

A cyclist wearing a white helmet and a black and purple jersey is riding a road bike on a grassy field. The cyclist is leaning forward in a racing position. The background is a blurred landscape with trees and a clear sky.

Effect of different seat position on lower limb kinematics, kinetics and electromyography during cycling.

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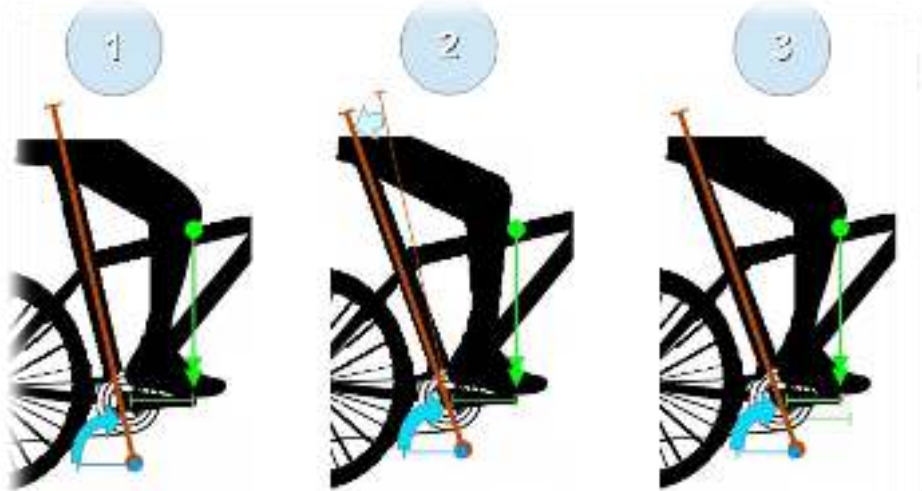
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Background

Proper riding posture reduces cycling injuries and enhance performance.

(de Vey Mestdagh, 1998; Silberman, Webner, Collina, & Shiple, 2005)

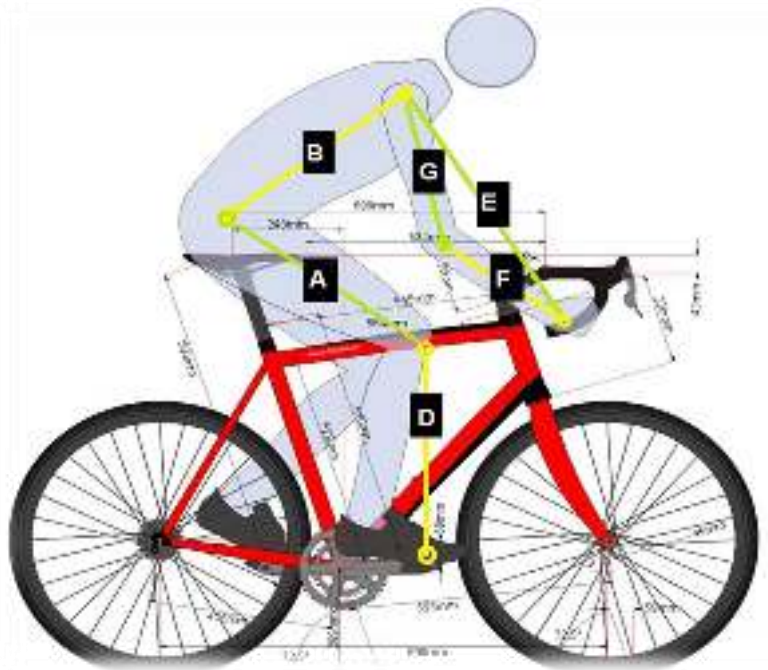




The correct combination of seat tube angle and crank length

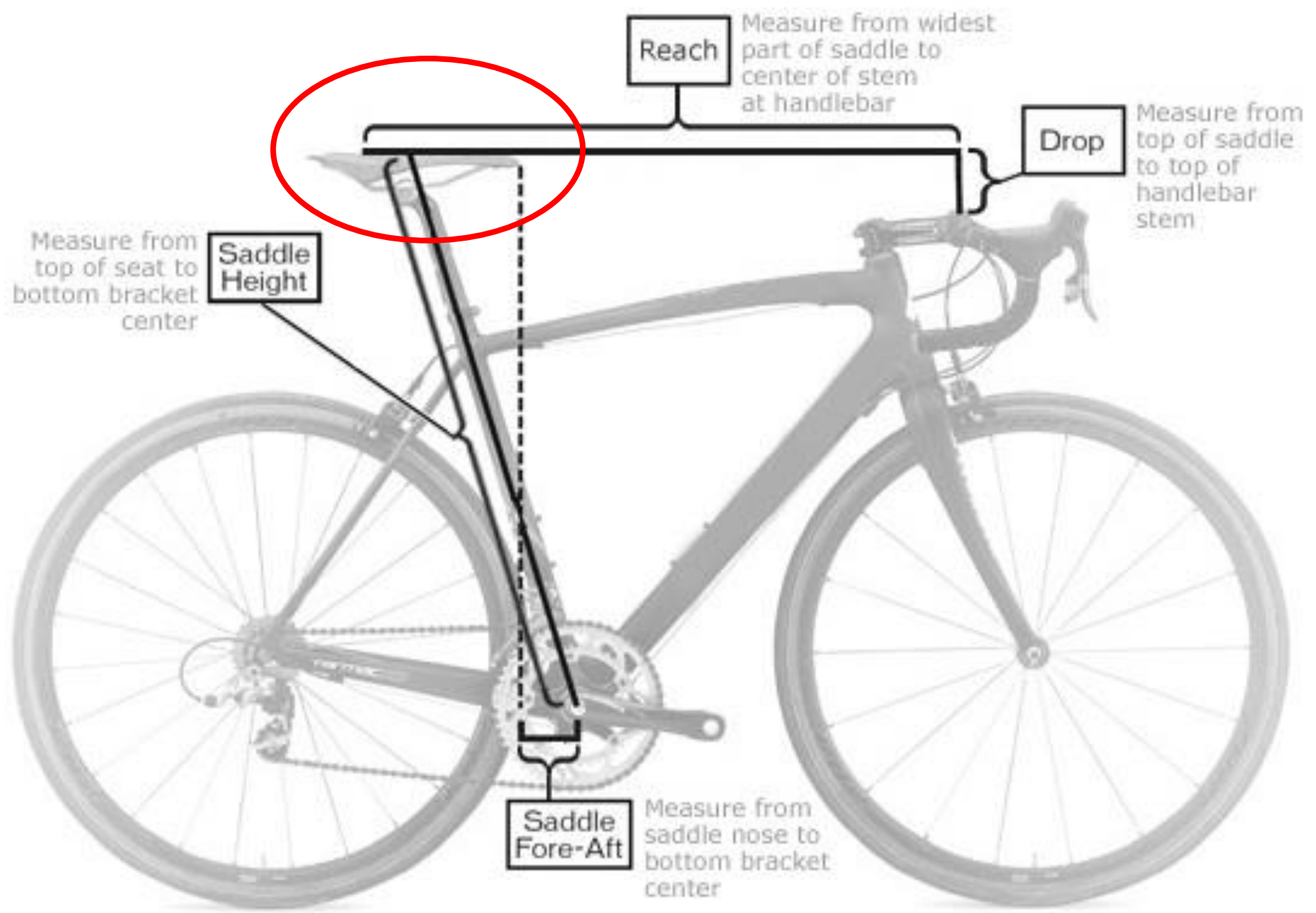
A slacker seat tube angle and same crank length
The knee moves back - off fit

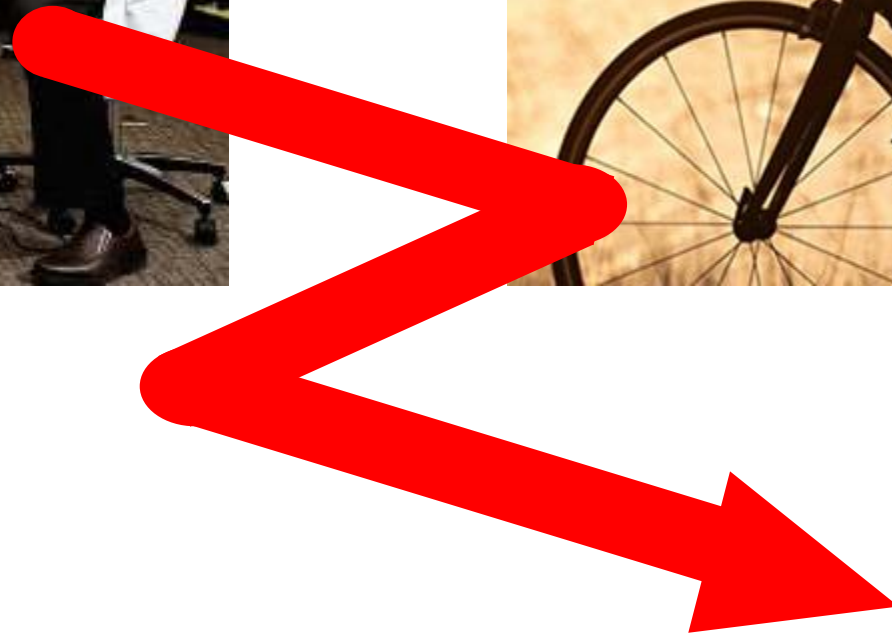
Changing the crank length on a slacker seat tube restores the fit



FIT GUIDELINES

- Saddle Height
- Saddle Set Back and Tilt
- Cleat Set up
- Crank lengths
- Handlebar reach and drop
- Shifter Positions
- Bar angles
- Muscle Activation
- Temporary positions





Studies focus on competitive cyclist rather than leisure cyclist

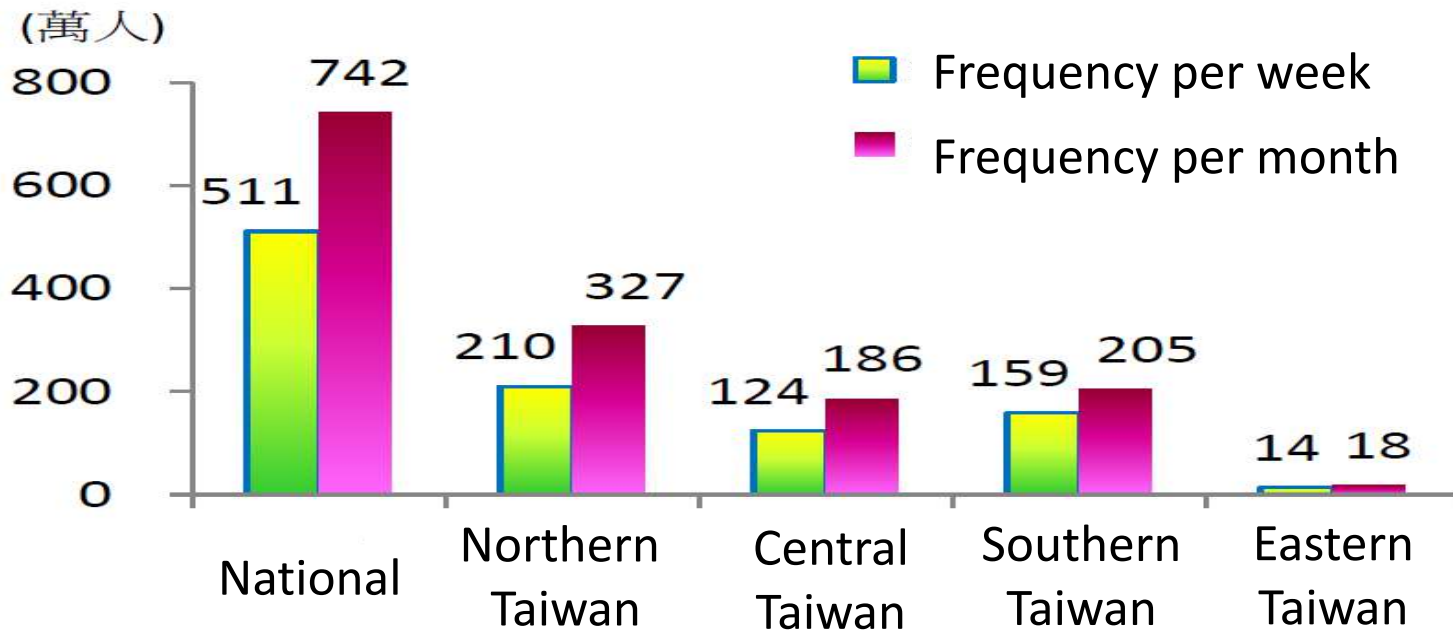


Sagan's watts and my watts??

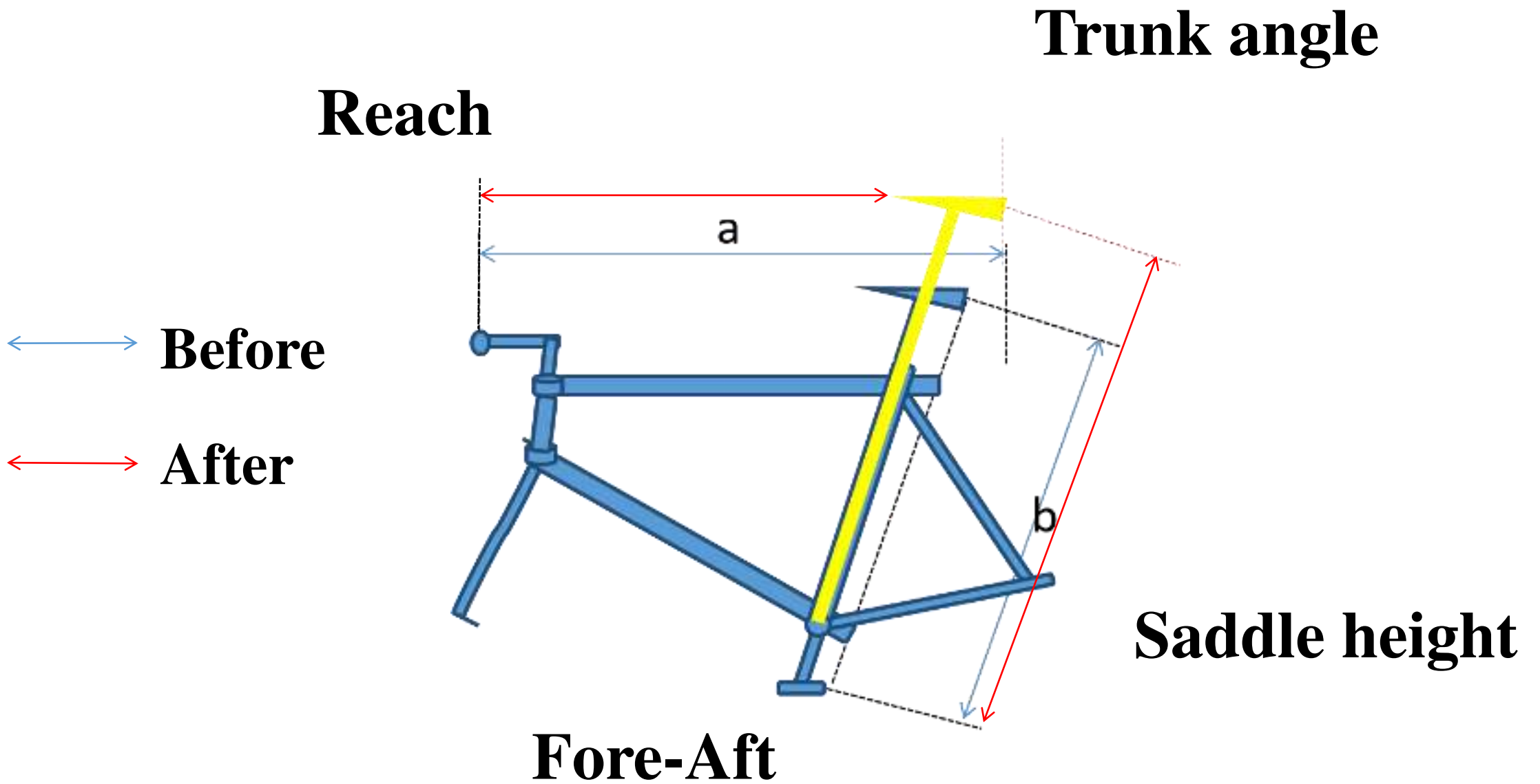
Froome's pedaling frequency and mine??



“Everyone should at least experience cycling around Taiwan once in the life time.”

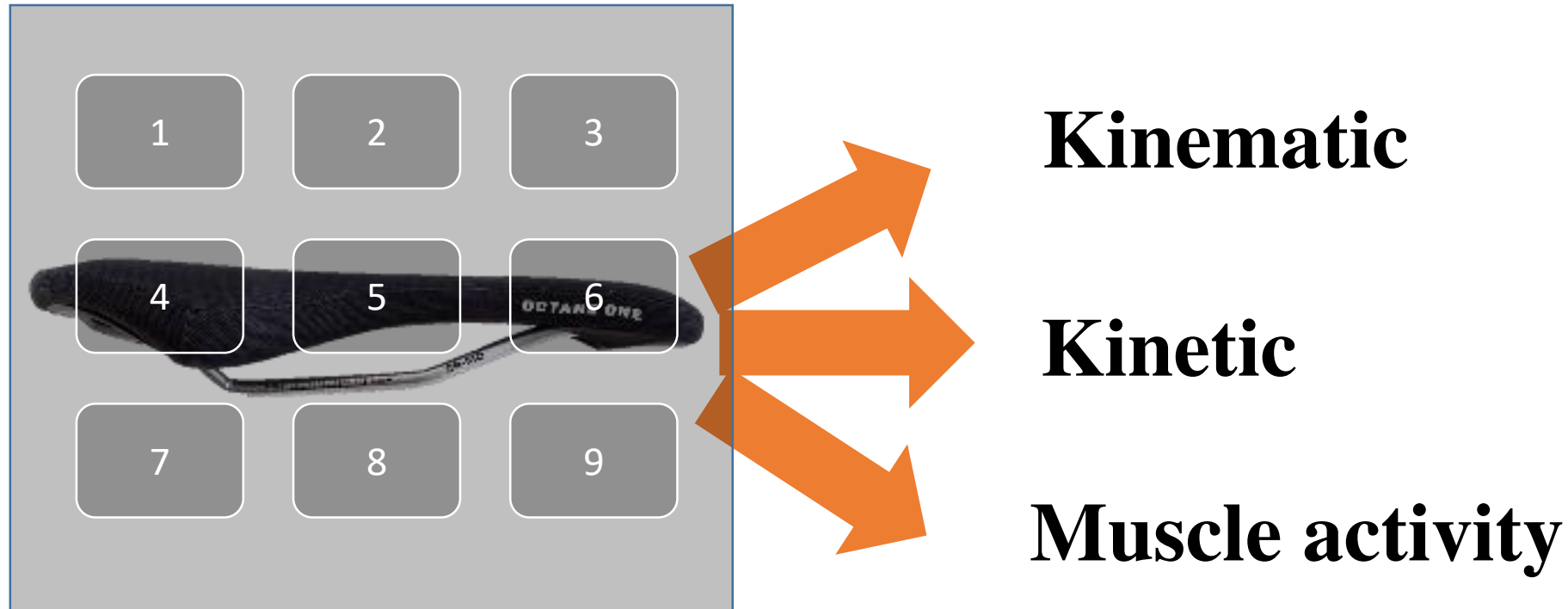


(Administrative of Transportation and Communication, 2018. March)

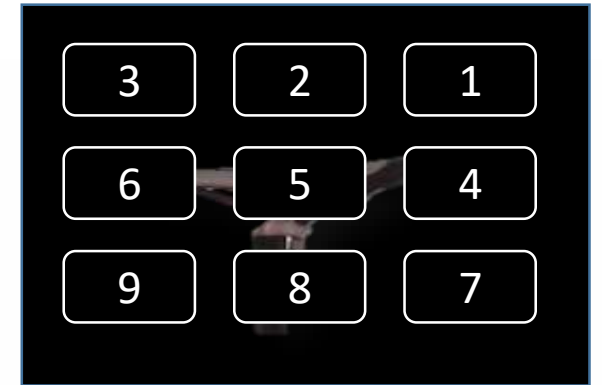
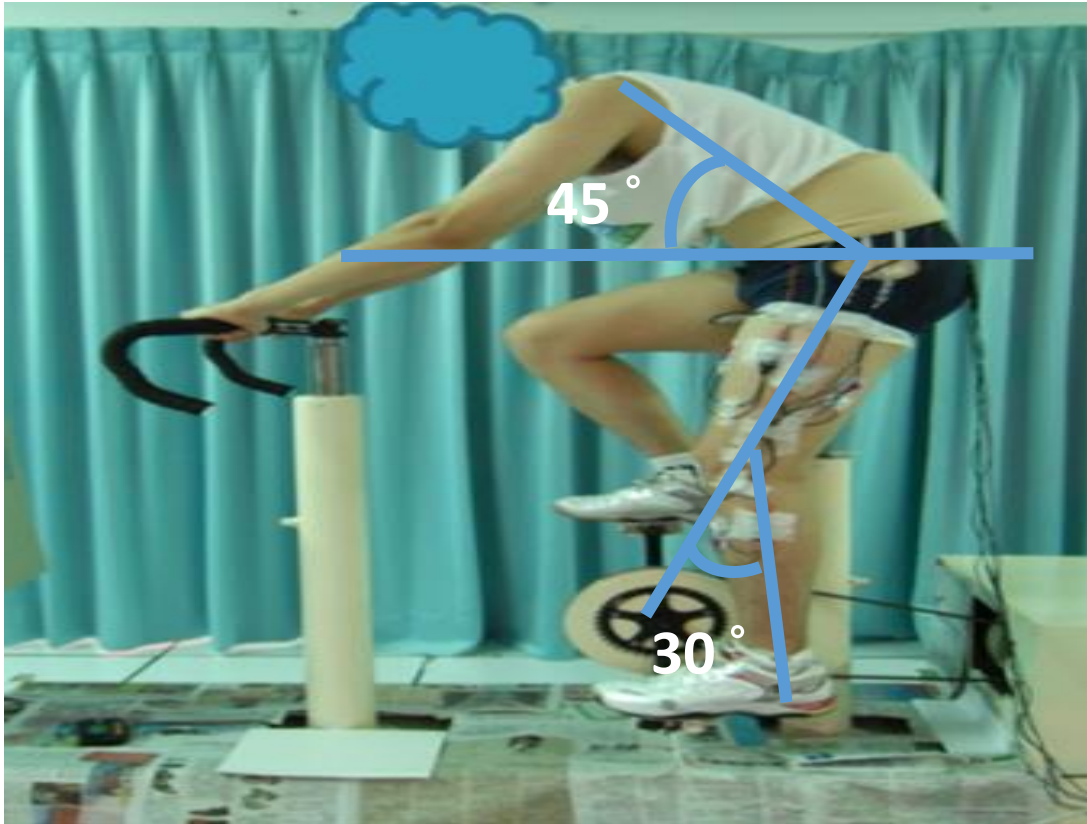


Purpose

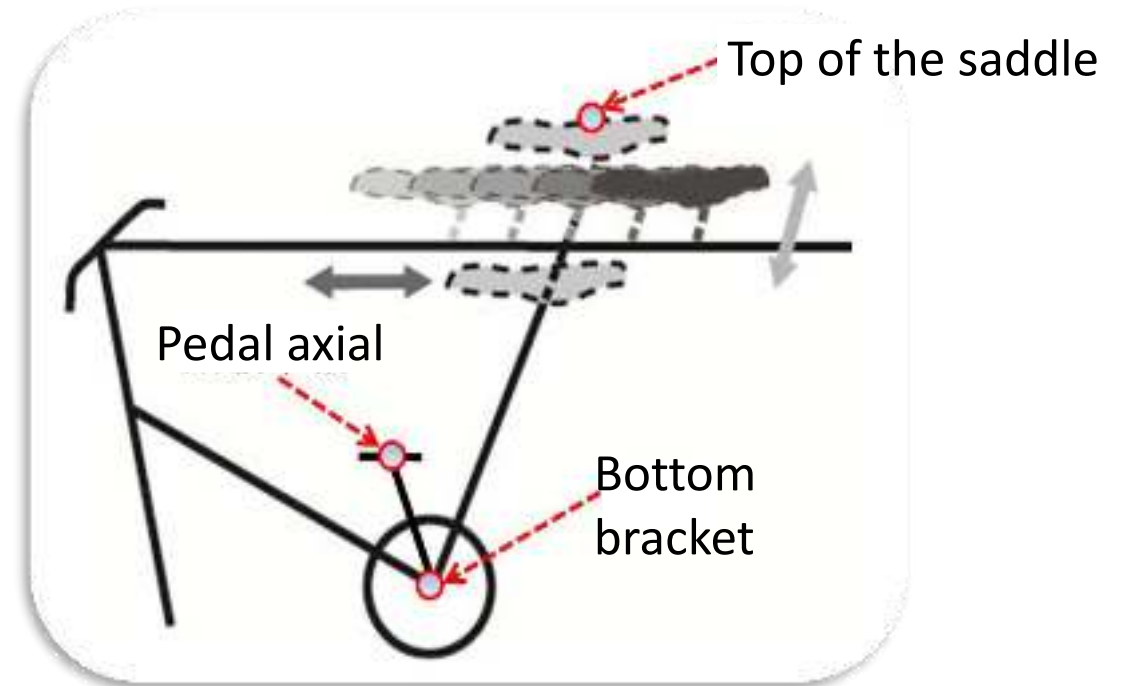
- The purpose of this study was to investigate different saddle position to kinematic, kinetic and muscle activity during cycling.



METHODS – SEAT ADJUSTMENT

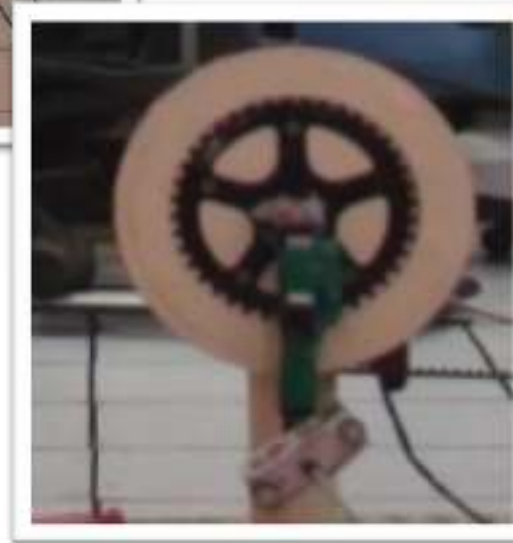
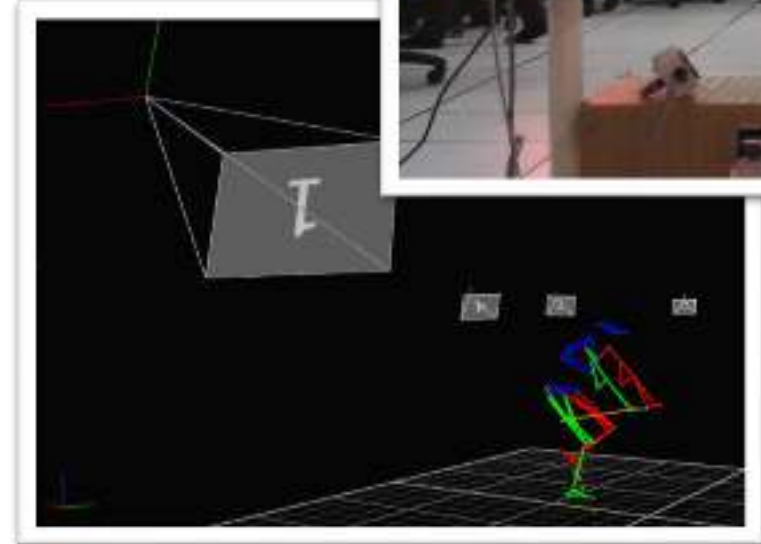
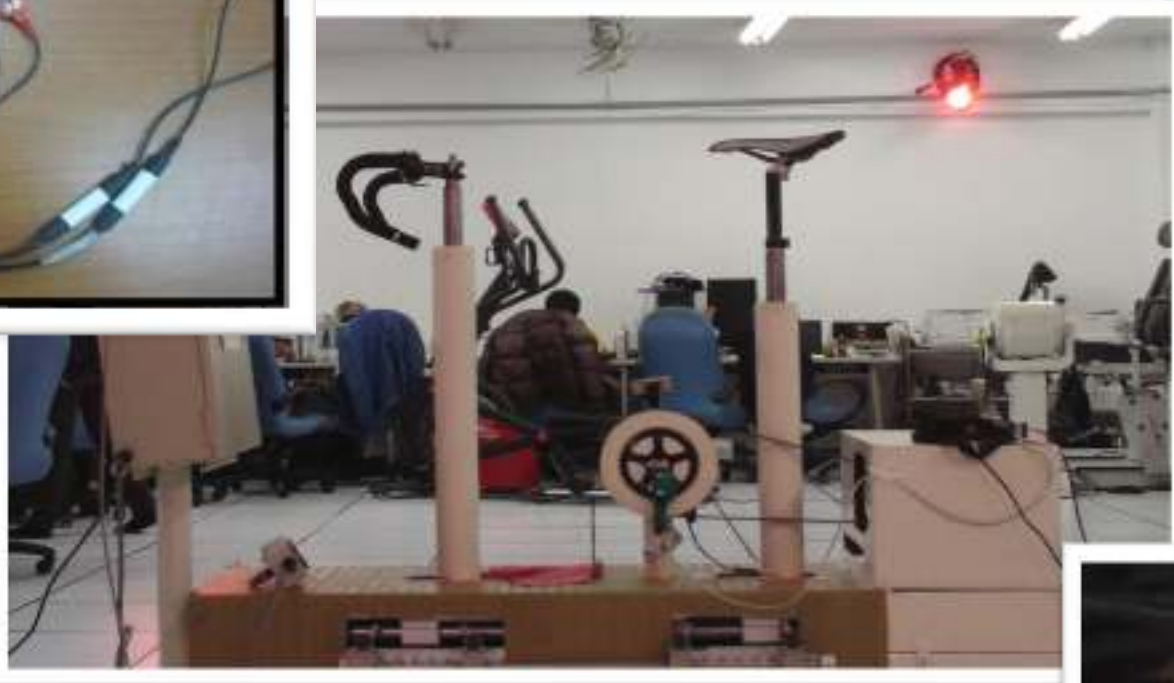


(Sanderson et al., 2009; Bini et al., 2010)



(Bini et al., 2010; 2011)

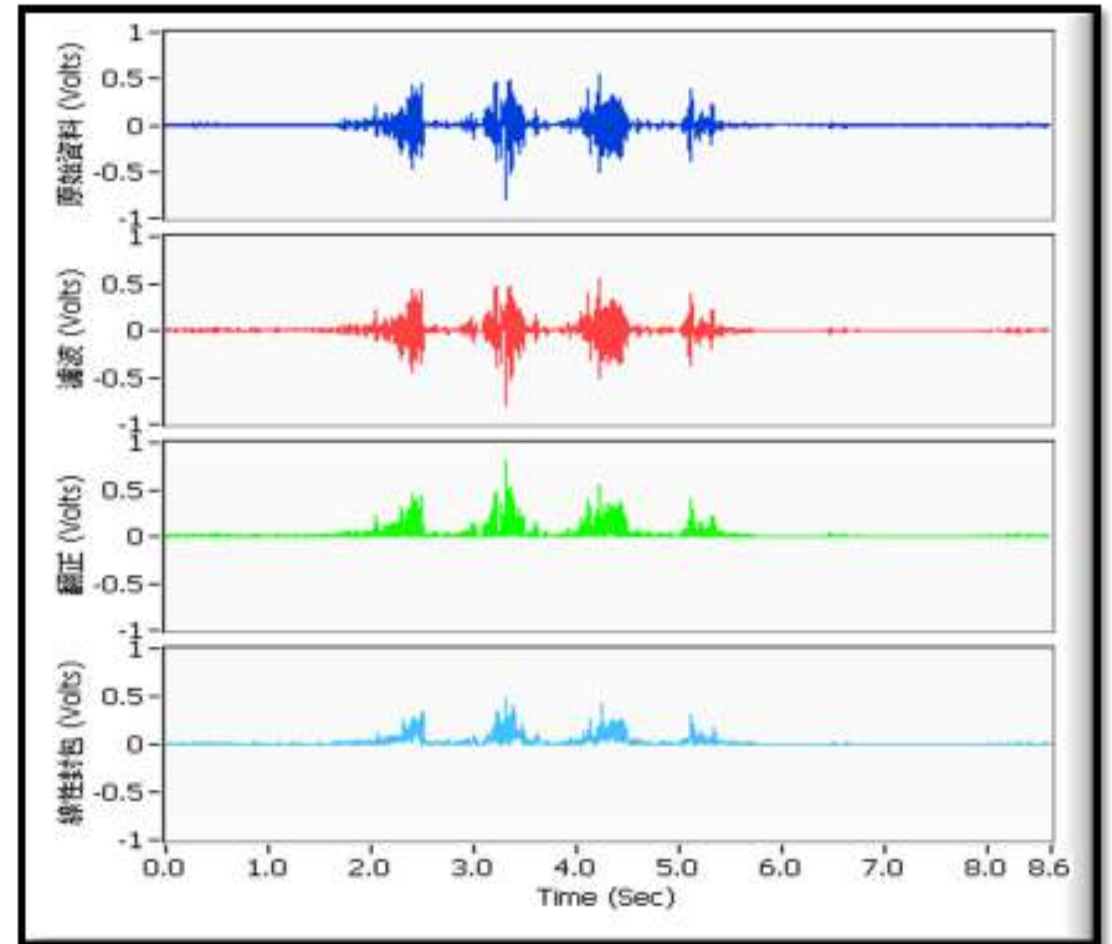
METHODS – INSTRUMENTS



METHODS – DATA ANALYZING

- kinematic: 6 Hz smoothed
- kinetic: 20 Hz smoothed
- electromyography:
 - 10~500 Hz band pass
 - Butterworth filter
 - 6 Hz rectified (liner envelope)

(Robertson et al., 2004)



- Pedaling efficiency = maximum power / EMG amplitude

(Deschenes et al., 2008)

METHODS-PROTOCOL

1. Equipment preparation and calibration
2. Protocol introduction and collecting human extremity parameters
3. Positioning Retroreflective markers and electromyography sensors

Adjusting seat and handle bar position to meet standard setup

10 minute cycling warm up

10 second sprint test

30 minute passive rest

Testing 9 seat positions

5 minute passive rest

Confirm all data have been collected

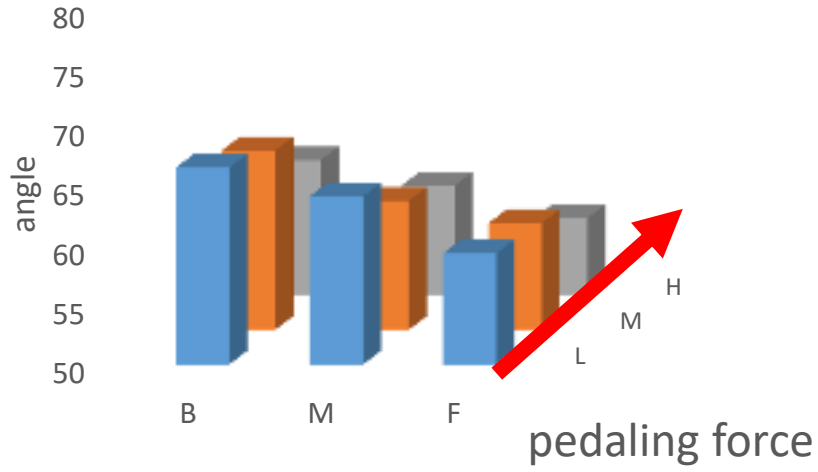
(Albertus-Kajee et al., 2010)

METHODS – STATISTICAL ANALYZING

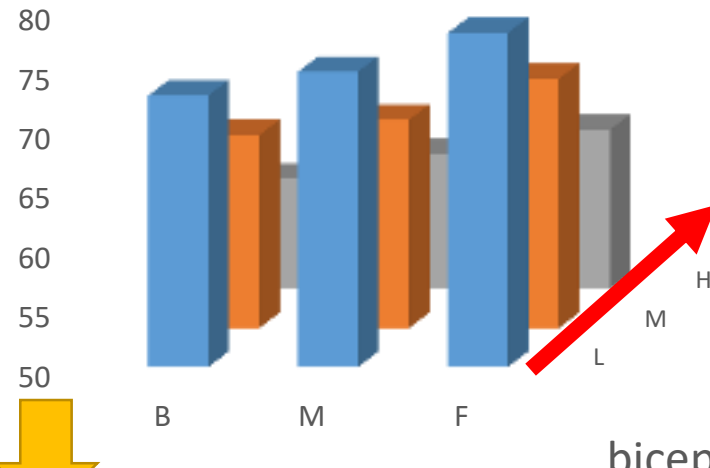
- Repeated Measures Two-way ANOVA
 - Different saddle position(up-and-down, forward and backward) to lower limb kinetics, kinematics, muscle activation, and PRE response.
 - If the statistical results meet significance level, Bonferroni post hoc test would be carried out. The significance level was $\alpha = .05$.

RESULTS

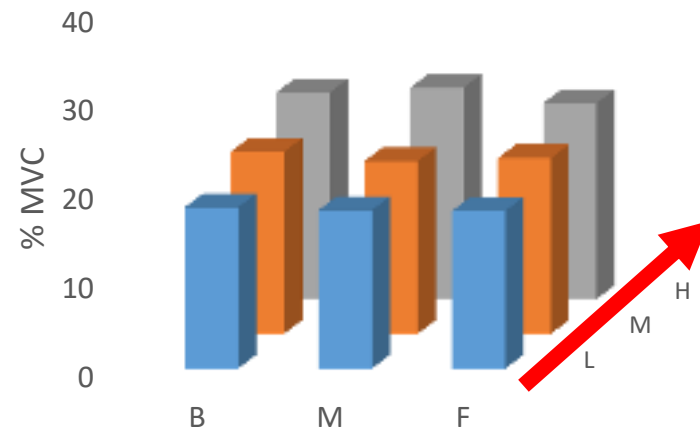
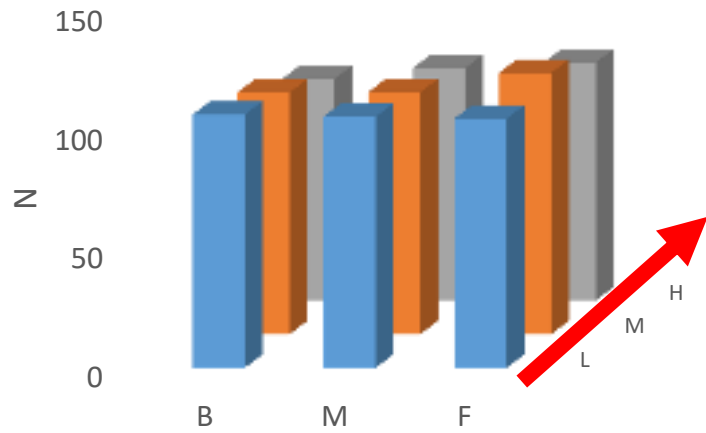
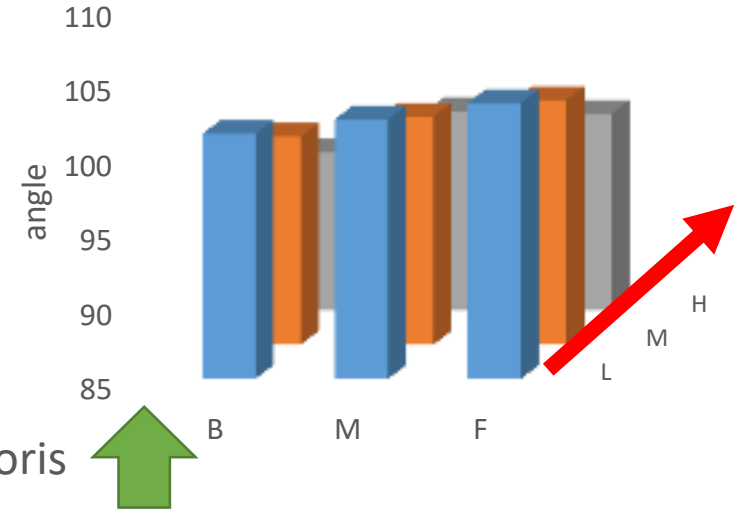
HIP



KNEE

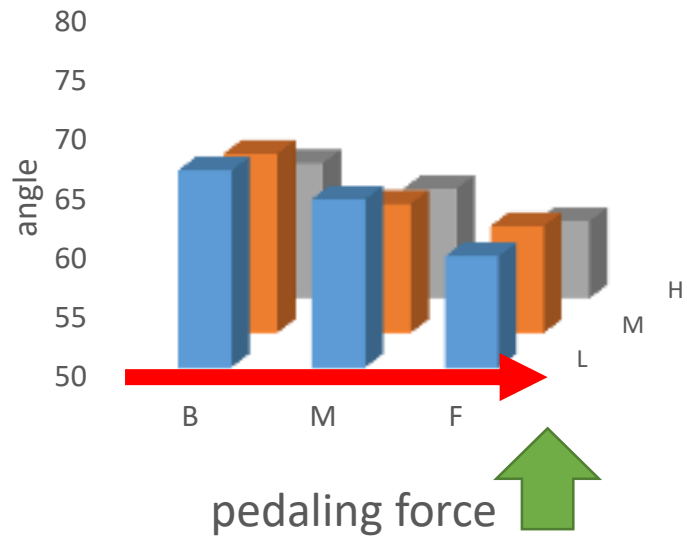


ANKLE

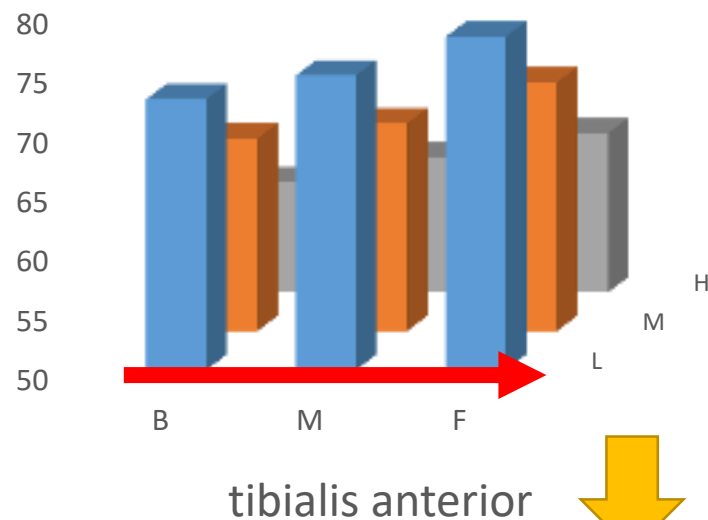


RESULTS

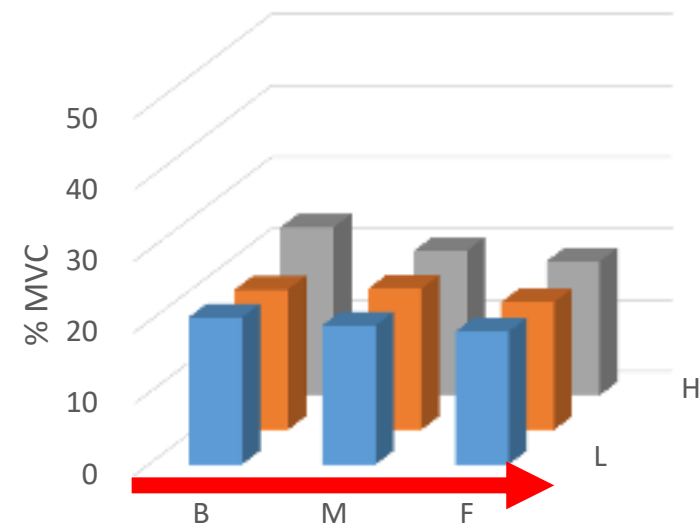
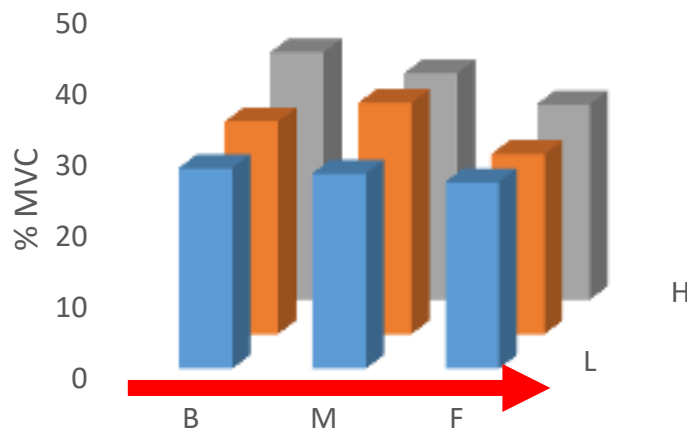
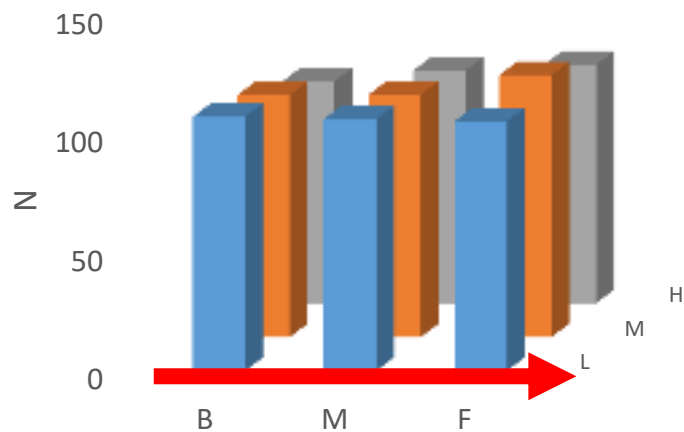
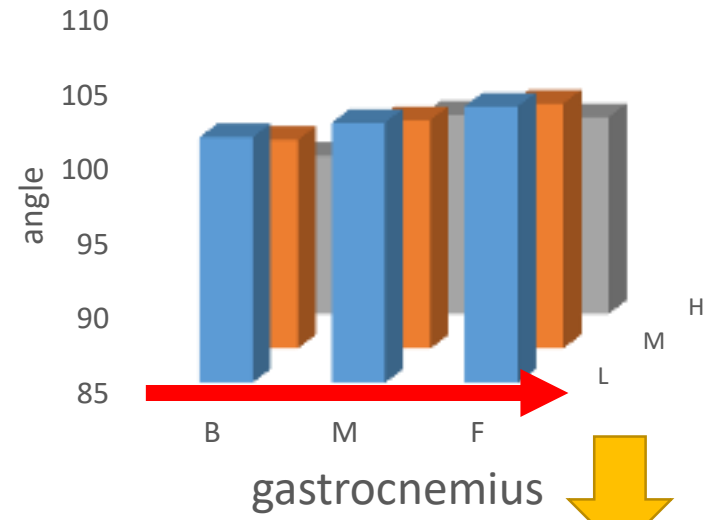
HIP



KNEE



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**upward and downward seat position
affects thigh muscles**

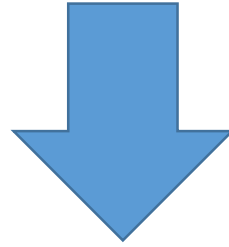


**forward and backward saddle position
affects calf muscles**



Conclusions

Optimized saddle position



**Forward-backward saddle position
should also be seriously considered**

Academic institute → Media → Public



A professional cyclist in a yellow jersey and helmet is celebrating a victory. The cyclist is wearing a yellow helmet with the 'sky' logo, yellow sunglasses, and a yellow jersey with 'LCL' and 'sky' logos. The cyclist's right arm is raised in a fist, and their mouth is open in a shout. The background is blurred, showing a crowd and a yellow support vehicle.

Thanks for listening!!