NORTH AMERICA, CENTRAL AMERICA AND CARIBBEAN
TRACK & FIELD COACHES ASSOCIATION

NACACTFCA BULLETIN Vol. 7 Number 4 – June 2010

NACACTFCA

20th Anniversary Congress to be held in Houston, Texas October 14-17, 2010

Practical Applications of Athletics Training and Technique
Marriott Medical Center and Rice University
Presenters: Keynote – Doug Logan, CEO USATF
Vitali Petrov – coach of Bubka and Isinbayeva
Tom Tellez – coach of Carl Lewis and several other Olympic medalists
John Godina -2 time Olympic Shot Put Medalist
Dr. Lyle Knudson – Distance Expert

Go here for Flier and Registration Information in English:
http://nacactfca.org/2010%20Houston%20Congress%20Brochure%20ENGLISH.pdf

2010 World Junior Coaching Seminar – Moncton, New Brunswick, Canada

Effectively Managing the Transition for Junior to Senior
July 18-25, 2010 along with IAAF World Juniors! 2 day Seminar by world-class coaches, followed by observation and tutorial with Les Gramantik and other coaches during the competition for the World Junior Championships - sponsored by NACACTFCA! Click for info: http://bit.ly/batcJd

World Congress on Science in Athletics – Barcelona, Spain

July 24-26 , 2010 – in conjunction with the European Athletics Championships!
http://nacactfca.org/WorldScienceCongressBarcelona2010.pdf

Call for papers and articles for this bulletin – please email Word .doc or .pdf format to rmercado@sjs.org

Previously archived articles from NACACTFCA Congresses will be published in this and future bulletins.

Featured here – Dan Pfaff: Skill Acquisition and Correction Concepts for High Jumpers

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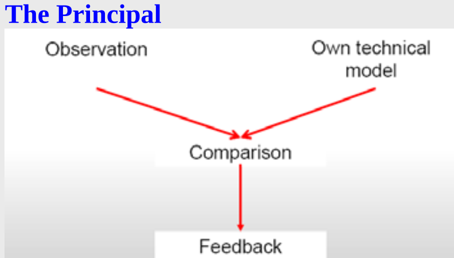
HIGH JUMP - Technique and Technical Training

Dr. Wolfgang Ritzdorf (GER)

The Training Situation

- In technical training we permanently use messages like
  - Your last stride was too long
  - Your lowering was too deep
  - Foot plant was too passive, etc…

The Principal



Observation

- Movements are extremely fast
- Position of observation, "coaching zone"
- It needs a lot of experience and practice to really see what happened
- Use of technical aids like markers and video to support and verify the observation
- If the observation is incorrect the message must be wrong

Technical Model

Basic question - WHERE DOES OUR TECHNICAL MODEL COME FROM?

Besides the observation this will determine the result of the comparison

Technical Models

- Technique of the world best performers?
  - Sotomajor ? / Cloete ?

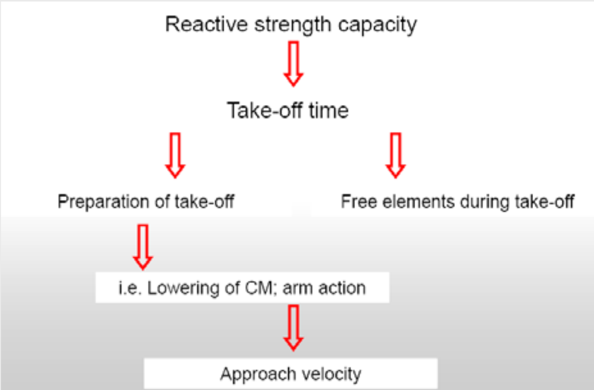
Specifics of High Jump

- Run-up is shorter and slower
- Curved approach
- Take-off time is longer
- Take-off angle is steeper
- Rotations around three axis

Consequences

- Due to its specific characteristics the high jump allows more technical variations than the other jumps
- Due to its specific characteristics the high jump allows more technical variations than the other jumps
- The following model shows an alternative approach for analysis and technical understanding of the high jump

Order of Influence



Strategies

- Identify key elements that are identical in top athletes
- Check whether personal style contributes to performance
- Check whether personal style hinders performance

KEY ELEMENTS (Selection)

- Increasing stride frequency
- Decreasing flight times at the end of run up
- Inward lean
- Acceleration of the hip before TD for takeoff
- Backward lean at TD for takeoff
- Full body extension at toe off
- Arching the body over the bar vs. Rotating over the bar

NON - KEY ELEMENTS (Selection)

- Opening and length of approach run
- Radius of the curve
- Arm action
  - Single arm
  - Short double arm
  - Wide double arm
- Approaching the bar

Training

- Running, running, running
  - The basic mechanics of running must be developed before you can expect a proper run-up
- Bouncing
  - The adaptation of the nervous system to short ground contacts must be developed by basic jumping drills
- Strength and power
  - Well developed strength of the whole (!) body is essential

Technical training

- Develop the major qualities by drills apart from the bar

Reasonable

- The number of repetitions will be much higher

- **How can you expect a proper technique if the basics are inadequate?**

Training versus Competition [The Common Approach]

- **Competition is considerably different from training**
- **It's the "here and now" that counts**

Pre-Competition Training

- **Unlike other sports (i.e. gymnastics) it's a bad habit in athletics to work on technical details in the last week before a major competition**
- **Work on rhythm instead of technical details**
- **Work on what you have**
- **It's quality that counts**
- **Go for distance / height**

Training versus Competition [A Better Approach]

- **Number of practice jumps is limited**
- **Time limits, time extensions, disturbances**
- **Pressure, stress**
- **Warm-up procedure**

Consequences

- **Number of jumps should be limited**
- **Foul jumps should have consequences**
- **Introduce time limits, time extensions, disturbances**
- **Introduce pressure, stress**
- **Insist on ritualised preparation**
- **Assign specific objectives to minor competitions**
- **Use minor competitions to rehearse**

Summary

- **Check whether your technical model matches the physical quality (especially reactive strength pattern) of your athlete**
- **Be strict in key elements, be generous in all the other items**
- **Use a variation of drills for both physical and technical preparation**
- **Training is different from competition**

Biomechanical Data

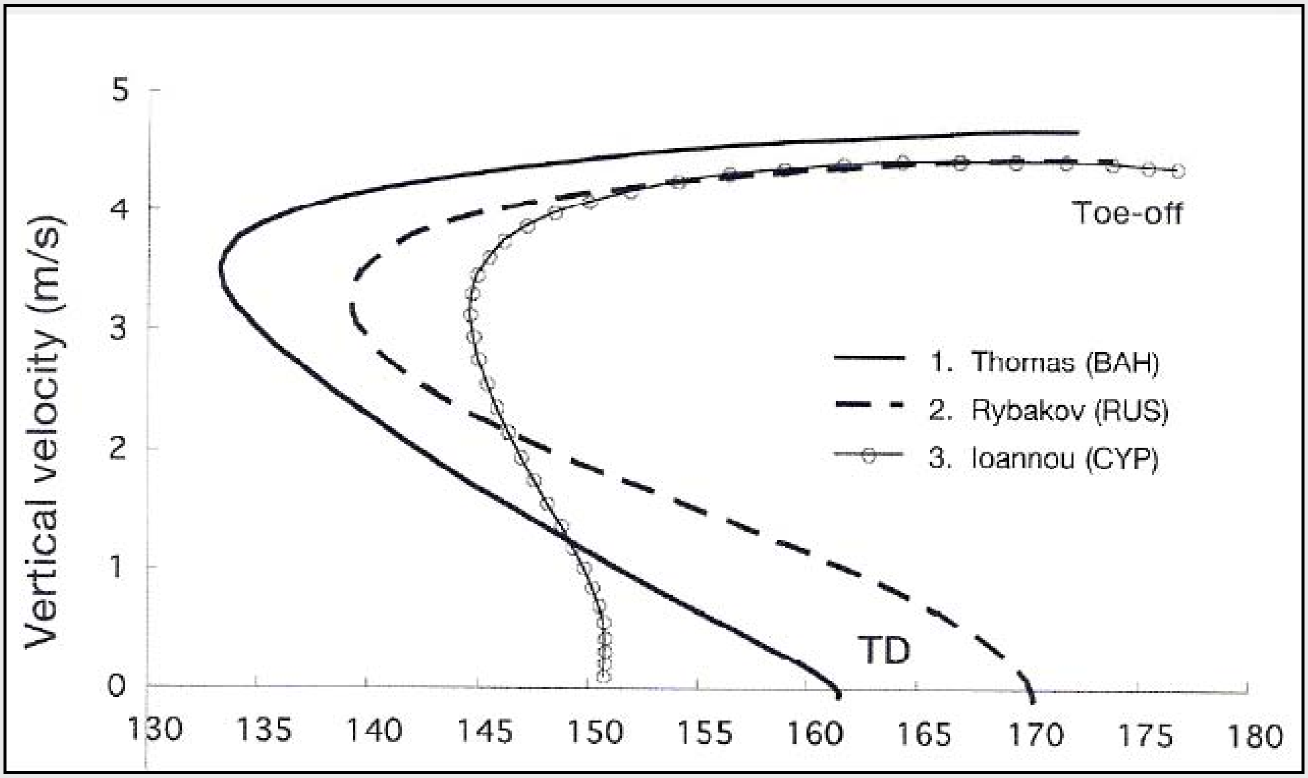
Run-up

- **Length of run-up varies between 7 – 10 strides**
- **Standing start or rolling start**
- **Reference values run-up speed**
  - **Men: 7.0 – 8.1 m/s; Women: 6.5 –7.5 m/s**

Take-off

- **Time: 140 – 180 ms**
  - **LJ: 120 ms; TJ & PV: 110 ms**
- **Angle: 45-55°**
  - **LJ: 20-24°; TJ& PV: 18-20°**
- **The angle is the result of horizontal to vertical speed ratio**

WC 2007



Curve

- **The final curved approach run is an important part of the high jump for two reasons**
  - **Lowering of CM**
  - **Facilitating rotations**

Rotations

- **Vertical Axis – Twist Rotations**
- **Horizontal Axis – Forward Somersault**
- **Frontal Axis – Lateral Somersault**

Findings

Heights of CM at touch-down (TD) and take-off (TO) WC Athens 1997

	Height last stride	Height TD for Take-off	Height TO at Take-off	Vert. Path of acceleration
Sotomajor 2,37m	.91	.86	1.43	.57
Forsyth 2,35m	.96	.99	1.41	.42
Partyka 2,35m	.98	.93	1.32	.39
Hoen 2,32m	.85	.85	1.29	.44
Grant 2,32m	.83	.88	1.33	.45

Velocities and angles at take-off WC Athens 1997

	V run-up	V Hor TO	V vert TO	TO Angle
Sotomajor 2,37m	8,04	3,58	4,80	53
Forsyth 2,35m	6,94	4,08	4,45	47
Partyka 2,35m	7,39	4,20	4,56	47
Hoen 2,32m	7,32	3,71	4,63	51
Grant 2,32m	7,32	4,07	4,52	48

The Art of Coaching in the 21st Century - Horizontal Jumps

Nelio Alfano Moura
Brazilian Athletics Federation
IAAF HPTC – São Paulo

The subject chosen for the 2008 NACACTFCA's Congress is opportune. We live a time of intense scientific and technological development, and the trend is to see acceleration in the production of knowledge and development of tools to be used by coaches and other sport professionals. The costs of systems and equipments are falling, and nowadays it is possible to have a physiology or biomechanics personal laboratory that can be transported in a backpack. I always give as example the MuscleLab ™, an almost complete solution for strength and power evaluation, training prescription and training control.

Coaches who want to be successful in the highest level can't stay away from these new technologies. However, it is important to remind that they are only TOOLS to be used in a smart way, not the focus of the attention. As also happens in educational environments, the ACTIVITY is the most important component of sports training. Successful coaches have personal abilities that surpass the availability of technological resources and their capacity to use them. These attributes as a whole have been named "Art of Coaching".

At this presentation, I will try to show a few technological resources I have been using to prepare jumpers in Brazil, the way I interpret and use scientific knowledge to help them to develop, problems I have faced trying to apply this knowledge, and some creative ways (art??) I have used trying to solve them.

A few aspects should be highlighted in advance:

Talent Identification

This is obvious: the first step to develop an elite athlete is to discover him or her! Brazil has a population of 187 million inhabitants, with a small prevalence of women. Around 23% of them are teenagers, something like 43 million people (Source: http://www.ibge.com.br). There is no consensus about minimal values to be achieved in motor tests in order to qualify a young person as a sport talent. Ljach, apud Hohmann e Seidel (2003) affirms that the old GDR and USSR used as minimum requirement 2 *sd* above the mean in field tests to select children for their system of sports talent's promotion. That means 2,3% of the teenagers. In Brazil, using the same norm, we can consider the existence of 989.000 teenagers with potential to each group of events! How to identify them, and how to attract them to the track, is our first and most important challenge.

Talent Development

Once identified and properly selected, it is time to begin a long term program of development for these athletes. Good initial values are important, but we also need to identify those with good trainability, another characteristic of sport talents. Both aspects are determined at least 50% by genetics, validating the need of a program of talent identification: systematic practice, perseverance and opportunity are

not enough. To offer programs that are adequate from the physiological, social and emotional points of view, and meaningful and motivating enough to keep the kids involved with the sport for many years is our second big challenge.

High Performance Training

Only after successfully complete the previous phases we can talk about a program aiming elite results. Even though we didn't solve our first two big challenges, a few athletes reach this phase, and have been developed appropriately. At this point, it is important to consider the big tendencies of the contemporary theory of sports training. In every case science, technology and the "Art of Coaching" are present: Planning and Training Monitoring; Individualization; Specificity; Interdisciplinary Approach.

William Wuyke and Nelio Moura with Congress Participants in Aruba


William Wuyke, Dennis Shaver, and Wolfgang Ritzdorf field questions in Aruba

Blast from the Past NACACTFCA Congress Article!

Dan A. Pfaff - University of Texas - Skill Acquisition and Correction Concepts for High Jumpers

A mistake in the athlete's technical pattern cannot be considered corrected until that athlete can clearly tell the difference between correct and faulty execution. Correction is further enhanced by stabilized execution of the more correct form. These foundational tenets of motor learning are influenced to a great degree by the perceptional grids possessed by both the coach and athlete. There are many factors that influence the learning of new motor behavior and the eradication of faulty activities. Listed below are several of the more common inhibitors blocking this learning process.

I. Possible Causes of Faults During the Learning Process
A. Misinterpretation of kinesthetic feedback

1. Obtaining maximum frequency during the first half of the approach might result in the athlete feeling fast as they prepare to take off but will result in a lessened momentum index and poor neuromuscular facilitation.

2. Bounding steps during the approach might utilize elastic energy systems and increase vertical velocity awareness but in fact result in slower approach speeds and increase approach accuracy problems.

B. Poor motor abilities
1. Tight erectors combined with shortened iliopsoas muscle result in increased antiversion of the pelvis. This lessens sprint efficiency and creates havoc in setting up the takeoff apparatus.

2. Poor dynamic balance of the lower leg can result in less efficient use of the foot as an elastic spring mechanism both while sprinting and while jumping.

C. Missunderstanding movement concepts
1. Flexion of the trunk forward to gain a more forceful takeoff in fact causes severe deceleration and fatal rotational movements.

2. Opening the takeoff foot prior to planting combined with premature shoulder rotation will result in getting the back to the bar but creates a much flatter parabolic path and creates numerous lower leg injuries.

D. Negative interference from another technique
1. A rigorous adherence to cycle kinesthetics will result in a poor setup for takeoff.

2. Arm mechanics taught in gymnastics can reduce run up speeds and create dysfunctional preparation for takeoff.

E. Insufficient background in fundamentals
1. The inability to run an approach with uniform, maximal controlled acceleration will result in reduced force application at takeoff.

2. The lack of free limb mechanics will not only affect vertical force production but can also create parabolic flight curve problems.

F. Interference of poor learning environment
1. Peer pressure is not always beneficial.

2. Constant negative feedback without positive alternatives can be demoralizing.

G. Premature introduction of strength or speed into the new skill
1. Increasing a jumper's length of approach will normally result in greater speeds at takeoff, but if the "preparation for jumping" concept is not stable, then progress will be limited.

2. Static strength gains may reduce elastic output and/or synchronization.

H. Lack of physical abilities required by the skill
1. Weak or injured hip musculation will result in reduced run velocities and sub- maximal takeoff forces.

2. Poor starting strength value limits approach starting forces and in addition restricts change in direction speeds.

I. Fear of injury
1. Sacroiliac injuries lead to protective postures both during the run up and throughout the takeoff movement.

2. The inability to land on the shoulders and roll with the momentum can create clearance difficulties and often promote injury.

J. Poor demonstration or explanation of skill
1. Numerous studies have shown that what an athlete or coach thinks is occurring does not actually happen when analyzed scientifically.

2. Unique positions or movements by model performers may in effect be stylistic quirks and/or compensation movements.

K. Overtraining of technical concepts
1. Analysis can cause paralysis. Flow state dynamics are inhibited by constant evaluation noise.

2. The neuromuscular coordination environment demands an orientation to spatial or temporal cues specific to that moment and the physiological state of the athlete.

II. Possible Causes of Faults in Established Techniques Already Learnt
A. Rational technique was not explained
1. Ineffectual posture during the last few strides of the approach due to a lack of understanding of acceleration mechanics often creates poor takeoff forces.

2. The effective use of limbs to counter undesired rotational forces is often lacking in novices.

B. Technique was not stabilized before competitions began
1. An athlete who exhibits technical mastery in training but reverts heavily to old motor behavior during the competition is in need of further stabilization methods.

2. Movements that look sound fundamentally but result in substandard results may be lacking in temporal rehearsal schemes.

C. Injury has caused compensatory movements
1. Microtears in the lower hamstrings will result in amortization problems upon the plant of the takeoff foot.

2. Sacroiliac joint disturbance will limit hip undulation and oscillation. This in turn reduces run and takeoff efficiency.

D. Poorly designed training programs
1. A lack of adherence to complimentary and compatible training principles can wreck skill coordination.

2. The inability to define over training symptoms results in skewed parameter development.

E. Poor training conditions
1. Repetitive work on hard or fast surfaces may result in compromised amortization-elastic force dynamics.

2. Attempting high intensity effort on less than optimal surfaces will result in a compromised takeoff scheme.

F. Technique is incompatible with lever system
1. A style that was effective at a particular level of strength and speed may have to be modified once new parameters are achieved.

2. The use of free limbs changes as velocities increase.

G. Coach lacks knowledge as athlete progresses
1. A sound foundation in biomechanics can save one years of experimentation looking for answers to annoying disturbances that are systemic.

2. The violation of kinesiological premises is rampant in the art and the literature.

H. Poor physical condition results in compensatory actions
1. A lack of eccentric strength will limit elastic energy production.

2. Imbalances between the iliotibial band tracts and the adductor magnus will prevent efficient curve running dynamics.

I. Poor technical model
1. The biomotor qualities of each individual athlete dictate stylistic peculiarities.

2. A common denominator analysis of both "intra" and "inter" trial efforts may reveal the "truth" much more readily than just blindly copying the current world leader.

Coming Soon – reprinted NACACTFCA articles from Loren Seagrave, Brian Maraj, Clyde Hart, Rudiger Harksen, and others…

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Featuring USATF CEO Doug Logan, Vitali Petrov, Tom Tellez, John Godina, and Lyle Knudson. Click HERE for the brochure with schedule and registration information.