EXOS Presents -
The 0.1 Second Difference

The Science and Application of Elite Linear Speed Development

Nick Winkelman, MSc, CSCS*D
Director of Movement
EXOS
+ Presentation Segments

+ The EVENT
+ The POINT
+ The PATH
+ The PATH: Programming Model
+ The PATH: Technical Model
+ The PATH: Coaching Model
+ The RESULTS
+ THE EVENT
DAY 2: MEDICAL TESTING
DAY 2: MEASUREMENTS
DAY 2: MEDIA
DAY 3: PSYCHOLOGICAL TESTING
DAY 3: BENCH PRESS
DAY 3: TEAM INTERVIEWS
“WHAT WOULD YOU HAVE LEFT?”
DAY 4: THE BIG SHOW
#1: 40 YARD DASH
#2: SKILL DRILLS
#3: VERTICAL JUMP
#4: BROAD JUMP
#5: PRO-AGILITY
“The NFL Scouting Combine came into existence to have an efficient way to obtain physicals on 300-plus players. It’s the first time your medical personnel can check players.”

–Charley Casserly (NFL GM)
“Who is the person inside of the player?”

+ System Fit
+ Leadership
+ Professional
+ Authentic
+ Predictable

Human Performance Qualifier
What the research doesn’t say...

Correlations

<table>
<thead>
<tr>
<th></th>
<th>40 YD ET</th>
<th>BJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 YD ET</td>
<td>Pearson Correlation</td>
<td>-.826</td>
</tr>
<tr>
<td>N</td>
<td>758</td>
<td>714</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
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</tr>
<tr>
<td>N</td>
<td>734</td>
<td>734</td>
</tr>
</tbody>
</table>
What the research doesn’t say...
What are we missing...

Can research uncover the benefit of the Pro Football Combine?

What is the Pro Football Combine missing?

Is it time to institute new drills?
"As to methods there may be a million and then some, but principles are few. The man who grasps principles can successfully select his own methods. The man who tries methods, ignoring principles, is sure to have trouble."

-Ralph Waldo Emerson
+ ATHLETIC PROFILING

9.14m (10yds) 9.14m (10yds) 9.14m (10yds) 9.14m (10yds)

Starting-Strength  Explosive-Strength  Reactive-Strength

Relative ↔ Maximal Strength

+ ATHLETIC PROFILING

9.14m (10yds) 9.14m (10yds) 9.14m (10yds) 9.14m (10yds)

Unilateral-Bilateral Horizontal Jumping

Unilateral-Bilateral Depth (Vertical) Jumping

Squat Jump ↔ Countermovement Jump

Mero (1985), Cronin & Hansen (2005), Holm et al. (2008), McCurdy et al. (2010), Shalfawi et al. (2011), Barr & Nolte (2011)
<table>
<thead>
<tr>
<th>DAY</th>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>AM ACCELERATION 60min AM 1º LB PWR 30min</td>
<td>AM CORRECTIVES 30min AM 1º UB STR 60min</td>
<td>AM ABSOLUTE SPD 60min AM 2º LB STR 30min</td>
</tr>
<tr>
<td></td>
<td>PM STARTS/ABS SPD 30min PM 1º LB STR 60min</td>
<td>PM MULTI (5-10-5) 60min PM 2º UB CAPACITY 30min</td>
<td>REGENERATION/OFF</td>
</tr>
</tbody>
</table>

| THURSDAY  | AM CORRECTIVES 30min AM 1º UB PWR 60min    |                                |                                            |
|           | PM MULTI (L-Drill) 60min PM 2º UB CAPACITY 30min |

| FRIDAY    | AM ACCELERATION 60min AM 1º LB POWER 30min |                                |                                            |
|           | PM STARTS/ABS SPD 30min PM 1º LB STR 60min  |                                |                                            |

| SATURDAY  | AM 1º UB STR-END 60min AM VID ANALYSIS 30min |                                |                                            |
|           | REGENERATION/OFF                             |                                |                                            |
+ Drills create context for athlete understanding

+ Drills should create affordances that allow optimal technical changes to emerge

+ Drills should be executed at a high enough intensity to stimulate adaptation

“Let the drill do the talking and the athlete do the walking”
+ Sequential or concurrent development of motor abilities have a compounding outcome that exhibits positive, negative or no change on performance.

+ Transfer results from complimentary strength and movement qualities being developed in the correct sequence.

(Zatsiorsky and Kraemer, 2006)
<table>
<thead>
<tr>
<th>SPECIFICITY</th>
<th>INTENSITY</th>
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<tbody>
<tr>
<td>FREE SPRINTS</td>
<td>LEVEL 1 Weeks 1+</td>
</tr>
<tr>
<td></td>
<td>10 YARDS (2pt/3pt)</td>
</tr>
<tr>
<td>SLED DRILLS (Waist)</td>
<td>LEVEL 2 Weeks 2-3+</td>
</tr>
<tr>
<td></td>
<td>20 YARDS (2pt/3pt)</td>
</tr>
<tr>
<td>HARNESS DRILLS (Shoulders)</td>
<td>LEVEL 3 Weeks 3-4+</td>
</tr>
<tr>
<td></td>
<td>30 YARDS (2pt/3pt)</td>
</tr>
<tr>
<td>PREP DRILLS</td>
<td>WALL DRILLS MARCH/SKIP</td>
</tr>
<tr>
<td></td>
<td>MARCH/SKIP + OVERHEAD</td>
</tr>
<tr>
<td></td>
<td>MARCH/SKIP + OVERHEAD + LOAD</td>
</tr>
<tr>
<td>SLED MARCH (15-20YDS)</td>
<td>SLED BOUND (15-20YDS)</td>
</tr>
<tr>
<td>SLED SPRINT + LOAD-RELEASE (20-30YDS)</td>
<td>HARNESS MARCH (10-15YDS)</td>
</tr>
<tr>
<td>HARNESS SPRINT (15YDS)</td>
<td>HARNESS BOUND (15YDS)</td>
</tr>
<tr>
<td>FOUNDATION</td>
<td>SPEED STRENGTH</td>
</tr>
<tr>
<td>-------------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Weeks 1-2</strong></td>
<td><strong>Weeks 3-4</strong></td>
</tr>
<tr>
<td>1. WALL DRILLS:</td>
<td>1. SLED DRILLS (Waist):</td>
</tr>
<tr>
<td>2. HARNESS/SLED DRILLS:</td>
<td>2. STARTS/FREE SPRINTS:</td>
</tr>
<tr>
<td>1. SLED DRILL:</td>
<td></td>
</tr>
<tr>
<td>1. 2pt/3pt</td>
<td>1. March</td>
</tr>
<tr>
<td>(3-5 x 5-10yds)</td>
<td>2. March-Bound</td>
</tr>
<tr>
<td></td>
<td>3. March-Bound-Run</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Posture Holds</td>
<td>1. 3-Point (100%)</td>
</tr>
<tr>
<td>2. Load &amp; Lift</td>
<td>(2-3 x 20-30yds)</td>
</tr>
<tr>
<td>3. Single Exchanges</td>
<td>1. Low-Lunge Walks</td>
</tr>
<tr>
<td>(2 x 5-10 ea or 20-30s)</td>
<td>(2-3 x 30yds &gt;50% BW)</td>
</tr>
<tr>
<td></td>
<td>NOTE:</td>
</tr>
<tr>
<td></td>
<td>Sleds are initially used for technique and then specific strength &amp; speed</td>
</tr>
</tbody>
</table>

**NOTE:**
- All drills should be performed at a moderate intensity.
- Technique should be prioritized over speed.
- Adjustments may be made based on individual progress and feedback.
+ ABSOLUTE SPEED PROGRAMMING MODEL

<table>
<thead>
<tr>
<th>LEVEL 1</th>
<th>LEVEL 2</th>
<th>LEVEL 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weeks 1-2+</td>
<td>Weeks 3-4+</td>
<td>Weeks 5-6+</td>
</tr>
<tr>
<td>FREE SPRINTS</td>
<td>FREE SPRINTS</td>
<td>FREE SPRINTS</td>
</tr>
<tr>
<td>40 YARDS</td>
<td>50 YARDS</td>
<td>60 YARDS</td>
</tr>
<tr>
<td>20BUILD+20GO</td>
<td>20BUILD+30GO</td>
<td>20BUILD+40GO</td>
</tr>
<tr>
<td>(2pt/3pt)</td>
<td>(2pt/3pt)</td>
<td>(2pt/3pt)</td>
</tr>
<tr>
<td>SLED DRILLS</td>
<td>SLED DRILLS</td>
<td>SLED DRILLS</td>
</tr>
<tr>
<td>(20-30YDS)</td>
<td>(20-30YDS)</td>
<td>(20-30YDS)</td>
</tr>
<tr>
<td>(Lb &lt;10% (V_m))</td>
<td>(Lb &lt;10% (V_m))</td>
<td>(Lb &lt;10% (V_m))</td>
</tr>
<tr>
<td>STEP OVER DRILLS</td>
<td>STEP OVER DRILLS</td>
<td>STEP OVER DRILLS</td>
</tr>
<tr>
<td>ANKLE RUNS</td>
<td>ANKLE RUNS</td>
<td>ANKLE RUNS</td>
</tr>
<tr>
<td>SHIN RUNS KNEE</td>
<td>SHIN RUNS KNEE</td>
<td>SHIN RUNS KNEE</td>
</tr>
<tr>
<td>RUNS</td>
<td>RUNS</td>
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<td>WALL DRILLS</td>
<td>MARCH/SKIP</td>
</tr>
<tr>
<td>MARCH/SKIP</td>
<td>MARCH/SKIP</td>
<td>MARCH/SKIP</td>
</tr>
<tr>
<td>+ OVERHEAD</td>
<td>+ OVERHEAD</td>
<td>+ OVERHEAD</td>
</tr>
<tr>
<td>+ LOAD</td>
<td>+ LOAD</td>
<td>+ LOAD</td>
</tr>
<tr>
<td>FOUNDATION</td>
<td>SPEED STRENGTH</td>
<td>SPEED</td>
</tr>
<tr>
<td>------------</td>
<td>----------------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Weeks 1-2</strong></td>
<td><strong>Weeks 3-5</strong></td>
<td><strong>Weeks 6-7</strong></td>
</tr>
<tr>
<td>1. WALL DRILLS:</td>
<td>1. STEP OVER DRILLS:</td>
<td>1. STEP OVER DRILLS:</td>
</tr>
<tr>
<td>1. Posture Holds</td>
<td>1. Ankle Runs</td>
<td>1. Ankle Runs</td>
</tr>
<tr>
<td>(2 x 5-10 ea or 20-30s)</td>
<td>(2 x 10-15yds ea)</td>
<td>(2 x 10-15yds ea)</td>
</tr>
<tr>
<td>1. STEP OVER DRILLS:</td>
<td>1. TECHNICAL BUILD-UPS:</td>
<td>1. TECHNICAL BUILD-UPS:</td>
</tr>
<tr>
<td>1. Ankle Runs</td>
<td>1. 40-60yds</td>
<td>1. 40-60yds</td>
</tr>
<tr>
<td>2. Shin Runs</td>
<td>1. (1 x 70-80%)</td>
<td>1. (1 x 70-80%)</td>
</tr>
<tr>
<td>3. Knee Runs</td>
<td>2. (1 x 80-90%)</td>
<td>2. (1 x 80-90%)</td>
</tr>
<tr>
<td>(2 x 10-15yds ea)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. TECHNICAL BUILD-UPS:</td>
<td>2. FLYING 20yd Sprints:</td>
<td>2. COMPLEX (100%):</td>
</tr>
<tr>
<td>1. 40yd (&lt;70/&gt;90%)</td>
<td>1. 20yd build +</td>
<td>A1 Flying 20s-30s</td>
</tr>
<tr>
<td>(3-4 x 40-60yds)</td>
<td>2. 20-30yd fly-in</td>
<td>1. (2-3 x 50yds)</td>
</tr>
<tr>
<td></td>
<td>(2-4 x 90-100%)</td>
<td>A2 Flying 20s-30s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. +Bungee Load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&amp; Release</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. (2x 50yds)</td>
</tr>
</tbody>
</table>

**NOTE:**

Gates are used to time flying 20s to monitor volume
The best way to run fast is to run fast
You lose the ‘race’ in acceleration
You win the ‘race’ with absolute speed
Bigger is better...force is king

“Speed is an embodied belief before it is an action”
CORRECTION MODEL

Strength Quality

Coordination

Mobility & Stability

POWER

PATTERN

POSITION
Front and Back

Front, Back, and Ground

Trunk Position

ARMS

LEG ACTION

POSTURE

Thompson et al. (2009)
Acceleration Error Model

Posture: Excessive Lean/Trunk Flexion

Backside Mechanics: Ankle Collapse
Acceleration Error Model

Backside Mechanics: Lack of Hip Extension

Backside Mechanics: Initial Contact in Front
ACCELERATION ERROR MODEL

<table>
<thead>
<tr>
<th>Posture</th>
<th>ERROR 1</th>
<th>ERROR 2</th>
<th>ERROR 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Excessive Forward Lean</td>
<td>Excessive Trunk Flexion</td>
<td>Excessive Trunk Rotation</td>
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<tr>
<td>Front Side Leg Mechanics</td>
<td>Lack of Knee Drive and Lift</td>
<td>Lack of Free Hip Lock and Lift</td>
<td>Open Knee Angle &gt;90°</td>
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<tr>
<td>Backside Leg Mechanics</td>
<td>Initial Contact Down in Front vs. Back</td>
<td>Triple Extension Coordination (Ankle Collapse)</td>
<td>Triple Extension Not Complete (Hip Extension)</td>
</tr>
<tr>
<td>Arm Action</td>
<td>Small ROM</td>
<td>Hinge at Elbow vs. Shoulder</td>
<td>Excessive Cross-Body Action</td>
</tr>
</tbody>
</table>

Bosch, 2013
Running Cycle

Swing+Flight Phase

Stance Phase

Leg Drive

Leg Recovery

Contact

Toe-Off

Bosch & Klomp (2005)
**+ ABSOLUTE SPEED ERROR MODEL**

- **Posture**
  - Excessive Forward Lean
  - Excessive Trunk Flexion
  - Excessive Trunk Rotation

- **Backside Leg Mechanics (Flight)**
  - Delayed Leg Recovery “Butt Kicking”
  - Plantarflexion during Leg Recovery
  - Low Leg Recovery

- **Front Side Leg Mechanics (Flight)**
  - Lack of Knee Drive and Lift
  - Lack of Free Hip Lock and Lift
  - Early Opening of Knee Angle >90° “Casting”

- **Ground Contact (Stance)**
  - Excessive Forward Contact “Deceleration”
  - Low Stiffness “Sitting >15°” “Ankle Collapse”
  - Knee Excessively Passes Hip During Toe Off

*Bosch, 2013*
Absolute Speed Error Model (ex. 1)

- **Posture**: Excessive Forward Lean
- **Backside Mechanics**: Delay in Leg Recovery
- **Ground Contact**: Forward Contact
- **Good Quality**: Lower Body/Trunk Stiffness
**Backside Mechanics**

- **Ground Contact:** Low Stiffness
- **Plantar Flexion**
- **Good Quality:** Leg Recovery

**Backside Mechanics:**

- **Ground Contact:** Low Stiffness
- **Plantar Flexion**
- **Good Quality:** Leg Recovery
+ THE PATH: COACHING MODEL
Instruction should guide not prescribe

Provide feedback on outcomes over process

Say the most with the least

Ask a question before you provide an answer

What you want vs. what you don’t want
Instruction & Feedback Model

Distance
- Proximal (Close)
- Distal (Far)

Direction
- Toward
- Away

Description
- Action (Visual Words)
- Analogy (Feel vs. Be)

Winkelman (2013)
“Push...drive...snap...explode...bound”
(1) Posture:
“Head to Heel Strong as Steel”
“Stay Long” “Stay Big”

(2) Leg Action (Front-side):
“Knee Drive” “Break the Glass”
“Punch the Mitt” “Sprint up the Hill”

(2) Leg Action (Backside):
“Drive Back” “Push Through”
“Push the Ground Away”
(3) Arm Action Cont.:
“Snap Down and Back”

Put it Together:
“Piston Action” “Stay Big”
“Bound: Power over Quickness”
“Snap...spring...explode...spin”

“Up and Lift”

“Down and Back”
(1) Posture:
“Drive Belt-Buckle Forward”
“Lean Into Wind” “Stand Tall”

(2) Leg Action (Front-Side):
“High Heels (Step-Over)”
“Snap Laces Under Hip”

(2) Leg Action (Backside):
“Drive Down and Through Ground”
“Drive/Snap Ground Away”
“Spin the Earth” “Ground is Enemy”

(3) Arm Action:
“Hammer Back”
“Throw Spaghetti Against the Wall”

(3) Arm Action Cont.:
“Snap Down and Back”
40 Yard Data (3 years)

Change (Sec)

- 0.21 for 2013
- 0.124 for 2012
- 0.108 for 2011

Similarly for 2014 and 2015.


Technical Sprinting Model

Resisted/Assisted Sprinting

Resisted/Assisted Sprinting


Coaching Model


Coaching Model