

Bicycle Geometry as a Determinate of Sagittal-View Kinematics While Time-Trial Cycling

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How Do You Learn Things?

- Where Do You Start?
 - Websites / Forums
 - Magazines
 - Friends
 - Research Journals / Science
- What Needs To Be Done?
 - Standardization
 - Understanding



What Was Your Goal?

- Primary Purpose
 - To define a collection of kinematic descriptors
- Secondary Purpose
 - To describe how the kinematic descriptors change with altered bicycle geometry and saddle design.



What Did You Do?

- 10 time-trial trained volunteers
- 8 Males / 2 Females
- Warm Up
 - Subject's personal bike
 - Power Output @ 70-80%HR_{APMAX}
- 16 Fifteen-second trials on Fit Cycle
- 1 min of rest
- Frontal Area Pictures taken after each set of variables



Constants

- Saddle Height
- Saddle Angle
- Cockpit Length
- Crank Length
- Cadence
- Power Output



Independent Variables

- Bar Height (Trunk Angle)
 - 2 angles > 10° apart
- STA
 - 76 & 80°
 - Center of Saddle Rails
- Saddle Position
 - Middle vs. Nose
- Saddle Type
 - Profile Tri-stryke
 - Adamo ISM



What About The Saddles?

- Profile Tri-Strike
 - TT specific
 - Padded Nose
 - "Traditional"
- Adamo ISM
 - Reduce perineal pressure
 - Non-existent nose
 - "Radical"



Which Angles were Studied?

Kinematic Descriptors / Dependant Variables



- Trunk Angle
 - Trunk Segment & Horizontal
- Hip Angle
 - Trunk Segment & Thigh Segment
- Pelvic Tilt Angle
 - Hip Segment & Horizontal

Which Angles Were Studied?

Composite Descriptors



- Body Position
 - Shoulder / Greater Trochanter / BB
 - Dan Empfield (HA)
- Pelvic Position
 - Shoulder / PSIS / BB
 - Combined pelvic tilt with BP
 - Muscle length / Length Tension

How Did You See What Happened?

- Defined Anatomical Landmarks
 - Reflective Markers
- Digitized Points
 - Peak Motus
 - Stick Figures
- Angles
 - Average of 5 rev.
 - TDC & BDC not used



What Did You Observe?



	Trunk Angle	Hip Angle	Pelvic Tilt	Body Position	Pelvic Position
↑ BH	↑ STRONG	↑ STRONG	↑ STRONG	↑ STRONG	↑ STRONG
↑ STA	↑ WEAK	↑ WEAK	↑ WEAK	↑ WEAK	↑ WEAK
SAD	Non Sig	Non Sig	Non Sig	Non Sig	Non Sig
NOSE	↑ Non Sig	↑ Non Sig	↑ Non Sig	↑ Non Sig	↑ Non Sig

Can You Put That Into Words?



- Bar Height
 - Greatest influence on dependant variables
 - Positive relationship
- STA
 - Some influence
 - Positive relationship
- Saddle Type
 - Little influence
 - Short timeframe
- Middle vs. Nose
 - Similar to Steeper STA
 - Non-significant changes

Where Could We Go Next?



- Differences in Knee Angles between STA= 76 Nose and 80° STA
- Pelvic Tilt relative to the Trunk, is there an interaction?
- Assessing Physiological / Performance measures
 - Bar Height Alone
 - STA alone (control for all others)
 - Interaction of Bar Height and STA

Thank You!



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 - Dr. Dan Heil
- Fellow Graduate Students
 - Melissa Dock
 - Erik Jacobson
- Subjects
 - SICI / Ray Browning
 - Most Importantly...
... You!

Questions?


