Training For The Long Jump

Aston Moore
Establish Your Technical Style/Model

• I don’t have a particular style for the long jump
  – Some countries (French, Chinese, Cubans) tend to produce long jumpers with very similar styles

• Once you adopt your technical style, that dictates what you do and how you implement your training programme

• I coach according to the bio-mechanical model that tells me what actions needs to be performed for successful long jumping
Preparation for Take-off

• Let’s accept that elite long jumpers have to be extremely fast at take-off

<table>
<thead>
<tr>
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<th>Men</th>
<th>Women</th>
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<tbody>
<tr>
<td>Long Jump</td>
<td>10.7m/s – 11.0m/s</td>
<td>9.4m/s – 9.8m/s</td>
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• Research – 20 elite/national level athletes
  – Jumpers run down the runway like a sprinter and we only see a change in normal sprinting behaviour over the final 2 strides from the take-off
Preparation for Take-off

– At touch down of the second to last stride, there is a large decrease in the height of the athlete’s CM and a small increase in the touchdown distance.
  
  • The long jumper is lower and land with the support foot further forward than in any of the preceding steps.

– In the last stride, there is a pronounced decrease in the flight distance and a further increase in the landing distance, during the last step.
I don’t buy into the idea that long jumpers should run off the board

– Sure, the long jumper has to maintain or increase their horizontal velocity through to the take-off
  • Dictated by specific strength and technique

– The whole purpose of the long jump take-off is to impart as much Vertical Velocity as you can (without a decrease of horizontal velocity)
  • Vertical velocity is not how high the jumper get of the ground (necessarily), it is how fast they get up into the air
The Take-off

• Of the 3 phases of the long jump, the take-off is the most important element
  – An athletically straight, pre-tension leg is planted on the board with “negative” foot speed
  – Think of climbing stairs
  – At touchdown, the take-off leg act as an “elastic lever”
    • Not a conscious flexing and extending

• To take advantage of the potential additional vertical impulse of the free limbs
  – the thigh of the free leg should be as close as possible to the take-off leg at the moment of plant
  – This should ensures the free knee will complete its punch to the front of the jumper’s body before full extension of the take-off leg is achieved
    • The punch of the arm and free knee should be sudden and “stopped”
Long Jump Flight and Landings

• The flight technique employed by jumpers is in general:
  – A function of personal style
    • Running in the air / Hitch-kick
    • Hang
    • Combination
  – Jumping ability
    • Time in the air

• Generally, I allow the athlete natural affiliations to dictate the flight technique they use. However, if I have to choose, it is based on:
  – The need to arrest forward rotation
  – To improve the preparation for landing
Session Organisation

• Session Organisation
  – Learning takes place only if successful jumps outweigh unsuccessful jumps
  – Assess strides where learning takes place
    • 9 – 11 strides
    • Most jumps are performed from this place
    • Mixed with jumps of a higher intensity
Plyometric Training For Long Jumpers

Aston Moore
What is Plyometrics?

• Plyometric activity, is a quick powerful movement involving the Stretch Shortening Cycle (SSC).
  – A SSC is when a muscle is stretched before it contracts. This eccentric - concentric coupling is referred to as the SSC.

• There are two mechanism at work in a SSC
  – Stored Elastic Energy
    • If a concentric contraction is preceded by a quick eccentric action, the force generated by the concentric contraction is significantly more powerful due to stored elastic energy
    • How does that work?
      – During the eccentric phase, the connective tissue is stretched, and energy is stored
      – As the muscle shortens (concentric contraction), the stores energy is recovered and contributes to the force the muscle can generate.
How Does Plyometrics Works

• Stretch Reflex
  – Muscle Spindle
    • Within the muscle complex there is an organ called the muscle spindle.
    • The spindle is sensitive to stretch, and is activated during violent stretching of the spindle itself and the surrounding muscle fibres.
    • Once activated, the spindle sends a signal to the surrounding muscle to contract, thus relieving the stretch on the spindle

  – Golgi Tendon Organ (GTO)
    • This is a tension relieving mechanism, which is situated within the tendons near the point of attachment of the muscle fibre to the tendon.
    • When potentially dangerous forces develop in the tendon, the GTO fires and causes the muscles to relax which limits the amount of tension in the tendon
      – For years I use to wonder how does that help me to become more powerful
How Does Plyometrics Work?

• The ability to use stored elastic energy is affected by the rate and magnitude of stretch.
  – Muscle power output is enhanced if the preceding eccentric contraction is of a small range and performed quickly.
    • The quick change in direction is the important factor
  – Training should be designed to improve the time it takes to switch between the eccentric contraction and the start of the concentric contractions.

• Too much energy and therefore power can be lost if knee flexion is too acute or if the amortisation phase is too long.
Benefits of Plyometric Training

• Better recruitment of motor unit

• Handle greater loads at greater speeds
  – The greater the load and stretch in the eccentric phase, the greater power output in the subsequent concentric contraction.

• The stretch reflex mechanism increases power output by:
  – Recruiting additional fibres that would not normally be recruited in ordinary concentric contraction.

• The potential inhibition of the GTO.
  – GTO limits the amount of force produce within the muscle, its stimulation threshold becomes the limiting factor.
  – With stressful plyometric training the GTO can become less sensitive to stress and thereby allow greater loads and the potential for greater force to be developed.
A Tale of Two Methods

• There are two ways you can put together a plyometric session
  – As a Separate element of training
    • Has its own periodisation phases
      – Target sub-division of the SSC (eccentric-Isometric-concentric)
    • Drawbacks
      – heavy on the loads and volumes
      – Counter-productive with reference to technical training
  – As an Integrated element of training
    • It occurred to me that Plyometrics was just another form of strength training and as such...
      – Part of the strength training element which leads to “Power or Explosive Force”
    • Periodised/weaved appropriately within the strength element
    • Less interference with the jumps technical elements
A Tale of Two Methods

• Many coaches get themselves into trouble with Plyometrics by going to the end game (DEPTH JUMPS) without following proper progression.

• Designing a strength training periodised year which included plyometric activities, with the end goal being the highest expression of “Dynamic/Explosive Strength”, it should have the following progression:
  – Single **counter-movement Jumps**
  – **Consecutive Jumps in-place**
  – **Consecutive Jumps with displacement**
  – **Barbell Exercises** (Maximum Strength)
  – **Explosive Jumps** with Barbell mixed with plyometrics (Complex/Contract)
  – **Depth Jumps** mixed with barbell exercises (Complex/Contract)

• The demands become increasingly more difficult
  – The above progression could also be a 3 stage LTAD for jumpers
# Integrated Plyometric Method

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<th>Training Objectives</th>
<th>General</th>
<th>Specific</th>
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<td><strong>Strength Resist Method</strong></td>
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<tr>
<td></td>
<td>Foundation 3-5x5x75-80%</td>
<td>Maximum Strength 3-5x5x80-90%</td>
</tr>
<tr>
<td><strong>Strength Plyo Method</strong></td>
<td>Singular Maximum Explosive Jumps (Forward &amp; Jump)</td>
<td>Vertical Jumps (in-place), Jumps Onto Box, Box Jumps (Low/High)</td>
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Integrated Plyometric Method

• Allows you to focus on the engine as well as technique improvements
  – There are times when only plyometrics are done and times when only gym work is done
  – It allows you to teach simple movements while developing “Explosive Force”
  – It allows you to develop “Explosive Force” while building on movement efficiency

• Recognise that ALL plyometric activities are part of a continuum
  – Reactive Str.  ↔  Explosive Str.
  – It’s not what you do, it’s the way that you do it
Know What You Are Training For

- **Reactive Exercises** – (quick response)
  - Any exercise that allow you to get off the ground quickly
    - What does quickly mean??
    - Minimal knee flexion
    - Ball of the feet
    - Impulse mostly below the knee
  - Helps to stiffen the system

- **Power Exercises** – (medium response)
  - Any exercise where both force and suddenness of movement is required in more or less equal quantities
    - Knee Flexion is more acute
    - Whole foot contact – most of the time
    - Impulse involves a greater use of the hip and knee

- Exercises can be Single or Double
  - It doesn’t matter, it’s a question of ability
What About Volumes

- Plyometrics are strength exercises, therefore the same rules apply
  - Repetitions
    - 1-3 repetitions = Maximum Force
    - 3-5 repetitions = Power
    - 7-10 repetitions = Power Endurance
  
  - Sets
    - 7-10 = Maximum Force
    - 4-6 = Power
    - 3-4 = Power Endurance
  
  - Overall Volumes (Per Session)
    - 50-75 Contacts = Competition Phase
    - 100-150 Contacts = Specific Phase
    - 200-300 Contacts = General Phase
First - Do No Harm

Where the rubber meets the road or your feet hits the ground

• Work from the ground up
  – Feet
    • Most plyometrics activity with the outcome of “impulse force” should be executed with a whole foot contact
    • Look for signs of feet abnormalities – pronation
  – Knees
    • Rolling Shins
    • Knock Knee
    • Proper force absorption
  – Relationship Between Torso, Hips and Feet
    • Must be aligned
      – Upright or Forward lean
Is Plyometrics Different for LJ?

• Recent studies suggest HDJ can be more effective in reducing 10m sprint times than VDJ
  – There is little difference between plyometrics for Long, Triple or High Jump – except for:
    • Speed of contact
    • Angles of take-off

• Exercises that are more reactive and which generate more vertical impulse
  – That doesn’t mean you neglect exercises that are more towards the strength side of power

• Once you understand how and why plyometrics work, you will be able to adapt exercises to any event – they are just a variations on a theme
DEMONSTRATION
QUESTIONS?

Aston Moore
Senior National Performance Institute Coach – Horizontal Jumps
M: +44(0)7718526370