

Connection between Heel Motion and Torque in crank revolution

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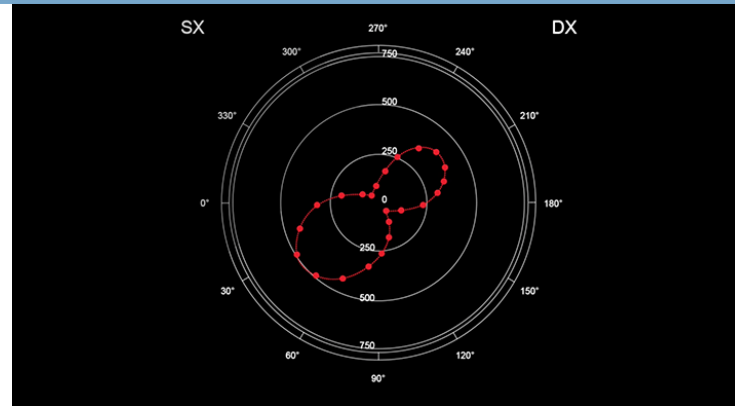
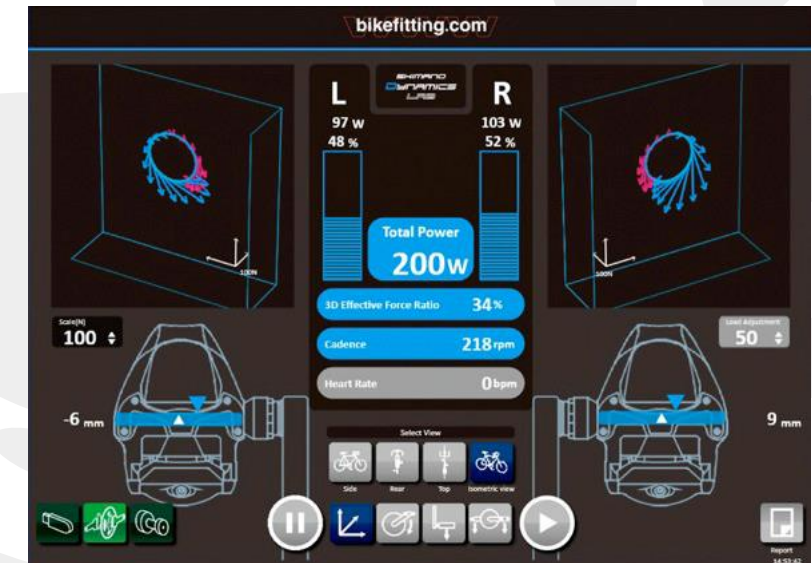
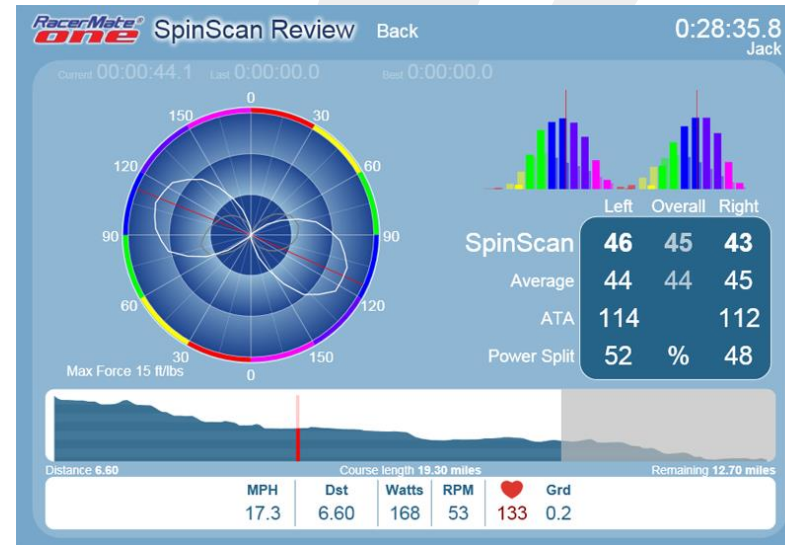
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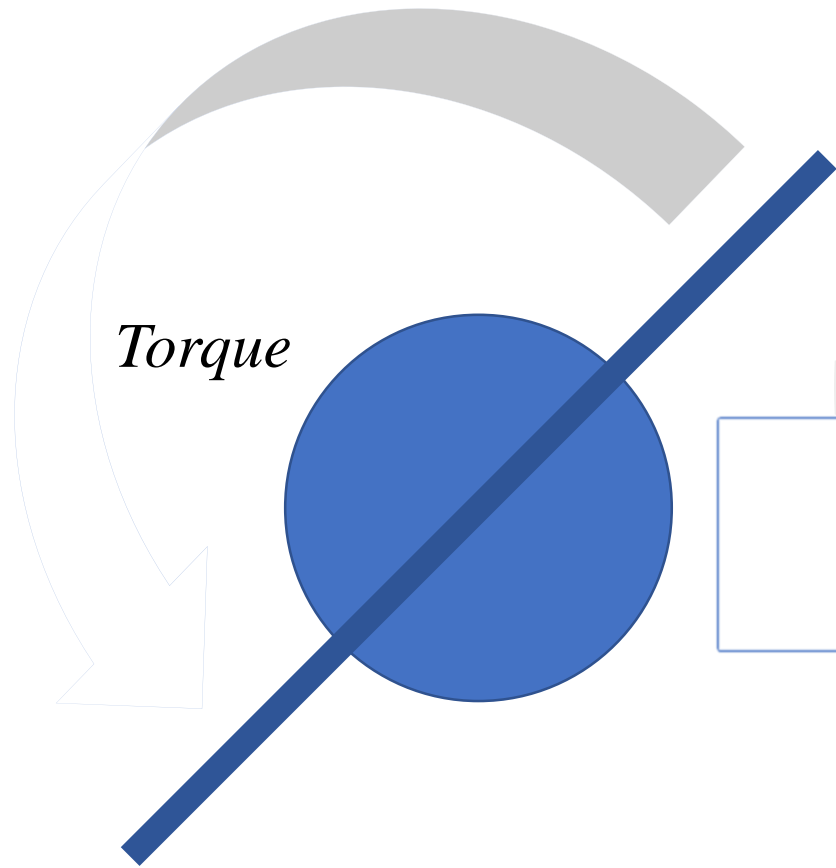


Introduction : Background

Pedaling torque analyzer for bicycles

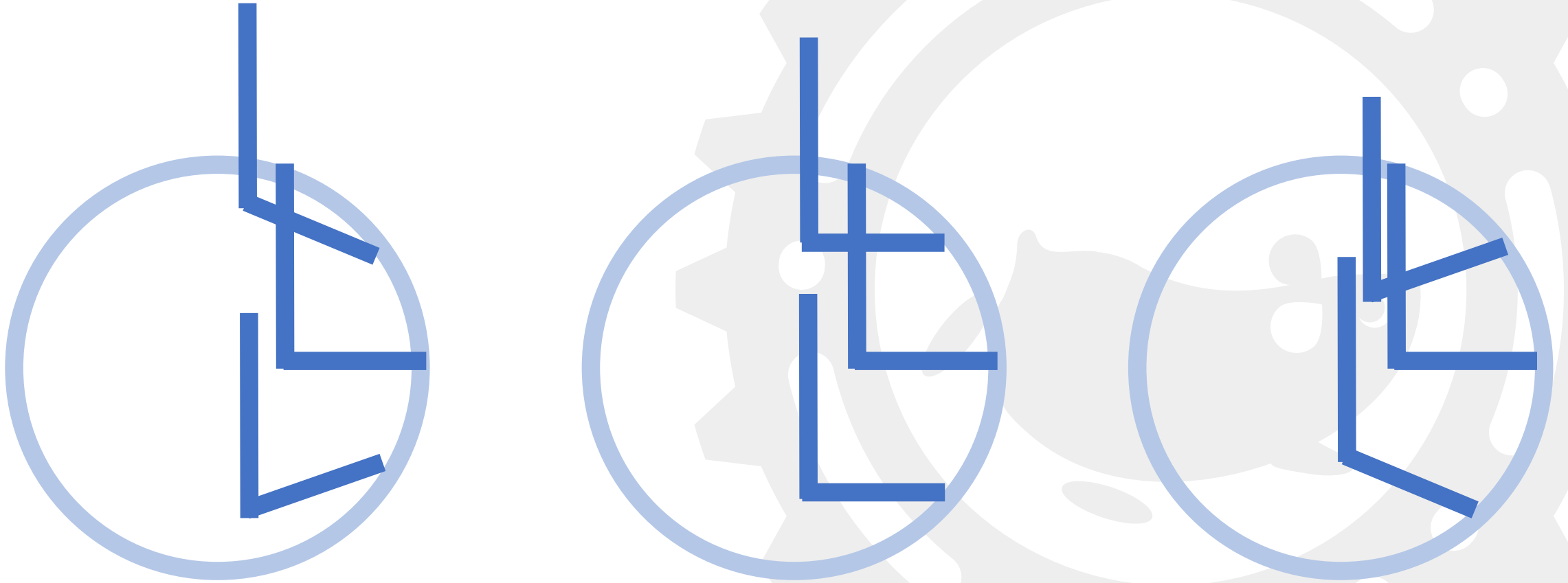


Introduction: Pedaling Power



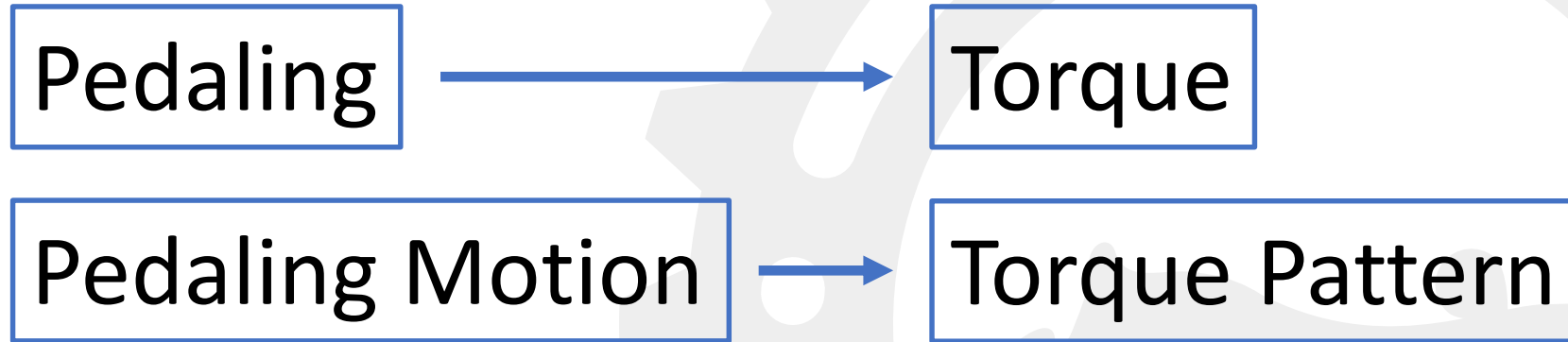
$$\text{Power} = \text{Torque} \cdot \text{AngularVel} \text{ [Watts]}$$

Introduction: Pedaling



Pedaling motion is different

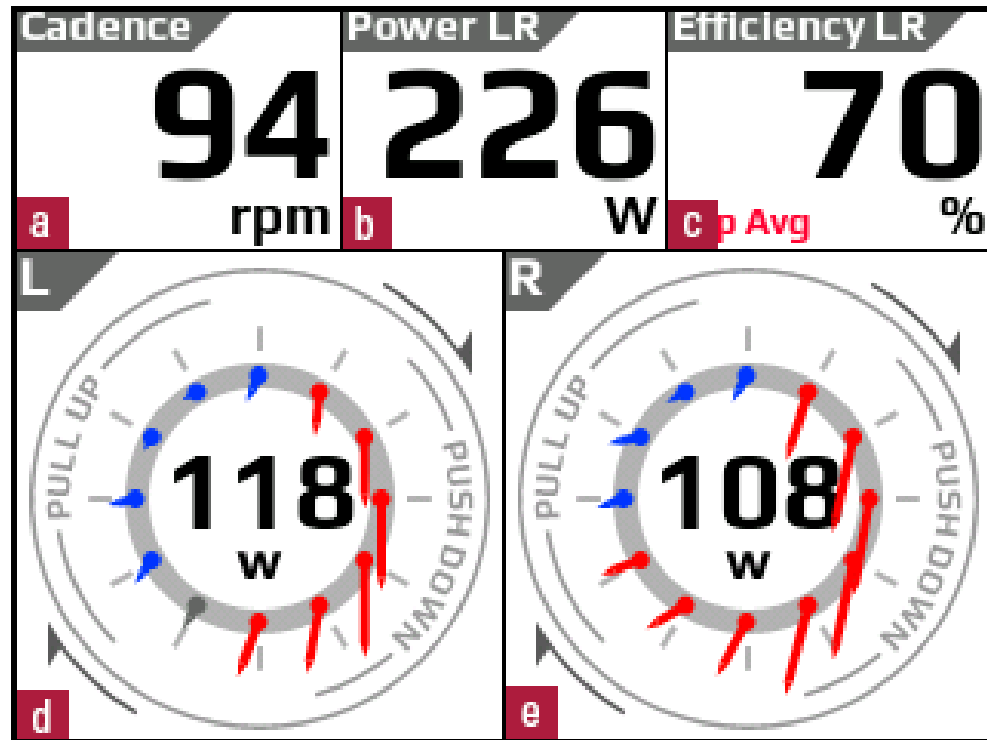
Introduction: Purpose



Purpose

To analyze how pedaling motion affect torque pattern

Methods: measuring system



Pioneer Pedaling Monitor System

Pedaling Monitor can measure each torque in twelve zones

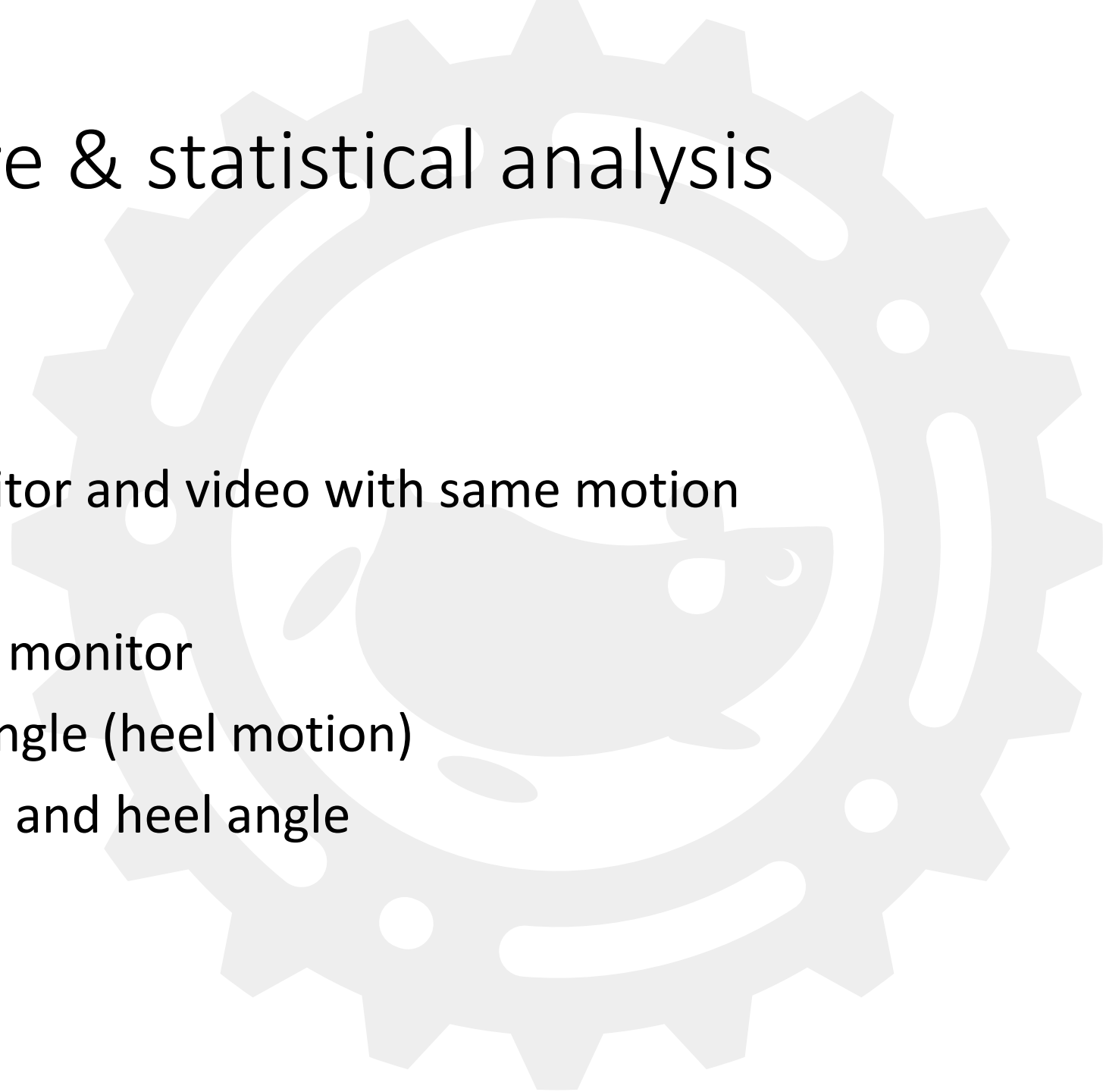
Methods: measuring system



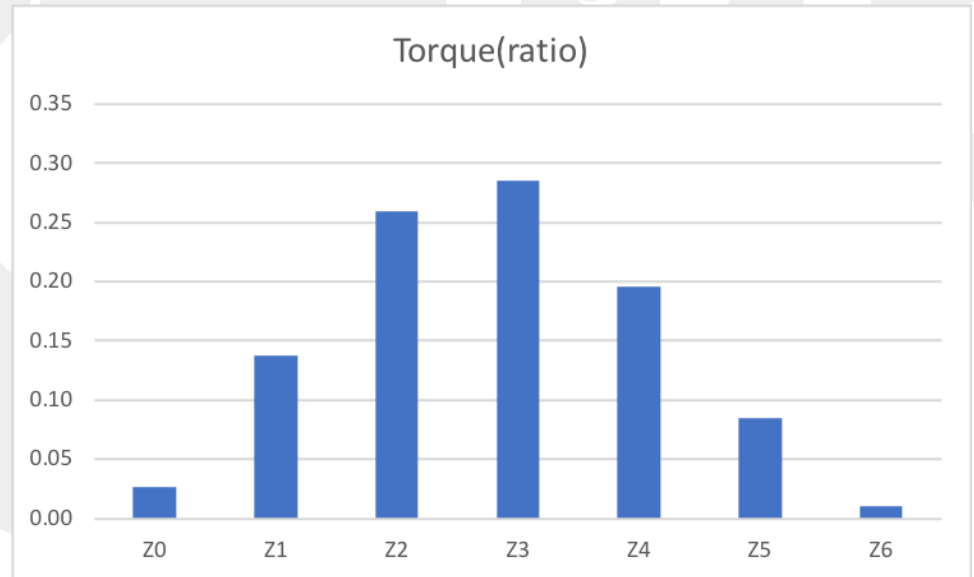
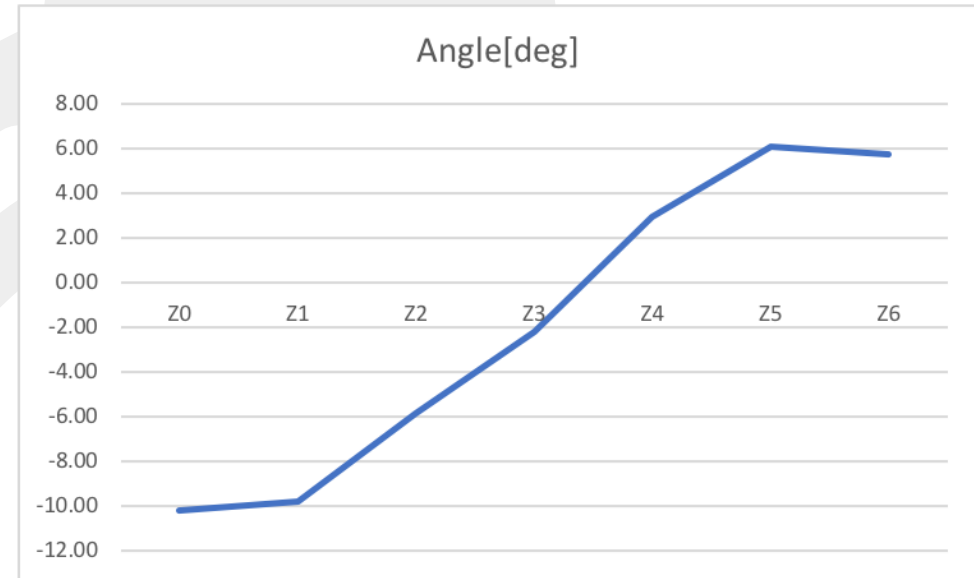
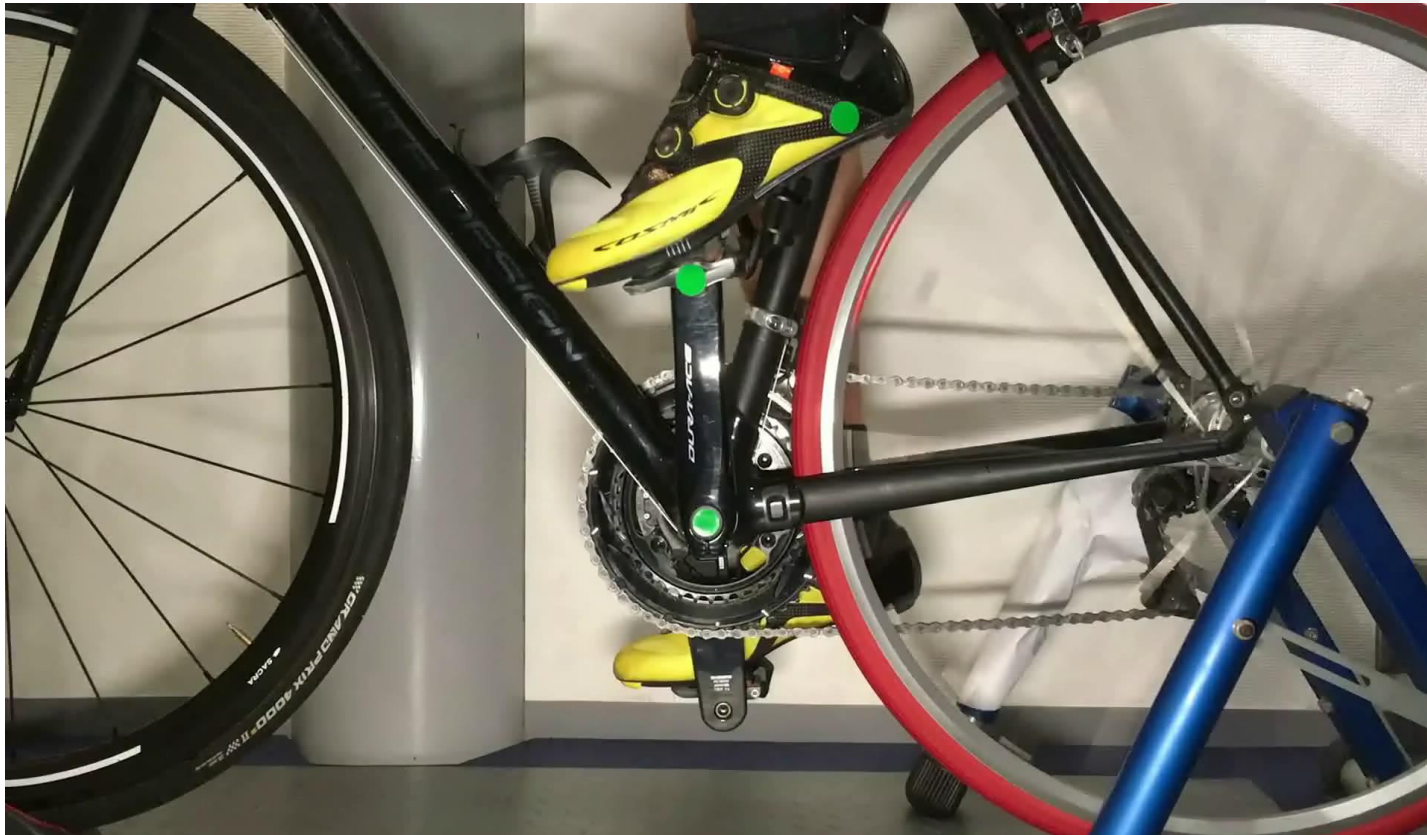
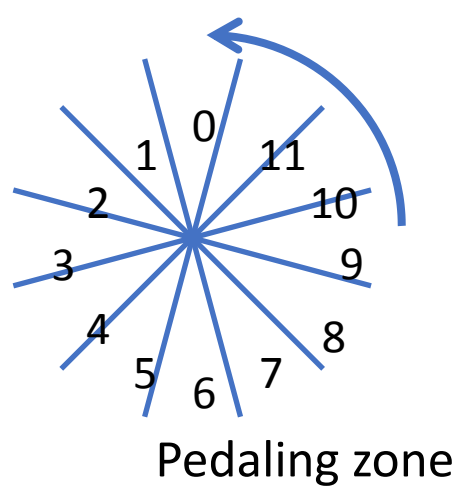
Analyze heel motion in each zone from high speed movie

Methods: procedure & statistical analysis

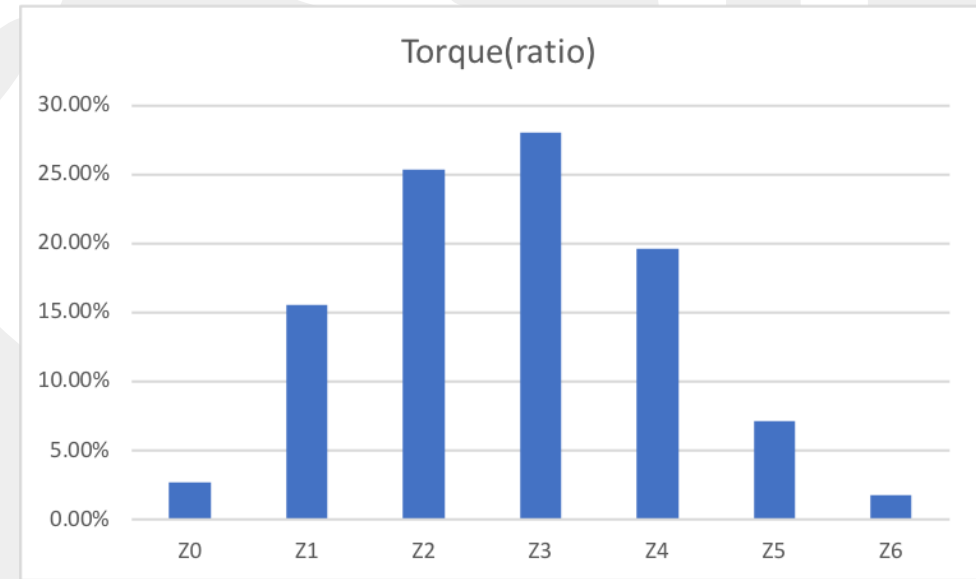
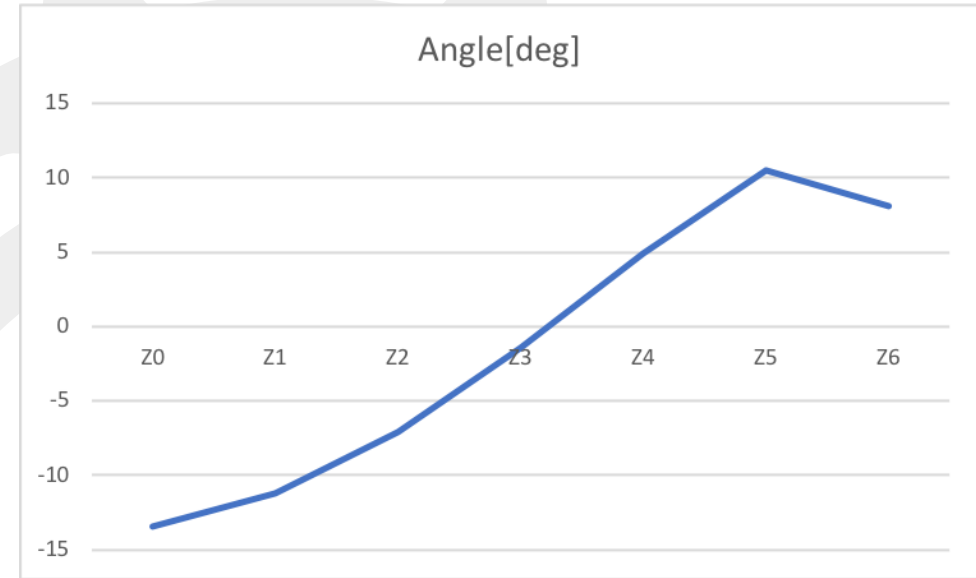
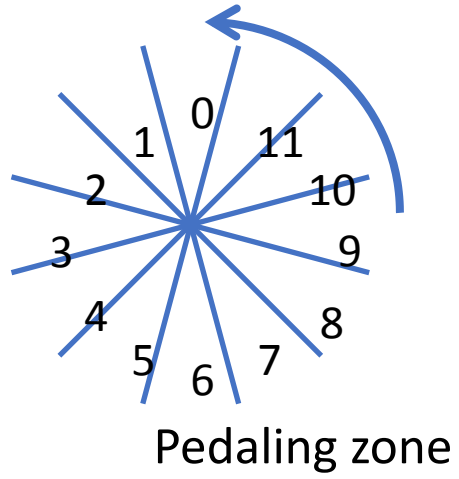
- Load power: around 200W
- Cadence lower than 90rpm
- Record 20 sec pedaling monitor and video with same motion
- Record one side
- Measure torque by pedaling monitor
- Measure how change heel angle (heel motion)
- Average torque of each zone and heel angle



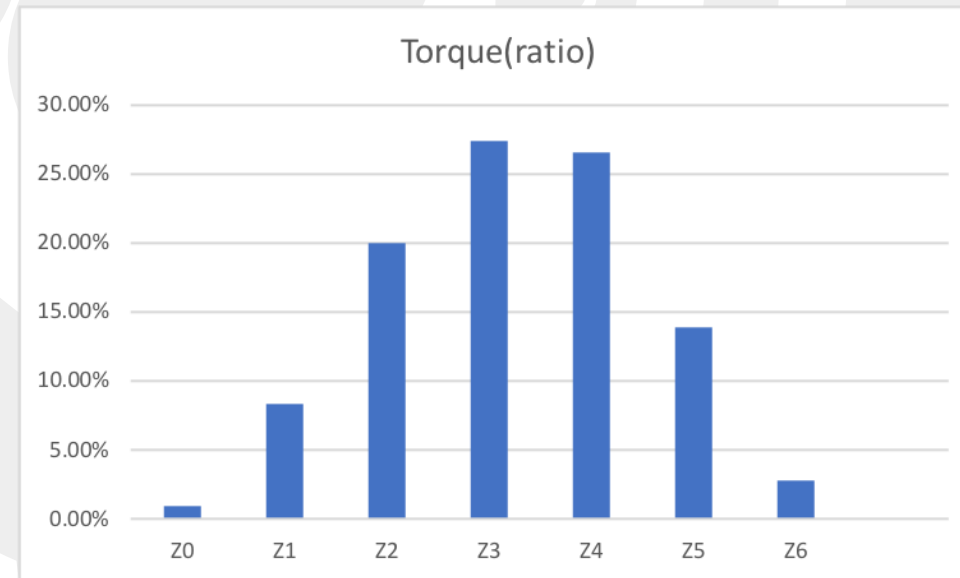
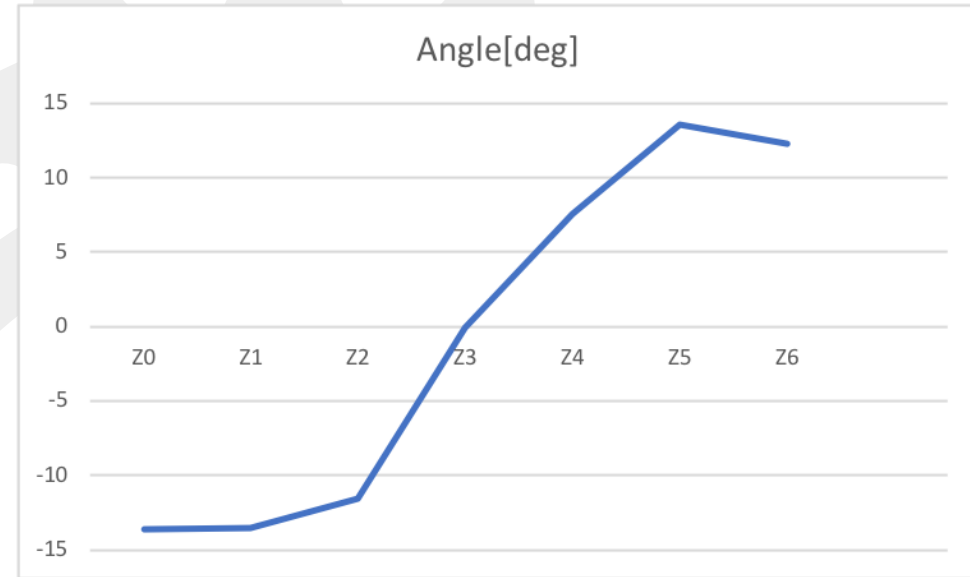
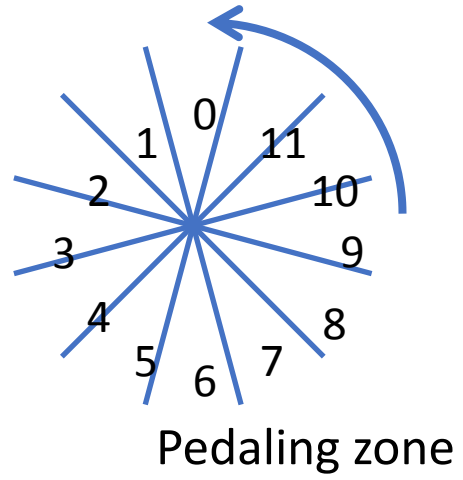
Case1:



Case2:



Case3:



Training: Change Squat Pattern



Results: Heel Motion

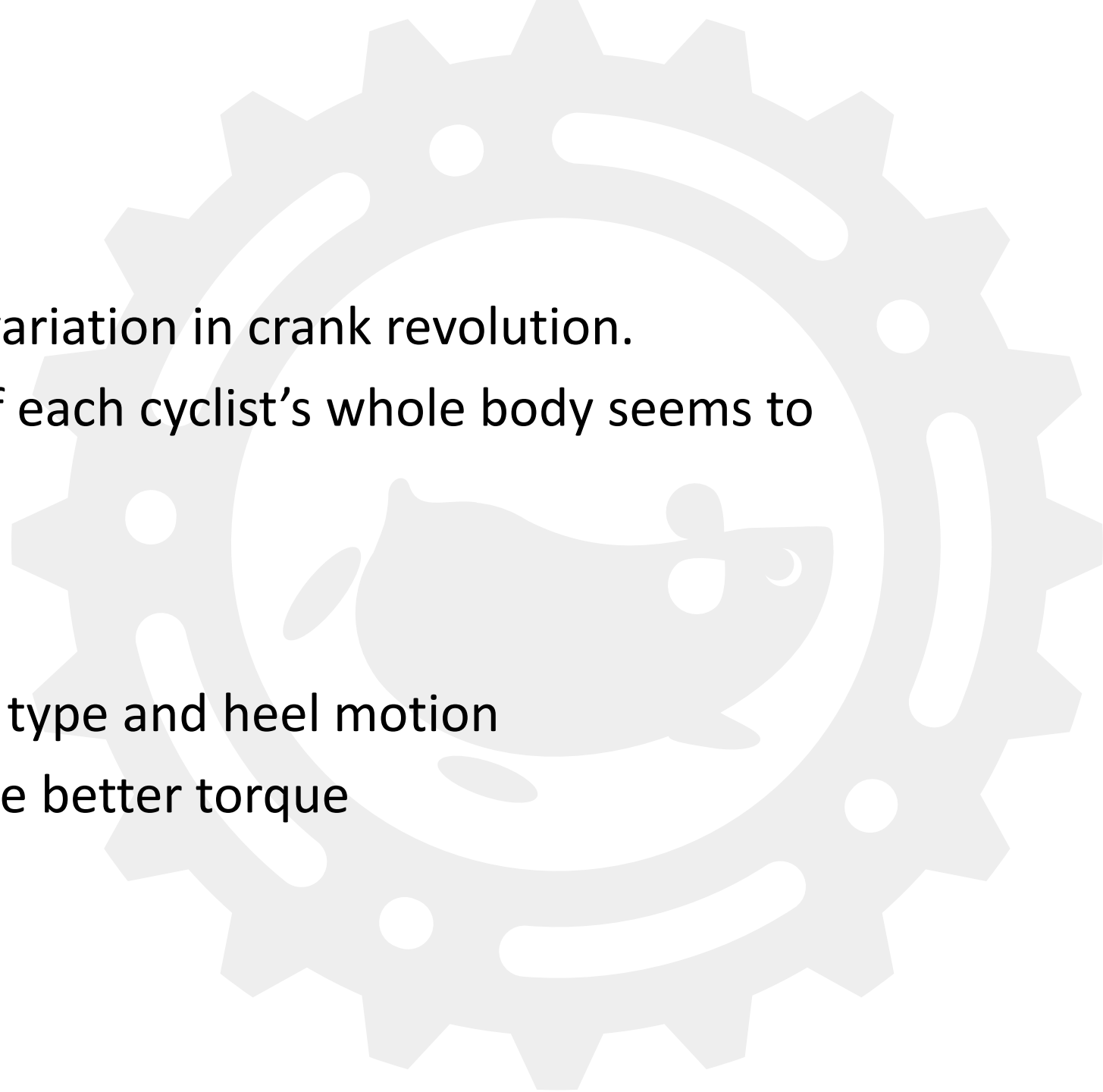


Conclusion

- Heel motions affect torque variation in crank revolution.
- Particular movement type of each cyclist's whole body seems to affect heel motion.

Future:

- Reveal particular movement type and heel motion
- Clear what heel motion cause better torque



Thank you



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