

3 Sprinting

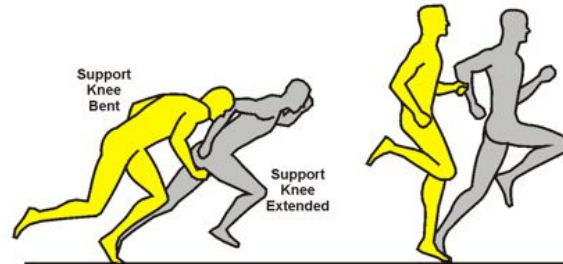
How does Strength Deficit Apply to Sprinting?

- Short to Long/Long to Short
- Accell to Max Velocity
- Ground Contact Time's Role in Sprinting Mechanics
- How we can leverage SD with Longer or Shorter Ground Contact Times

Long to Short/Short to Long

SPEED VS. SPEED ENDURANCE

All of the muscles are not working at 100% all of the time during the 100m.



Acceleration

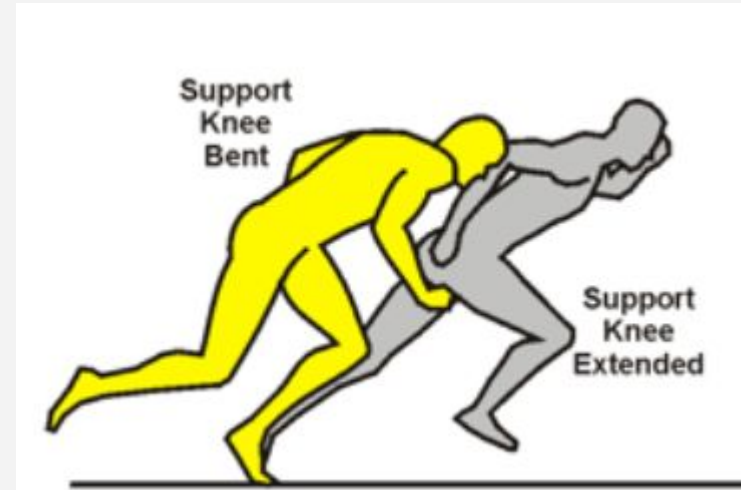
- Increased power leads to a much longer forward leaning component. In a World Record 100m sprint, 17 strides were in a forward leaning position, accounting for 38% of the total number.
- There was significant movement about the knee joint during the ground contact phase in the early stages of the race.
- Optimal extension consists of a straight line from head to foot (see grey illustration above left).
- Hip rotation about the centerline is not a factor.

Full Upright Stride

- In the same World Record, 29 strides were in an upright position, accounting for 62% of the total steps in the race.
- Very little movement was observed at the knee joint during the ground contact phase at top speed.
- Optimal extension moves beyond a straight line from head to foot (see grey illustration above right).
- Hip rotation about the centerline is a significant factor during this phase.
- Increased hip height at foot strike reduced ground contact time and energy loss (see Vertical Displacement diagram and discussion).

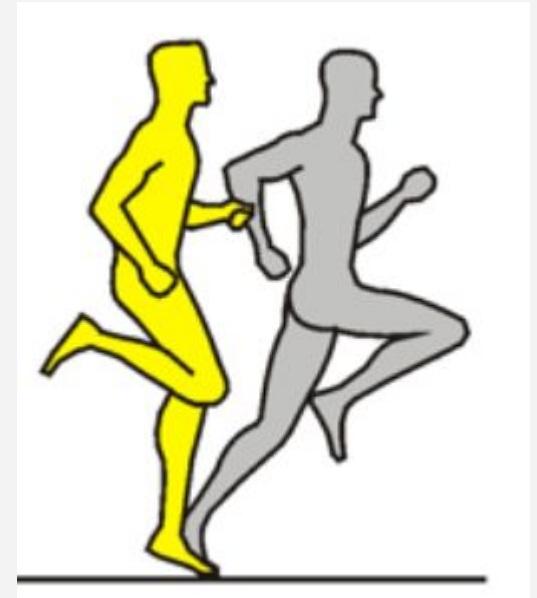
Long to Short

- Push Guy
 - Concentric Oriented/Wide Type/Mesomorph-High CSA
- Going to do better w/ Longer Ground Contact times
 - Inertia - Tendency to stay in unchanged state unless acted upon by outside force
 - Create Force from Static Position
 - Highest Correlate to Force is CSA
- Create Capacity before Power
 - Develop the underlying ability to create force in a more horizontal position to the ground
 - Relative Strength/Functional Hypertrophy



Short to Long

- Pull Guy
 - Eccentric Oriented/Narrow Type/Ectomorph-Longitudinal
- Going to do better w/ Shorter Ground Contact times
 - Elasticity - Ability to restore normal shape following stretch or compression
 - Reactive Force to Stress
 - Highest Correlate to SSC Ability
- Create Power before Capacity
 - Develop the underlying ability to create force in a more vertical position to the ground
 - Relative Strength/Power



Phases of Sprinting

- Acceleration - Rate of change of velocity per unit of time
 - More specific from zero velocity to transitional phase
 - This will be associated with longer ground contact times
 - Creating mechanical advantage is about creating momentum in a certain direction - horizontal position
- Max Velocity - The maximum of directional speed of a object in motion as an indication of its rate of change in position
 - More specific from transitional phase to top speed
 - This will be associated with shorter ground contact times
 - Momentum is achieved and therefore will need to more upright position to maintain propulsion



Ground Contact Time

- Acceleration - High Concentric Force
 - Larger Concentric Forces requires longer Ground Contact Times
 - Breaking a static position (Inertia) needs to be met with high Concentric Strength
 - Decreasing the Deficit will improve Acceleration Ability
- Max Velocity - High Eccentric Force
 - Larger Eccentric Forces requires shorter Ground Contact Times
 - Speed built through acceleration and transitional phases creates momentum that needs to be supported through high Eccentric Strength
 - Increasing the Deficit will Improve Max Velocity Ability

SAID Principle

- We will be the product of what we repeatedly do
- Focus on Increasing Force Output will improve Acceleration
 - Concentric Strength has direct correlation to improving Acceleration
 - Starts, Sled Pushes, Hill Sprints
 - MB Throws/Tosses, Plyometrics from Static Position/Reduced Landing Impact
 - Traditional Strength Exercises, Accommodating Resistance
- Focus on Increasing Rate of Force Output will improve Max Velocity
 - Eccentric Strength/RFD has direct correlation to improving Max Velocity
 - Flying Runs, Wicket Runs
 - Plyometrics with Increased Eccentric Stress
 - Eccentric Focus Strength Exercises, Complexes

Take Home

- Intuition is important
 - Focus on training that is relevant to the desired outcome
 - Ground Contact Time has a residual effect on improving certain phases of sprinting
- Fight Premature Effects
 - Novel stimuli will have an immediate impact
 - Not always directly correlated to larger goal
 - Fitness:Fatigue are a constant flux and need to be evaluated to the Acute and Chronic Loads
- Collaborate
 - Ask athletes to give feedback on how they are feeling
 - Should be a collaborative effort between athlete and coach
 - Was that Better/Same/Worse? Is an underrated question