

# 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

	Men	Women
Long Jump	10.7m/s – 11.0m/s	9.4m/s – 9.8m/s

- 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.

## Preparation for Take-off

- 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 gets off 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

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## 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 Works?

- 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 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 produced 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

Training Objectives	General			Specific						
<b>Strength Resist Method</b>				Foundation 3-5x5x75-80%	Maximum Strength 3-5x5x80-90%	Maximum Strength 4-6x3-2x90-95%	Dynamic Strength (consecutive jump squats 20-30%), 2:1	Dynamic Strength Complex (Vertical jump squats 50-70%)	Explosive Strength Complex (Maximum Strength (2) 2-3x90-95%)	Speed Strength 3x4-6x70%
<b>Strength Plyo Method</b>	Singular Maximum Explosive Jumps (Forward & Upwards)	Vertical Jumps (in-place), Jumps Onto Box, Box Jumps (Low/High)	Multiple Consecutive Jumps with Forward Displacement (sub-maximal) Hop/Stops	Sub-maximal Hops and Bounds (40-60m), Hurdle Jumps (spaced),			Maximal Hops and Bounds (30-40m). Hurdle Jumps (close) 1:2	Explosive Strength Complex (Intensive Bounds 20-40m)	Explosive Strength Complex (Depth Jumps)	Speed Bounds and Hurdle Jumps (close) (Power Sets)



## 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 suggests 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 works, you will be able to adapt exercises to any event – they are just a **variations on a theme**

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# DEMONSTRATION

## QUESTIONS?



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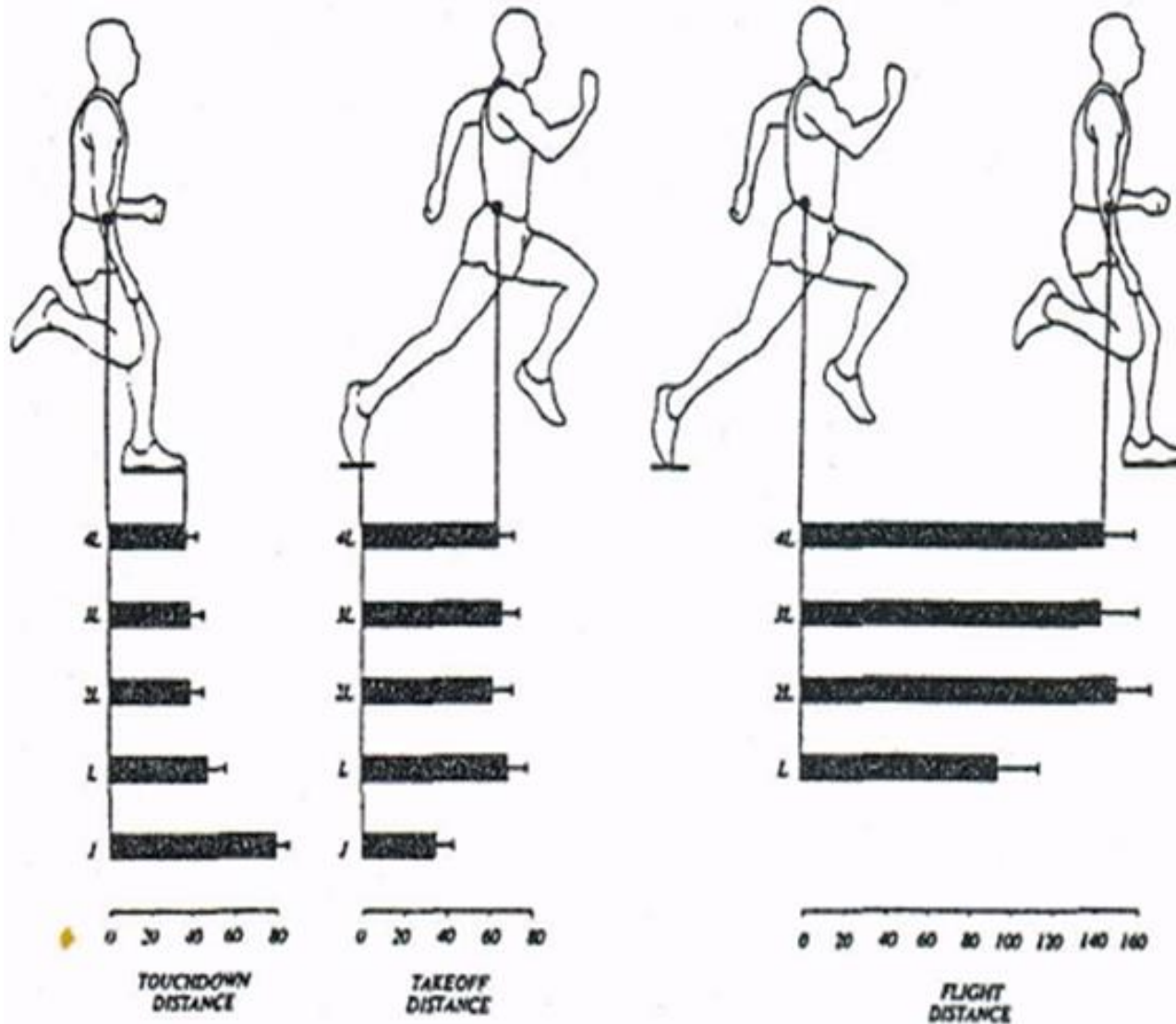


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305

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