Women Data in Product Development

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Introduction

Why is it so difficult to solve female saddle soreness?

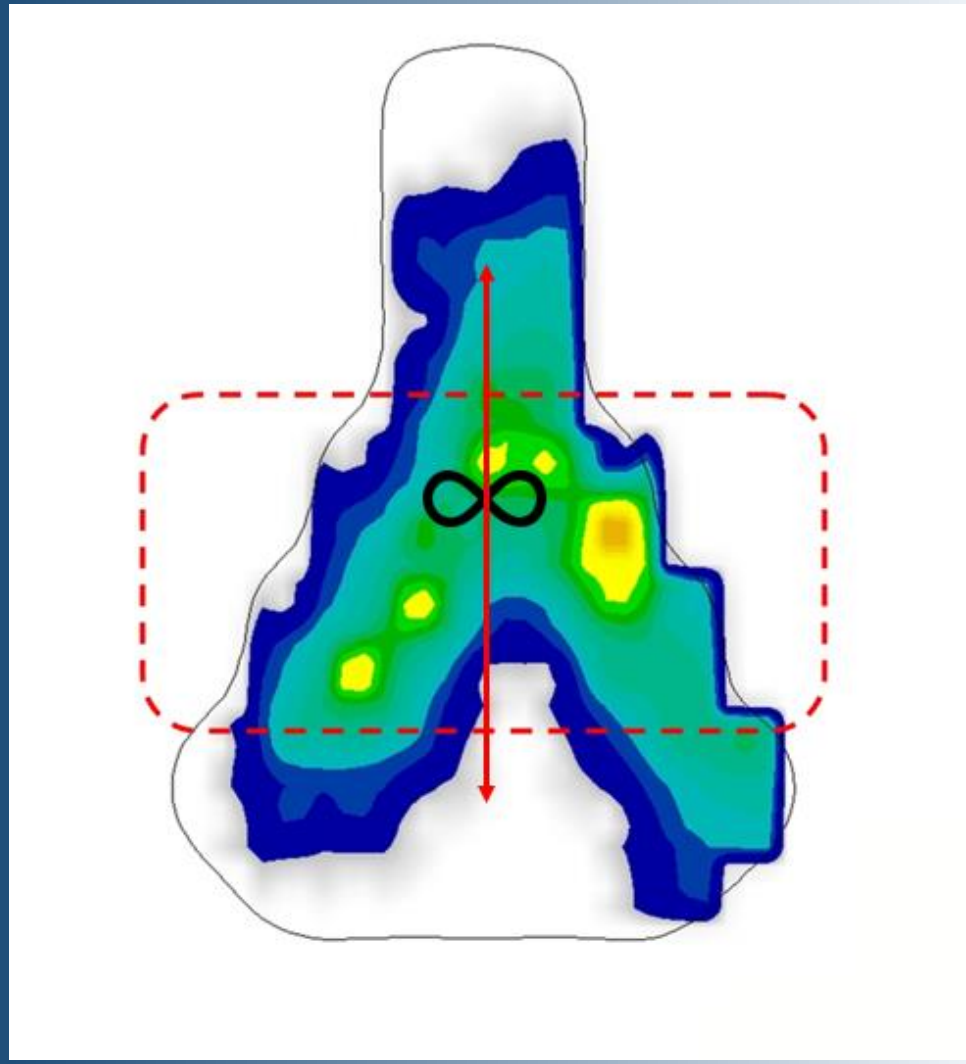
→

Data analysis for ICS, Manchester 2016

Introduction

Differences between female and male cyclists:

* Pattern and position of COP
* Pressure distribution



Introduction

Dynamic profile

- COP ratio 9,2 of „not fitted“ female rider

… in comparision to a male rider

- COP ratio 7 of „not fitted“ male rider

BUT:

both gender leave the lab with no significant difference in stability (COP Ratio 6,2 / 6,5)

Sattelmodelle: 4	n = 25 f	**COP t**	**COP l**	(longitudinal * transversal) / 100
	tops - mean	28,7	31,8	9,1
	SD	12,13	11,11	1,3
	hoods - mean	29,74	30,43	9,0
	SD	12,66	11,42	1,4
	drops - mean	30,14	30,66	9,2
	SD	13,23	12,02	1,6
	über alle 3 Lenkerpositionen			
	mean	29,53	30,96	9,1
	SD	12,64	11,49	1,5

Introduction

Dynamic profile of a female rider: pressure distribution

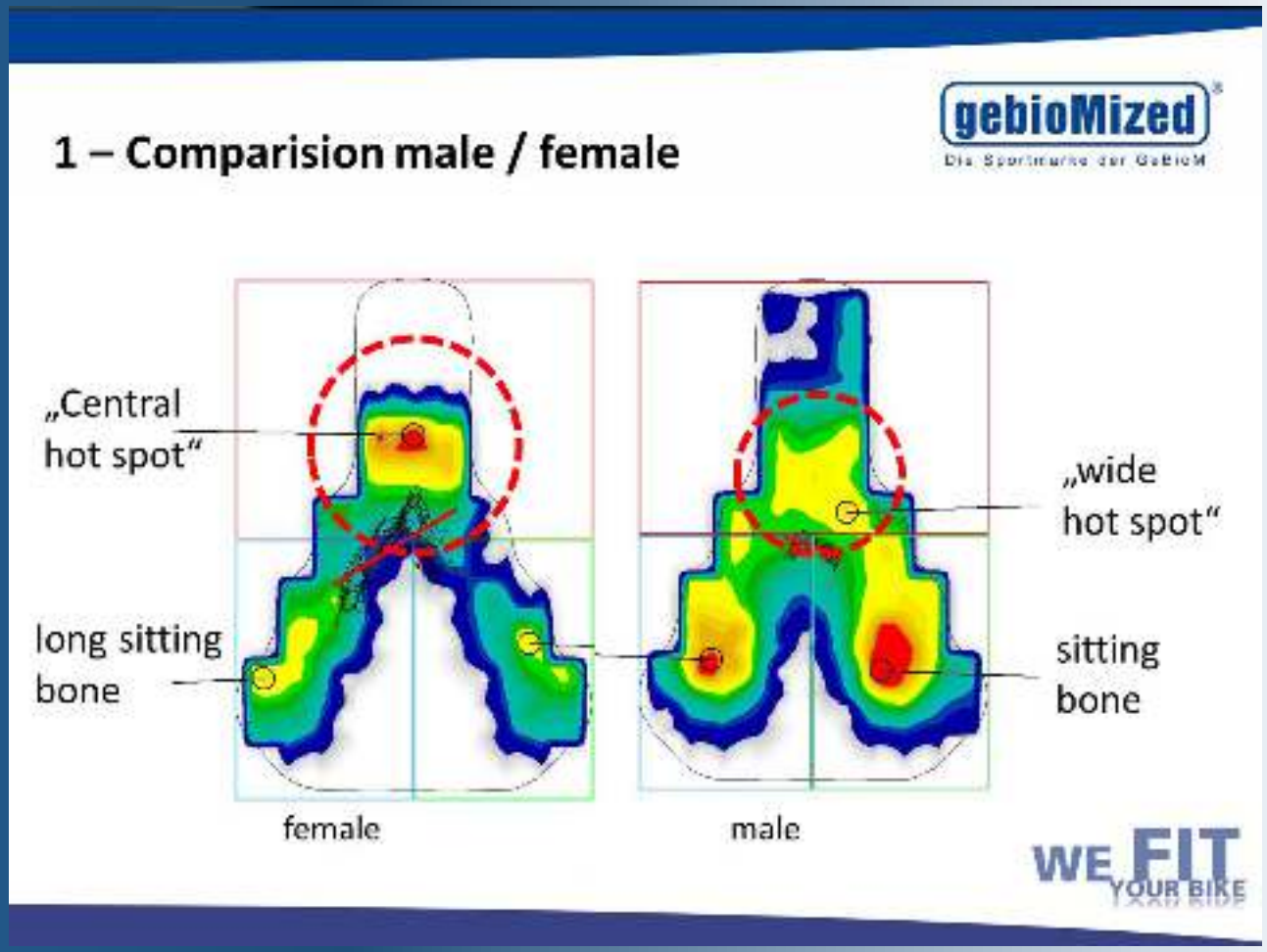
- Central hot spot

… in comparision to a male rider

- Wider hot spot

BUT:

What happens in the front and middle area of the saddle?



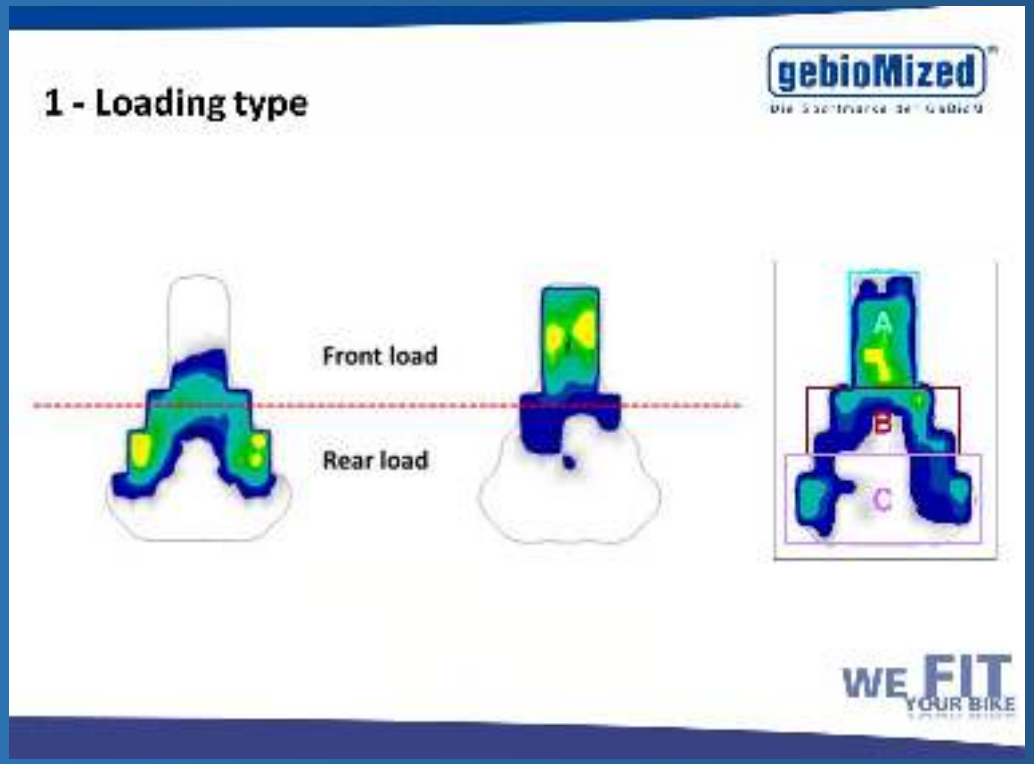
Introduction

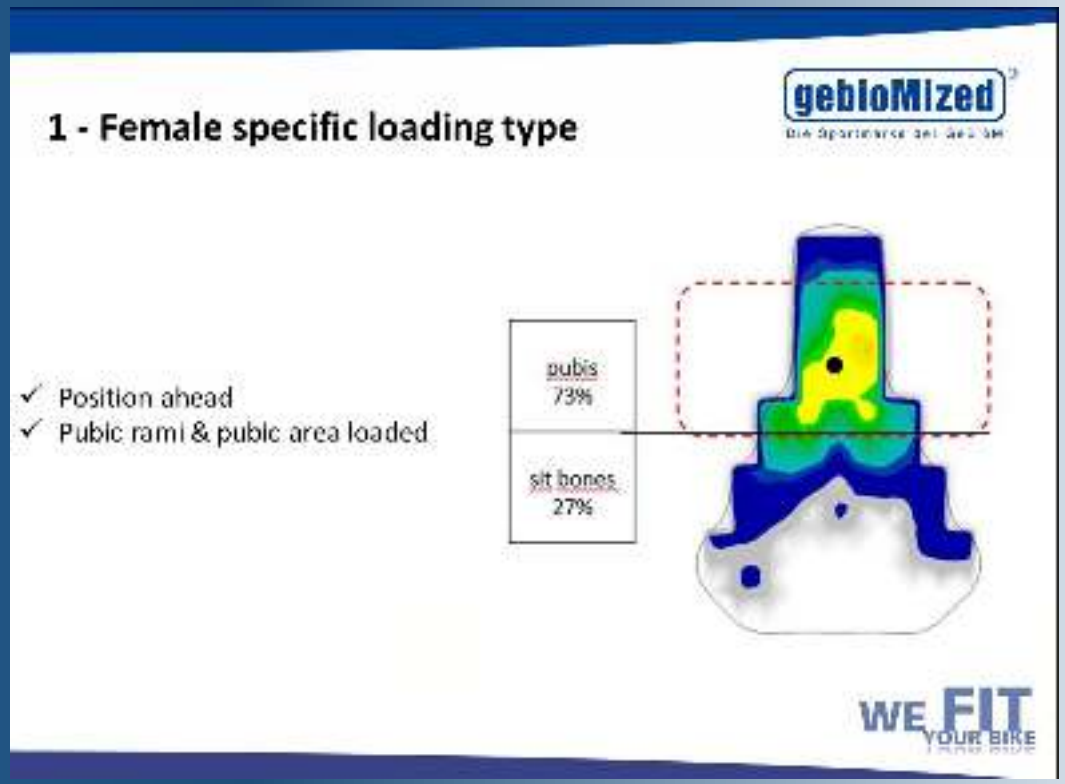
Why women lack comfort and stability if the bicycle is not adjusted professional?

??? Gender Marketing / Psychology
??? Geometry development
??? (Contact Point) Components

Can we think about another perspective on developing saddles?

Introduction (Status 2016)





Method

2 analysis of data cases, n = 10 / 10(2016)
4 clinical studies n = 45 / 25 (2017 – 2019)

(Static sit bone distance)

Lab set up / stationary trainer with control of power output

Female and male athletes

3 handlebar positions

Transfer of individual set up into a moderate and an aggressive position (Roadbike) to fit bike

2 W / kg (Resistance)

Steady cadence

Sample

45 F / 25 M
Active, recreational rider
Average age: 38 (F) / 32 (M)
2500 – 5000 km / year

- N = 20

	age	height [cm]	weight [kg]	BMI [kg/m²]	years of cycling experience
min	20	159	45	17,58	0,5
max	60	178	75	26,45	40
mean	**33,10**	**167,46**	**62,75**	**22,37**	**5,73**
SD	11,44	5,52	7,96	2,55	9,83

N = 25	Age [years]	Height [cm]	Weight [kg]	BMI [kg/m²]	Cycling experience In years
mean	38	170	65	22,4	8,3
min	18	165	55	18,9	1
max	59	184	86	30,1	30

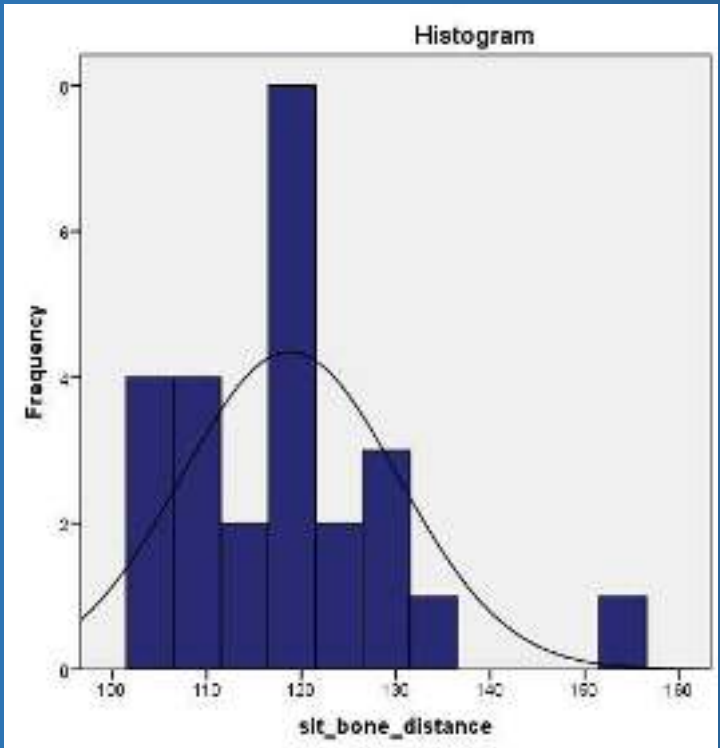
occurence	range km/year
3	1000 – 2500 km
11	**2500 – 5000 km**
7	5000 – 7500 km
3	7500 – 10.000 km
1	> 10.000 km

N = 25	Age [years]	Height [cm]	Weight [kg]	BMI [kg/m²]	Cycling experience In years
mean	32	182	78	23,5	10
min	15	175	61	18,02	2
max	61	193	109	34,79	40

occurence	range km/year
4	1000 – 2500 km
14	**2500 – 5000 km**
4	5000 – 7500 km
3	7500 – 10.000 km
0	> 10.000 km

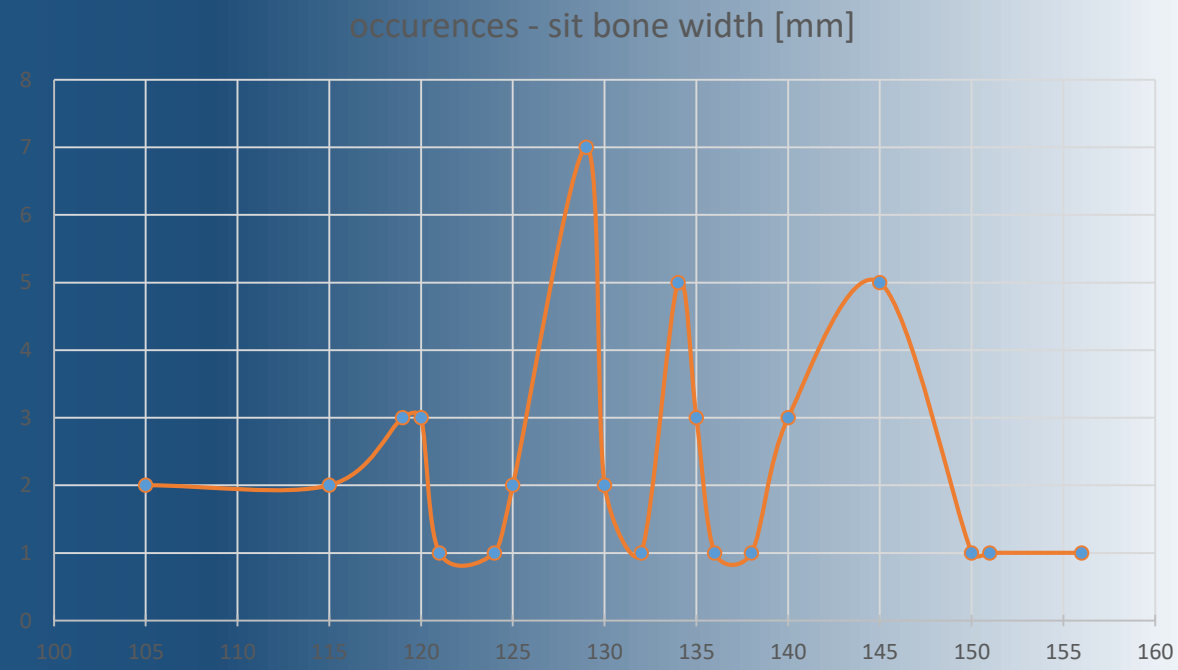
Results
Static sit bone distances

Male



	min	max	mean	standard dev.
distance [mm]	104	155	**119**	11,46

Female

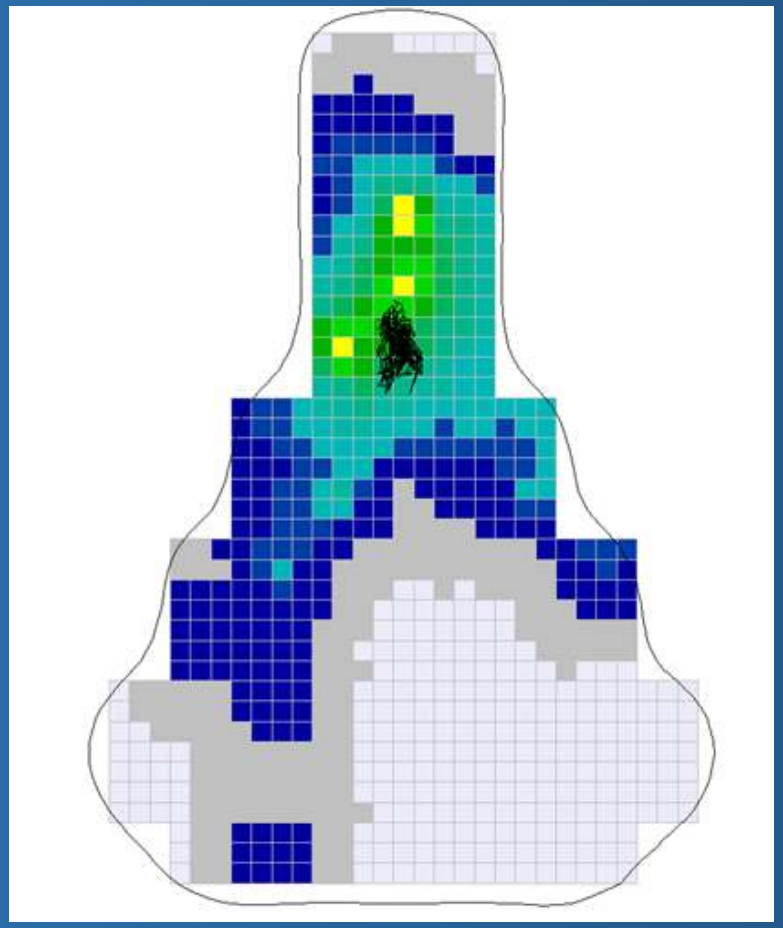


N = 45
mean = 131 mm

Results
Position on the saddle

4 different saddle constructions

Female zone



Male zone

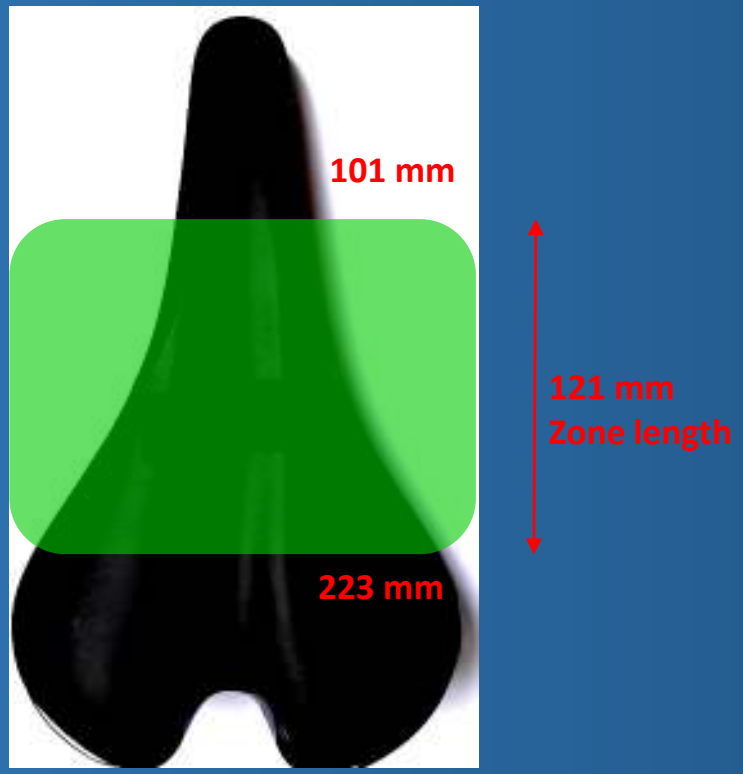
female	Primary loading area (mm from saddle tip)			
		start	end	length
	Saddle 1	101	227	126
	Saddle 2	100	222	122
	Saddle 3	103	219	116
	mean	101	223	121

male		start	end	length
	Saddle 1	130	228	98
	Saddle 2	122	224	102
	Saddle 3	134	234	100
	Saddle 4	124	233	109
	mean	128	230	102

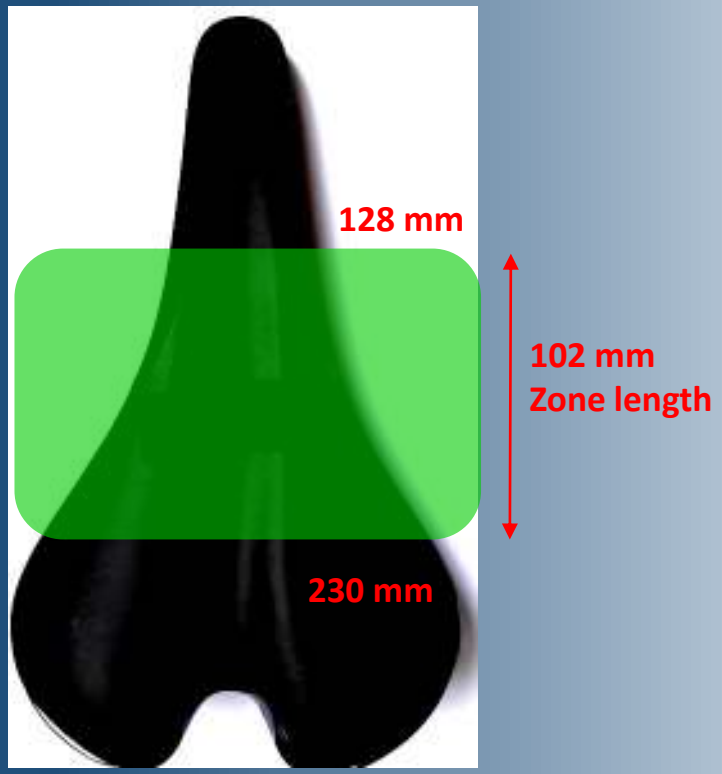
Discussion

Loading zones of female and male cyclist

Female Zone

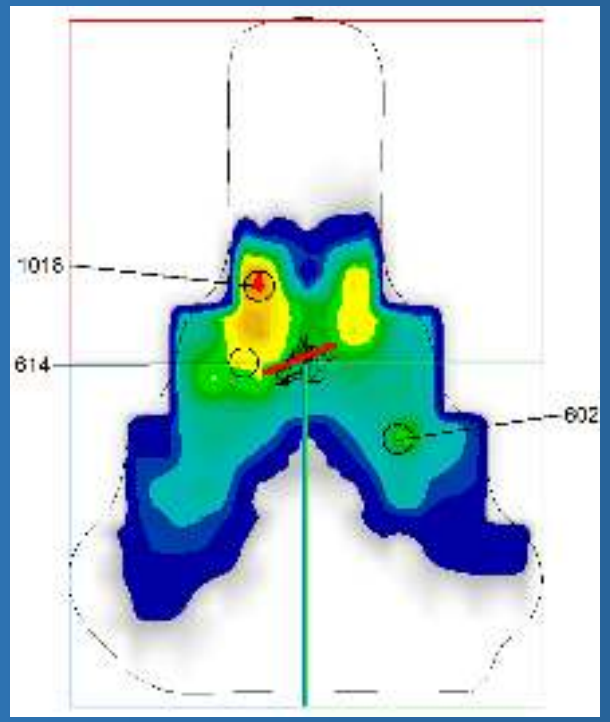


Male zone

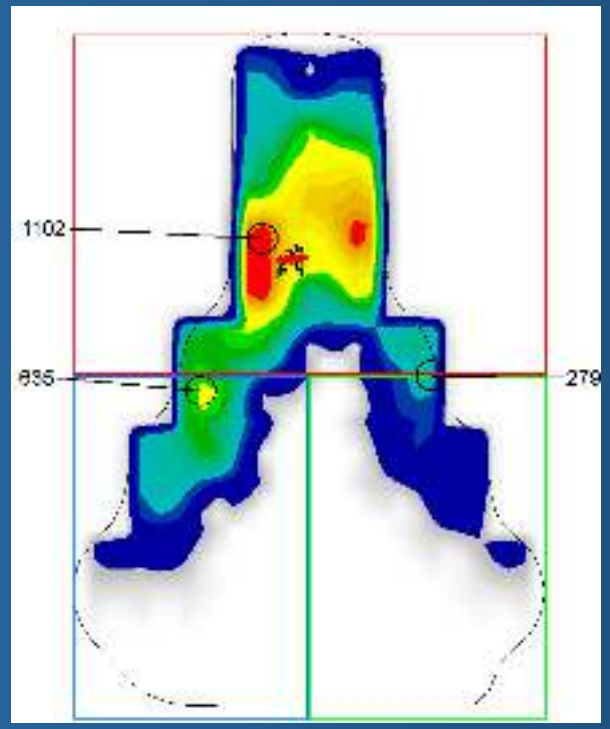


Identification of Dynamic Profiles (pubic loading type)

Female
Front loading profile



Male
Front loading profile



Dynamic profile 1 (Female)

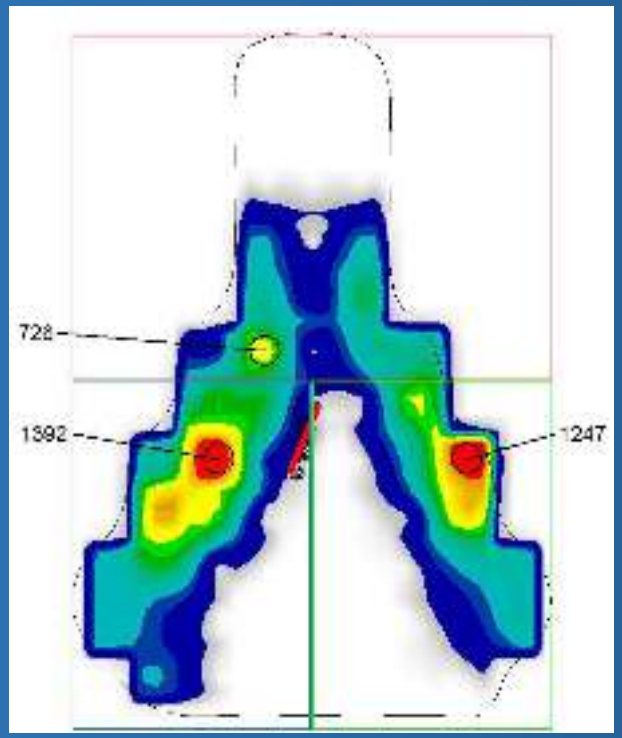
- Main loading area: pubic rails
- Less rear part (sit bones)

Dynamic profile 2 (Male)

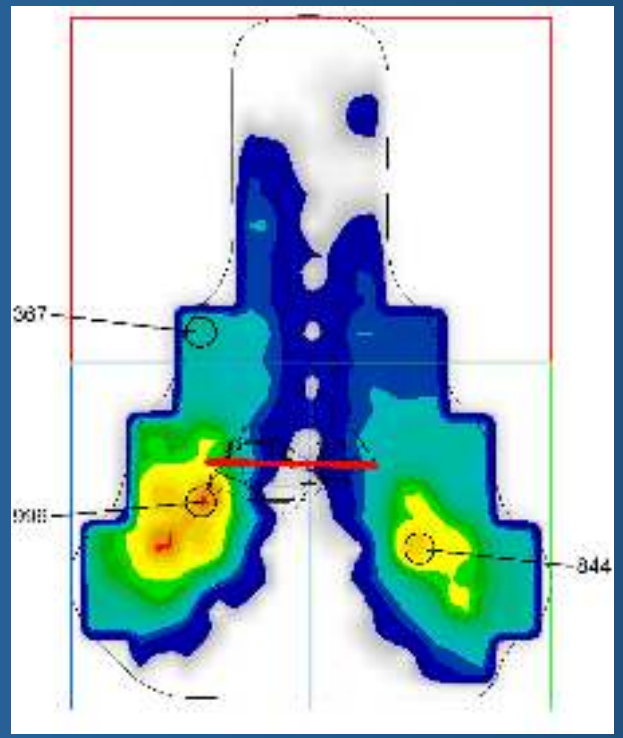
- Main loading area: front / tip of the saddle and rear part (wings & sit bones)
- In need of wider saddle nose

Identifiction of Dynamic Profiles (sit bone loading type)

Female rider
Sit bone loading profile



Male
Sit bone loading profile



Dynamic profile 3 (Female)

- CPP more frontal = more pelvic tilt
- Pubic rails more involved
- Longer loading zone in wing area (middle part of the saddle)

Dynamic profile 4 (male)

- CPP further back
- „Pure“ sit bone load = less pelvic tilt
- In need of „leg clearance“

Conclusion

- Static sit bone width is not important
- Construction of the wing area is important
- Identification of „loading zones“ is important

Conclusion

- **Saddle development for different „dynamic rider profiles“**

- Education of cyclists, fitter and retail specialists

Schade 2005, 2013, 2017
Daley 2006
Kraus 2015, 2016
Holliday 2019
Neuhaus (in review)
Brandtner (in review)