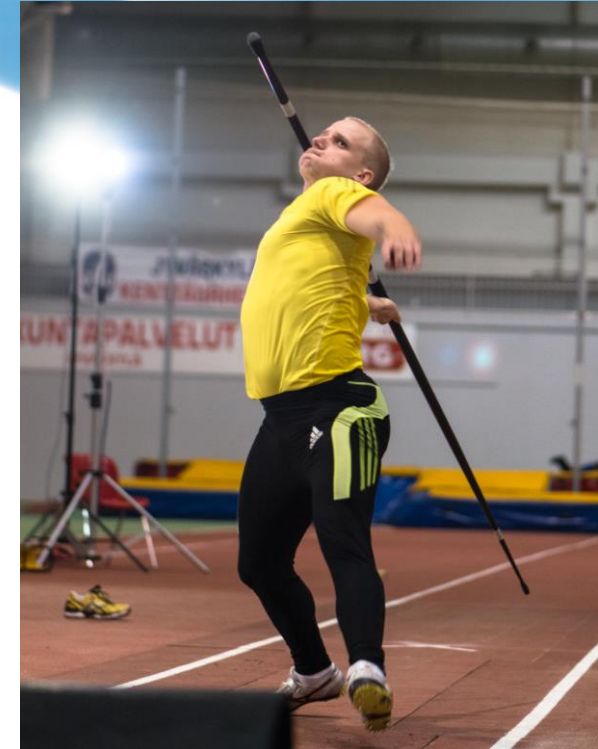
- **Goals**
 1. Efficient throwing performance
 2. Good control of the javelin
 3. Individually optimal technique
- **Deeper co-operation**
 - Biomechanists "to be the part of the family" in throwing team
- **Training camps**
 - Biomechanist present at all camps
 - Fast analysis + feedback + self-evaluation of the throwers





Way to Rio 2016

- Force plate throwing
 - 2 times/athlete during the spring
 - Combined to fast motion analysis
- Competition analyses
 - 2-3 competition during the summer
 - More discussion
- A special "foot project"
 - Deeper analyzing of the support leg
 - Need for a new kind of throwing spikes?





Thank you!

