

Heel Kick in Cycling Shoes

THE INFLUENCE OF CYCLING SHOES ON YOUR OPTIMAL CYCLING POSITION

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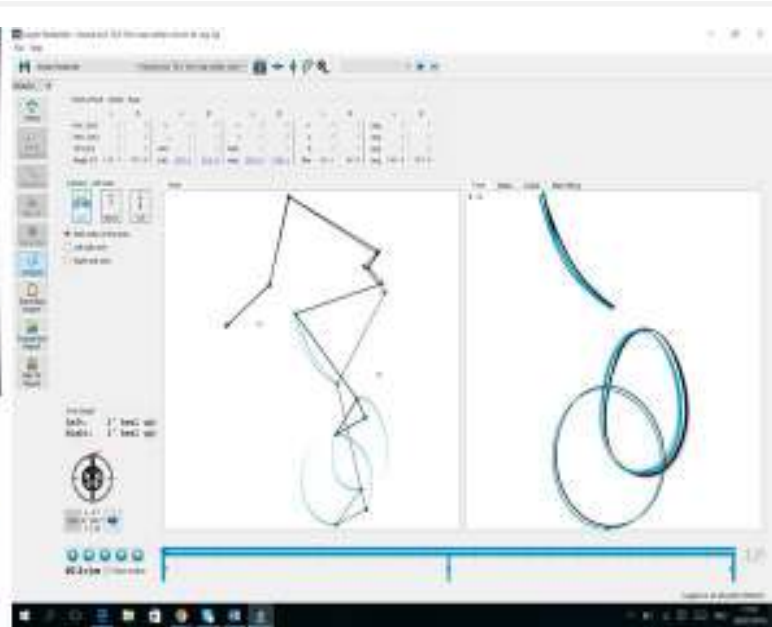
Traditional Bike Fitting

During bike fitting sessions, the optimal bicycle rider position is determined by expert scoring.



motion capturing system

BIKEFITTING
EXPERT



120 fps, 6 cameras, 20 markers

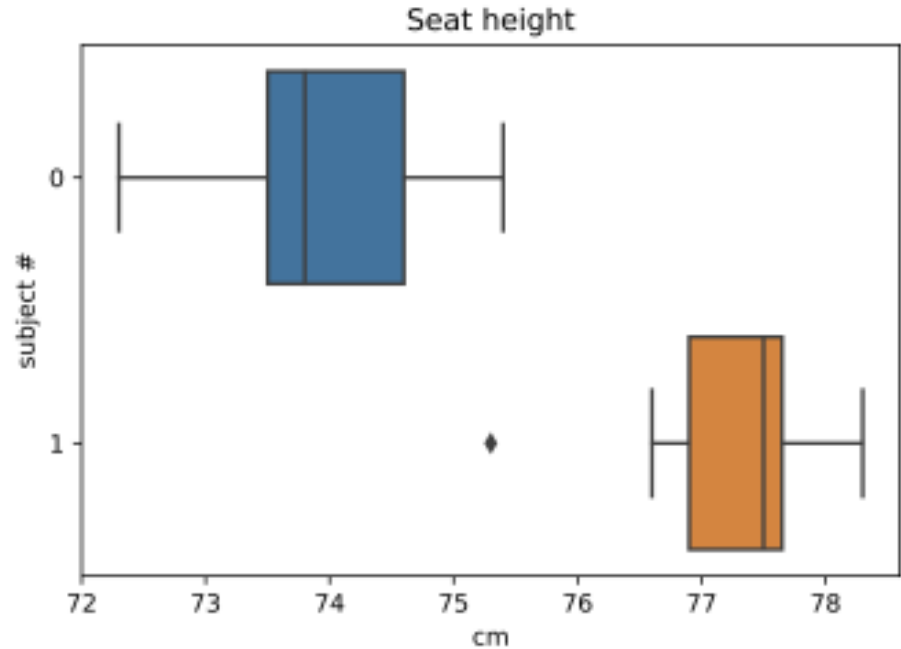


Subjectivity in Bike Fitting

Different bike fitters

Different systems

Different “optimal” positions?



Yearly Check-up

- Lucinda Brand
- Couldn't find the right position
- Felt that something was off
- Shoes



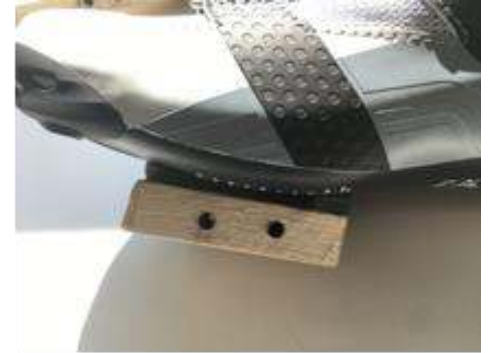
External Factors in Bike Fitting

- Pedal + shoe interface
 - Cleat Position
- Saddle type
- Insoles
- Heel Kick



Heel Kick Measurement Tool

- Bottom of the shoe
- Ground pane
- Cleat flat



Methodology

- Maximal heel kick range
- Standard cycling configuration
- Only shoes were changed
- Same cleat position
- Same resistance
- Same cadence
- Markers on skin



Results

- Heel kick differs a lot from shoe to shoe
 - Between brands
 - Within the same brand

	Mean difference heel kick		
Brand	Front	Middle	Back
Sidi	4.53	4.31	4.51
Bont	2.00	2.07	2.14
Bont without Riot	0.85	0.73	0.88

	Mean heel kick		
Brand	Front	Middle	Back
Sidi	14.34	12.71	11.80
Bont	11.08	9.76	8.75
Bont without Riot	10.19	8.80	7.79
Specialized	10.44	9.68	8.43
Carnac	16.97	16.56	16.65
Bontrager	12.68	11.48	10.34
Diadora	8.00	6.30	5.78

Results From 3D Assessment

- The differences have consequences

Brand	Type	Heel kick [deg]	KOPS [cm]	Max knee extension angle L [deg]	Max knee extension angle R [deg]	Ankle angle L [deg]	Ankle angle R [deg]
Sidi	Ergo2	14,1	1.5	144.1	142.6	6	7
Bontrager	RL Racing	12,7	0	146.2	147.2	8	5
Bont	Helix red	10,5	-0.5	148.2	147.8	9	10
Bont	Vaypor	8,9	-1.0	149.9	147.3	9	9

Results From Saddle Pressure

- The differences have consequences

Brand	Type	Max. pressure	Average pressure 1, front of saddle	Average pressure 2, back of saddle left	Average pressure 3, back of saddle right
Sidi	Ergo 2	584	139	151	188
Bontrager	RL Racing	829	281	194	201
Bont	Helix red	765	296	165	169
Bont	Vaypor	901	320	145	178

Discussion

- Discipline ~ heel kick
- Technique ~ heel kick
- How to take heel kick into account to choose a shoe?



Conclusion

- Notable differences
 - Inter and intra
- Influence on cycling movement
- Re-fit is advised
 - For shoes, but also for cleats, ...

Future Work

- Testing with a large test group (expensive)
 - To see differences in preferred heel kick
- Testing the influence of other parameters
- Testing the 10 most used shoes on the market
- Development of an adjustable shoe



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