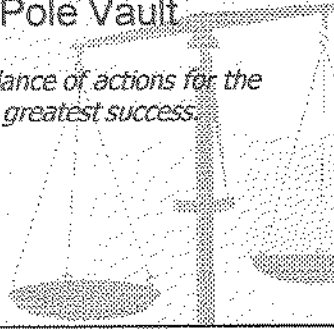


Inversion Mechanics, Techniques, and Drills for the Pole Vault

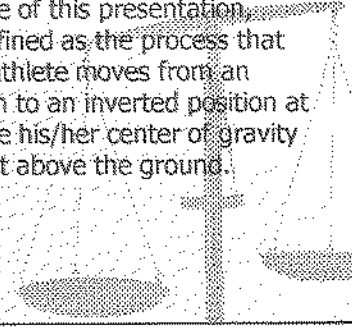


*A balance of actions for the
greatest success.*

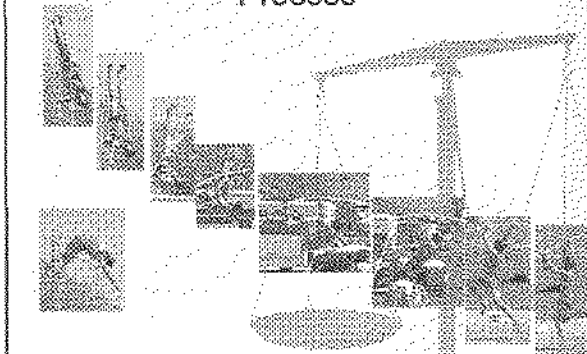


Definition

- For the purpose of this presentation, Inversion is defined as the process that occurs as the athlete moves from an upright position to an inverted position at the point where his/her center of gravity (c.g.) is highest above the ground.

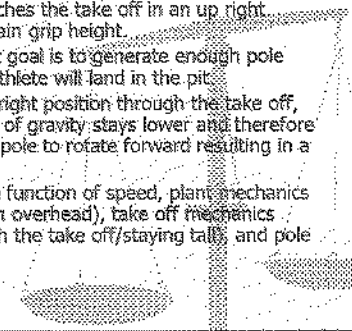


An Example of the Inversion Process

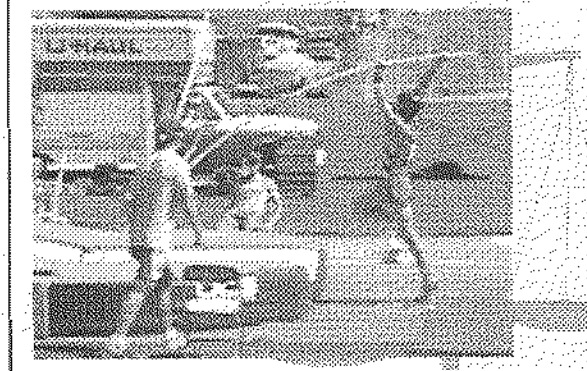


Initial Goal: Land on the Pit

- The athlete approaches the take off in an upright position with a certain grip height.
- At take off, the first goal is to generate enough pole speed so that the athlete will land in the pit.
- By staying in an upright position through the take off, the athlete's center of gravity stays lower and therefore better allowing the pole to rotate forward resulting in a safe pit landing.
- The grip height is a function of speed, plant mechanics (tall and hands high overhead), take off mechanics (running up through the take off/staying tall) and pole flexibility.

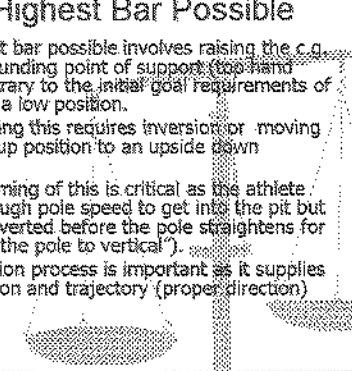


Take Off Position

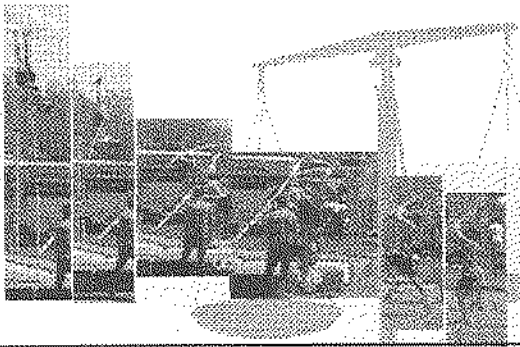


Performance Goal: Clear the Highest Bar Possible

- To clear the highest bar possible involves raising the c.g. high above the grounding point of support (the hand grip) which is contrary to the initial goal requirements of keeping the c.g. in a low position.
- The process for doing this requires inversion or moving from an upright position to an upside down position.
- The balance and timing of this is critical as the athlete must generate enough pole speed to get into the pit but also needs to be inverted before the pole straightens for best results ("beat the pole to vertical").
- Further, this inversion process is important as it supplies energy for propulsion and trajectory (proper direction) off the pole.



Sequence from Upright to Inverted



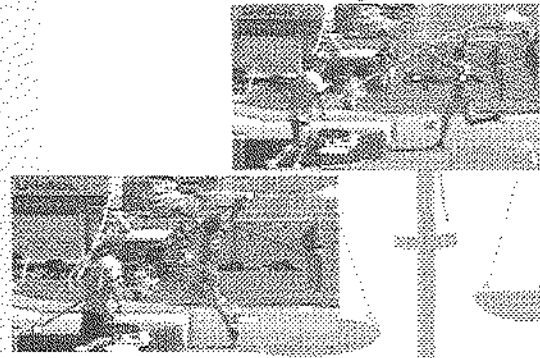
Inversion Mechanics or How to get from Right Side Up to Up Side Down?

- The pole vault take off by nature lends itself to swinging. At take off, because of the stopping of the top hand and the forward momentum of the body generated by the run, the athlete will tend to swing forward toward the line of the pole or its cord (if pole is bent). The cord is defined by the line from the grip to the butt end at pole/box. This initial swing is not sufficient to completely invert the athlete so the athlete must perform other actions to arrive at a completely inverted position.

Note: Factors Limiting Long Body Swing to an Inverted Position

- When watching a vaulter from left to right, the greatest full body swing is generated when the athlete takes off in an upright (right side up) position. The swing potential diminishes as the vaulter rotates counter clockwise toward the cord of the pole. If the athlete stays long (straight body) past the cord of the pole, he/she will eventually begin rotating clockwise back to the cord of the pole (away from the desired goal). This may lead to flipping forward off the pole.

Initial Swing

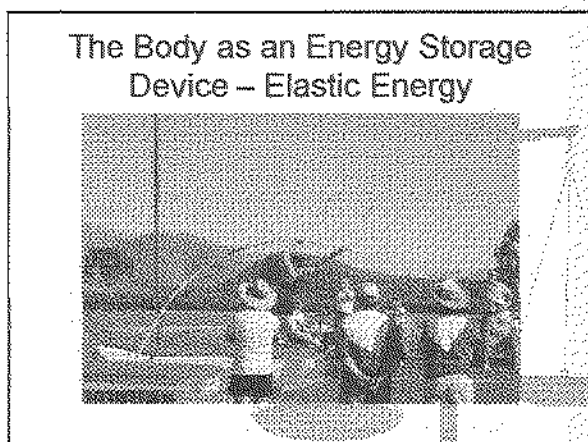
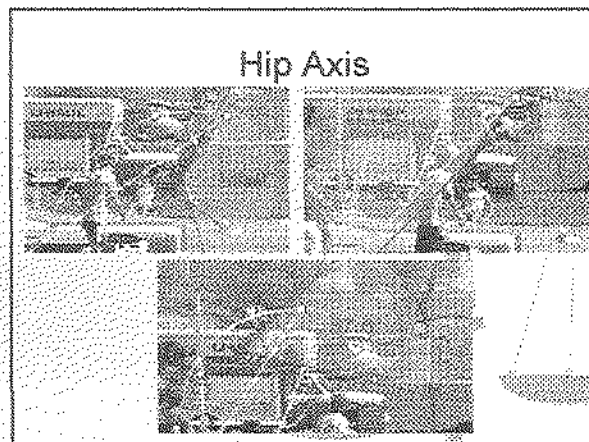
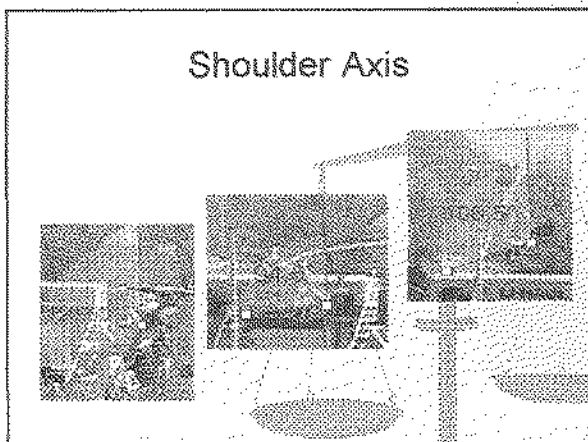


Swing Magnitude

- The magnitude of this initial swing is largely determined by the approach velocity, the ridgedness of the pole, posture of the athlete at take off, and the work the athlete does on the pole. The energy from this swing magnitude can be utilized and magnified in a variety of ways dependent on the actions of the athlete.

Multiple Axes of Rotation

- The initial axis of rotation is formed by the top hand grip (and somewhat the bottom hand) and pole with the body swing toward the pole.
- Secondary axes are formed at the shoulder, hip, vertebrae, knee, and elbow.
- The sequential timing and activation/deactivation of these axes determine style and result.
- Further performance variables include utilization of elastic muscular response for concentric contraction.



The Use of the Initial Swing

- By performing certain actions the vaulter can use the initial swing generated to accelerate the swing action or retard it and store the energy for later use relying on a different method to invert his/her body. The first example can be referred to as a "swing technique" while the second method as a "tuck and shoot technique".

Example of "Swing Technique"

- [..\Desktop\Shortcut to 19970801 Bubka 601.Ink](#)
- [..\Desktop\Shortcut to 20010806 Dragila 475.Ink](#)

Example of "Tuck and Shoot" Technique

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- [..\Desktop\Shortcut to 20010806 Feofanova 475.Ink](#)

To Swing or Not to Swing to Inversion

Advantages/Disadvantages of "tuck and shoot"

Keeps vaulter c.g. lower longer allowing the pole to rotate to vertical more easily with higher grip. Appears more difficult physically to effectively time or complete extension.

Advantages/Disadvantages of "swinging to vertical":

Better use of available rotational forces and body elasticity to arrive at an inverted position in a timely manner. May limit effective grip height.

Note: Most individual techniques lay somewhere in between. This presentation devoted more to swing style of vaulting.

Drills and Exercises: Clues for the Athlete to Learn How to Effectively Invert

- Drills only as good as their application to the goal.
- Clues, Cues, and Adjustments – Drills as a Clue to Sensory Information
- Training and the Mixing of Drills with Full Vaults

Drills: Setting it Up!

- Grass/ground vaults
- Step through on pit
- Run and grab rope
 - Still rope
 - Swinging rope
- Turning up and staying down

Your Body as a Pole: Creating Elastic Energy

- Shoulder Rotation (Chest Pressure) Drills
 - Med ball overhead catch from lunge position, kneeling, and walking into simulated plant
 - Throwing stuff – e.g. football, javelin,
 - Pole push drill
- Hip Rotation (Leg Sweep) Drills
 - Swinging on rings – especially split leg swings
 - Rope swings to invert in split position

Developing Timing of the Rollback Shoulder Drop, and a Sense of Tap

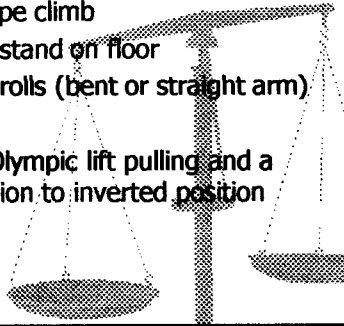
- No touch pull overs
- Back hip circles (free hip)
- Kip and drop kip on horizontal bar
- Kip and drop kip on parallel bars
- Giants swings on horizontal bar
- Free hip to handstand on horizontal bar

Applications: Pop Ups on Pole – straight and bent poles

- Straight pole pop ups
 - Focus points: chest through bottom, high hands, open shoulders; tap to invert with same feeling as drills.
 - Don't pass the pole
- Soft (bending pole) drills are to mimic good straight pole drills.

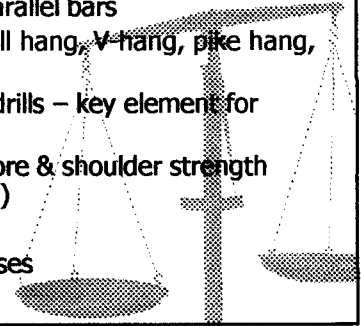
Beating the Pole to Vertical "Pulling Drills"

- Upside down rope climb
- Pike up to handstand on floor
- Back extension rolls (bent or straight arm)
- "Topper" drill
- Connection of Olympic lift pulling and a vaulter's extension to inverted position



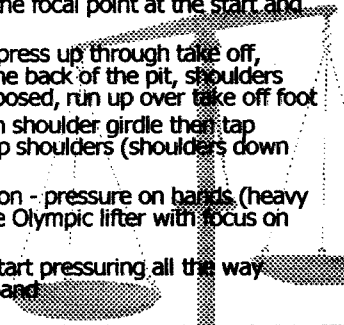
Drills/Exercises for Shoulder Rotation and Strength

- Swinging on parallel bars
- Bubka drills: full hang, V-hang, pike hang, on rope
- Incline Bubka drills – key element for extension
- L – pull ups (core & shoulder strength more than arm)
- Pull up levers
- Pommel exercises



Cutting to the Chase

- Top hand axis is the focal point at the start and finish of inversion
- Set up a swing – press up through take off, chest up and to the back of the pit, shoulders open/arm pits exposed, run up over take off foot
- Create pressure in shoulder girdle then tap (swing) hard, drop shoulders (shoulders down and hips up)
- Extending Inversion - pressure on hands (heavy hands) pulling like Olympic lifter with focus on top hand
- Finish what you start pressuring all the way through the top hand



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