Approach Run
PRECEPTS

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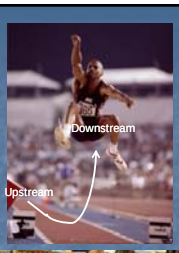
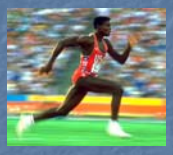
FlyFishing Analogy



Why is the Approach Run so important in the Long Jump?



- **Single most important factor** determining the distance of the jump is horizontal velocity at take-off!

- Parabolic flight of the jumper's center of mass is determined at the moment of take-off.

Why is the Approach Run so important in the Triple Jump?

- Single most important factor in determining the distance of the jump is horizontal velocity at take-off;
- Ability to minimize the loss of that horizontal velocity through two landings determines the sum distance of the triple jump.

Why is the Approach Run so important in the Pole Vault?

- Increase in approach run velocity (Kinetic Energy) will result in an increase in gravitational potential energy stored in the pole and a corresponding increase in vault height.

$$KE = \frac{1}{2}mv^2$$
$$PE = mgh$$

- Research shows that an increase in velocity of 1 meter/second results in an increase of approx. 0.5m in vault height.

POLE VAULT: Velocity Required for Height Attainment

Bar Clearance Height	Velocity Required
5.80m (19'0")	9.1 m/s
5.50m (18'0")	8.7 m/s
5.20m (17'0")	8.4 m/s
4.90m (16'0")	8.1 m/s
4.60m (15'0")	7.8 m/s
4.30m (14'0")	7.5 m/s
4.00m (13'0")	7.2 m/s
3.70m (12'0")	6.9 m/s

Interpolated from Data From Studies by Dr Peter McGinnis, Jan 2003

OBJECTIVES
of the Approach Run

1. Achieve ***Optimal velocity*** .
2. ***Acceleration*** **t-h-r-u take-off** *(Perceived)* **.**
3. Get jumper to (precise) **optimal take-off spot**
4. Execute a **Vertical impulse** at take-off
   (to achieve ***effective*** **take-off** ***vector***)

MAXIMUM CONTROLLABLE VELOCITY

VS.

OPTIMAL VELOCITY

Establishing the Run

- Establish the approach run on the track! (with no markers!)
- Never "run it back"

Length of the Run

Relationship between
a) Number of strides &
b) Measured distance of the approach run

Length of the Run
RULES

- Establish a minimal # of strides which gets the jumper to ***Optimal*** **velocity**.
- The faster the athlete's track speed, the longer it will take them to get to ***Optimal*** **velocity**.

Length of the Run

Relationship between Approach Velocity & # of Steps
(NOT necessarily early season)

30m Crouch Start	100m Crouch Start	# of Steps
3.7	10.2	24
3.8	10.5	22
3.9	10.8	20
4.0	11.1	18
4.1	11.5	17
4.2	11.8	16
4.3	12.1	15
4.4	12.5	15
4.5	12.9	14
4.6	13.2	14
4.7	13.8	13
4.8	14.0	13

Length of the Run
RULES

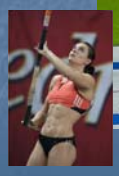
- Length of the Run (# of Strides) needs to be ***increased*** as the Jumper's Maximum Velocity ***increases.***
- Do NOT increase the length of your jumper's run until they are ready to *exploit* their increased velocity with effective take-off technique!

Initiating the Run
(overcoming *Inertia*)

- No "hops," no "skips"
- Every approach run (drills, short run, full run) must start the same way

Initiating the Run
(overcoming *Inertia* while holding Pole)

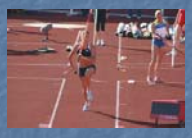
- With (take-off) foot in contact with the runway, "rock back" to the heel of the take-off foot;
- Take a short step back with the other foot;

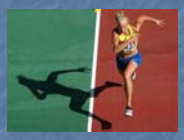


Initiating the Run
(Overcoming *Inertia*)

- Slight lean forward to give horizontal displacement to COM
- Begin to "power" down the runway

Rhythm of the Run





S-m-o-o-t-h acceleration pattern
(velocity curve)

Short Strides → Longer Strides

Slow → Fast → Faster → Faster yet

SPRINT MECHANICS

Two (2) Factors Affect Sprint Velocity

1. **Stride Length**
2. **Stride Frequency**

What happens to **Stride Length** when the jumper decelerates?

It increases

SPRINT PHASES
(of the Approach Run)

1. ***Drive*** **Phase**
2. ***Preparation for Take-off***

DRIVE PHASE
(of the Approach Run)

- Same mechanics as the sprinter;
- Not same acceleration rate as the sprinter;
- Phase is shorter distance / shorter duration than the sprinter's Drive Phase, i.e., reached in 25-35m (82'-114').

DRIVE PHASE
(of the Approach Run)

- "*Back-side Mechanics*" Predominate
- Power from the extensors of hip and knee; (near) full extension of hip/knee/ankle
- Knee drives forward & upward--applies force down & back
- Ground contact is made slightly behind the COM

SPRINT PHASES
(of the Approach Run)

1. ***Drive*** **Phase**
2. ***Preparation for Take-off***

PREPARATION FOR TAKE-OFF
(during the Approach Run)

- Begins when jumper reaches ***Optimal velocity***
- Lasts just a few strides (includes *penultimate* stride and *plant*)
- In the vault, includes the pole plant from start to finish.

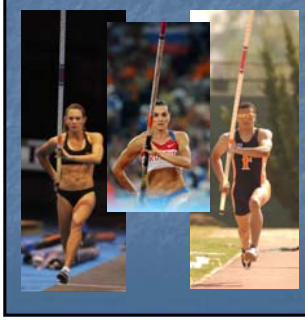
PREPARATION FOR TAKE-OFF
(during the Approach Run)

- "Front-side Mechanics" begin to pre-dominate;
- Power from hip flexors and hamstrings
- Foot touches down slightly ahead of COM
  Active landings-- "feel the runway"
- Ground contact times decrease
- Posture becomes more upright ("running tall")
  Progression of body angle with surface
- Heel recovery is higher
  (foot passes above opposite knee)

POSTURE
(ramifications for pole vault)

In the pole vault, the mass of the pole is a factor in maintaining "***Postural Integrity***"

POLE CARRY MECHANICS
(during Preparation for Take-off)



Pole tip starts HIGH.

G-r-a-d-u-a-l and **ACTIVE** pole drop over entire course of the Approach Run...

As the vaulter runs faster, the pole tip drops faster!

POLE CARRY MECHANICS
(during *Preparation for Take-off*)

- The lowering of the pole tip over the final few strides increases gravitational pull on the extended pole and... actually forces the vaulter to increase their cadence and accelerate into the take-off

POLE CARRY MECHANICS
(Common Mistakes)

Premature pole drop →
- "*carrying*" (instead of "*pushing*") the pole →
  - "arching" the back to counteract gravity force on pole→
    - Feet land ahead of COM→
      - Braking forces→

Deceleration

POLE CARRY MECHANICS
(Common Mistakes)

- Late pole drop→

Rush to get the pole planted in the box →

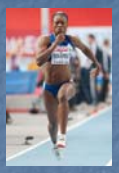
Deceleration

POSTURE

(during *Preparation for Take-off*)

- **Head up**
  (*Neutral* Head position)
- **Chest up**
- **Hips underneath**
  (*Neutral* Pelvic position)
- **Knees up**
- **High heel recovery**

FOCAL POINTS



During the *Drive Phase* --
Focus is on the take-off board!

During *Preparation for Take-off*...
Focus is out the back of the pit
("pick a spot " to focus on)

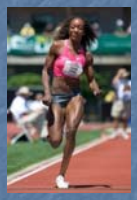
except...

FOCAL POINTS

...except the Pole Vault!

PREPARATION FOR TAKE-OFF

What happens on "*Penultimate*" Stride?



- 2nd to last (penultimate) stride is slightly longer– lowers the COM
- Heel-to-toe foot plant and toe-off
- Last stride is slightly shorter– "catches the COM on the the rise."

PREPARATION FOR TAKE-OFF

("*Penultimate*" Stride)

(example from Long Jump)

METHODS OF TEACHING

PENULTIMATE STRIDE TECHNIQUE

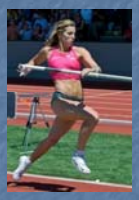
- "Flat foot" landing on penultimate stride, "Flat foot" landing on final stride
  – Tom Tellez
- "Push-pull-plant" (with take-off leg) from 2nd-to-last stride
  – Randy Huntington

HOW CAN THE JUMPER PRACTICE *PENULTIMATE STRIDE* TECHNIQUE?

- Long Jump take-off drills from box
- Basketball lay-up drills
- Hurdles
- *Gallop* drills

PLANT

What happens at the Plant



- Quick last stride!
- "*Gallop*" ~Cliff Rovelto
- "Get on your take-off leg as fast as possible!" ~Joe Walker

ACCELERATION T-H-R-U the TAKE-OFF

ACCELERATION THROUGH TAKE-OFF

Competitor	Best Ht	Velocity 15-10m	Velocity 10-5m	ΔV
J Hartwig	5.84m	9.09 m/s	9.45 m/s	+.36
T Mack	5.74m	8.96 m/s	9.09 m/s	+.13
N Hysong	5.74m	9.02 m/s	9.09 m/s	+.07
T Stevenson	5.74m	9.06 m/s	9.23 m/s	+.17
D Miles	5.74m	8.92 m/s	9.16 m/s	+.24

From Data compiled by Dr Peter McGinnis, Men's Pole Vault Final
USA Track & Field Championships, June 22, 2002, Stanford, CA

Common Causes of **DECELERATION at Take-off**

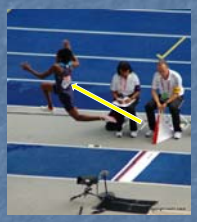
- Approach run may be too long;
- Optimal (Maximum controllable) velocity is reached to early in the run;
- Focus on the board can transmit mixed signals and results in excessive steering (chopping, reaching strides)
- Ineffective plant technique disrupts efficient sprint mechanics

WHAT HAPPENS AT TAKE-OFF?

1. Horizontal momentum from approach run and...

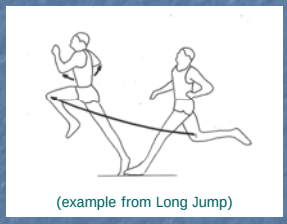
2. Vertical impulse applied at take-off together result in the...

Take-off Vector.



VERTICAL IMPULSE AT TAKE-OFF

(To Achieve **Effective Take-off Vector**)

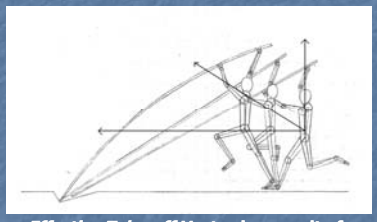


(example from Long Jump)

*** KNEE DRIVE FORWARD & UPWARD ***

VERTICAL IMPULSE AT TAKE-OFF

(To Achieve ***Effective Take-off Vector***)



Effective Take-off Vector **is a result of**
(a) vertical impulse at take-off and
(b) horizontal momentum generated from the approach run.

APPROACH RUN

Length Management Methods

Checkmark Systems

- ***Start Mark*** (only mark the jumper/vaulter is aware of)
- ***Teammate Mark*** (monitors 1st 4 steps of drive phase)
- ***Mid-mark*** (4-6 steps out from take-off)
- ***Take-off*** (not a physical mark)

APPROACH RUN
Length Management Methods

Value of *"Mid-mark"*

- Provides confirmation of "chopping," or, more commonly, "reaching" during final steps
- Provides confirmation of deceleration over the final steps of the approach run
- Allows coach to focus on the jump (rather than foot placement at take-off)

APPROACH RUN
Length Management Methods

Steering

Early visual pick-up of the target (box or board) allows for more subtle stride length changes during the steering phase.

Steering ability is trainable

- Jumping/vaulting from variable run lengths
- hurdling with variable spacing

APPROACH RUN
Length Management Methods

Start Mark Adustments

- Feedback from previous approaches
- Wind, runway surface
- Confidence, Motivation, Arousal
- *"Feel"*

APPROACH RUN

Length Management Methods

Counting Strides

("Left's" for left foot T-O)

- Gives jumper rhythmic feedback
- Helps identify phases of the approach run

QUESTIONS?

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Purpose of SPEED DEVELOPMENT DRILLS

- Affect *Stride Length*
  - "*Backside*" mechanics
    (i.e., pushing down the runway)
    (Near) full extension of hip/knee/ankle
- Affect *Stride Frequency*
  - "*Frontside*" mechanics
    [i.e., driving knee forward, generating *negative foot speed* (whip action of foreleg)]
- Affect "Acceleration thru Take-off"

Progression of SPEED DEVELOPMENT DRILLS

"Mach Drills"

- *A-march*
- *A-skip*
  - *Double A's*
  - *Continuous A's*

Progression of SPEED DEVELOPMENT DRILLS

Drills for Front-side/Back-Side Mechanics

- *A-Bounds*
- *Speed Bounds*
- *Speed Bounds w/pole*
- *Speed Bounds w/thigh weights*
- *Speed Bounds w/pole w/thigh weights*

Progression of SPEED DEVELOPMENT DRILLS

Drills for Acceleration thru Take-off

- *2-step Take-off Drill*
- *Run-Run-Run-Bound w/Pole Plant*
- *Sprint to Rope Plant*
- *Speed Bounds to Rope Plant*

SPEED DEVELOPMENT Physiological Basis

OBJECTIVE

Train the Energy System used in the Approach Run

SPEED DEVELOPMENT Physiological Basis

What Energy System is used in the Approach Run?

Anaerobic/Alactic Energy System

SPEED DEVELOPMENT
Physiological Basis

Most Effective Method of Training the Anaerobic / Alactic Energy System:

- Near-maximal velocity sprints
- 3-8 seconds duration
- Near full recovery, i.e., 1-3'

SPEED DEVELOPMENT
Physiological Basis

Why would we want to incorporate longer sprints (120's, 150's, 200's) into jumper's training ?

- Speed endurance work improves efficiency of metabolic system, reducing recovery time between vaults;
- Longer sprints allow more conscious attention to developing efficient sprinting mechanics;
- Improves "general fitness"—energy efficiency, weight management, etc.
- Improves cardiovascular efficiency thru increased capillarization

SPEED DEVELOPMENT
Methods

Acceleration Sprints

- 10-40m from standing start
- Vaulter-- both with and without pole
- 1' – 3' recovery
- 250-300 meters per session

SPEED DEVELOPMENT Methods

Speed Development Repetitions

- "*flying* sprints" of 30-60m w/1-3 seconds at maximum velocity
- Vaulter– both with and without pole
- 4' – 6' recovery
- 400-500 meters per session

SPEED DEVELOPMENT Methods

Speed Endurance Repetitions

- 80-200m
- 3-5' recovery
- 600-900m meters per session

SPEED DEVELOPMENT (Other Methods)

***Resisted*-Sprinting**
(<10% loss in velocity)

- (Slight) uphill sprints
- Sled-pulling
- Parachute-resisted sprints

SPEED DEVELOPMENT (Other Methods)

***Assisted*-Sprinting**
(<10% gain in velocity)

- (Slight) downhill sprints
- Wind-aided sprints

(for the vaulter, sprints w/o the pole are actually "*assisted*" sprints!)

SPEED DEVELOPMENT NEUROMUSCULAR BASIS

When in the training cycle does the jumper work on speed development?

- Throughout the macrocycle (training year)!
- Frequently in each mesocycle (training phase)
- At least once in each microcycle (weekly plan)
- At the beginning of a training session, i.e., immediately after the warm-up

SPEED DEVELOPMENT NEUROMUSCULAR BASIS

Fatigue cannot be allowed to become a factor in speed development training

SPEED DEVELOPMENT NEUROMUSCULAR BASIS

Although physiological recovery is immediate (i.e., just a few minutes), neuromuscular recovery takes 48 hours (or longer)

"When you're green,
You're growing.
When you're ripe,
You're rotten."