II swimming research and classifications

Ingi Þór Einarsson

Physical fitness profile of elite athletes with intellectual disability

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Freestyle Race Success in Swimmers with Intellectual Disability

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Athletes with intellectual disability (ID) competing at international level show lower levels of explosive strength and cardiovascular fitness when compared to age matched trained persons.

Perceptual-motor coordination in persons with mild intellectual disability

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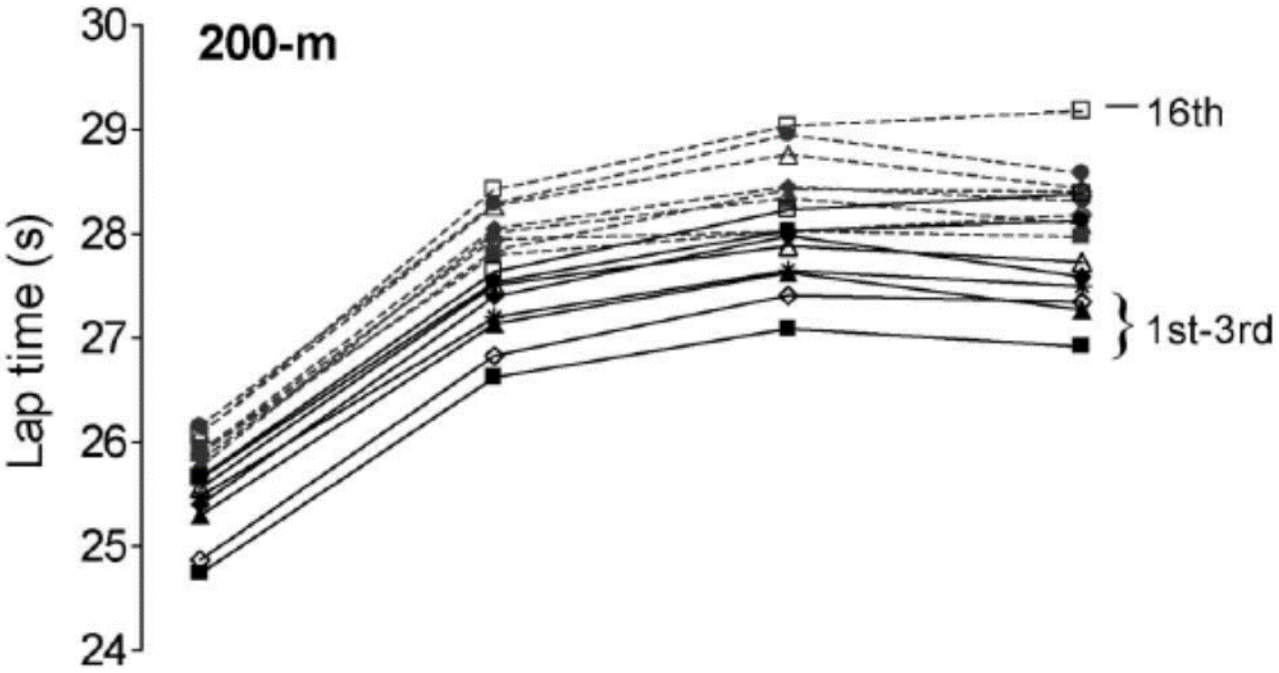
The purpose here was to examine certain race segment times and stroking variables in two groups of Paralympic swimmers matched by functional class and race performance. Start time, Turn time, Finish time and mid-pool swimming speed and SR and SL were measured in two groups (Cerebral Palsy(CP) and Limb Loss (Amp)) of Paralympic 50-m, 100-m and 400-m freestyle finalists

Skills in swimming



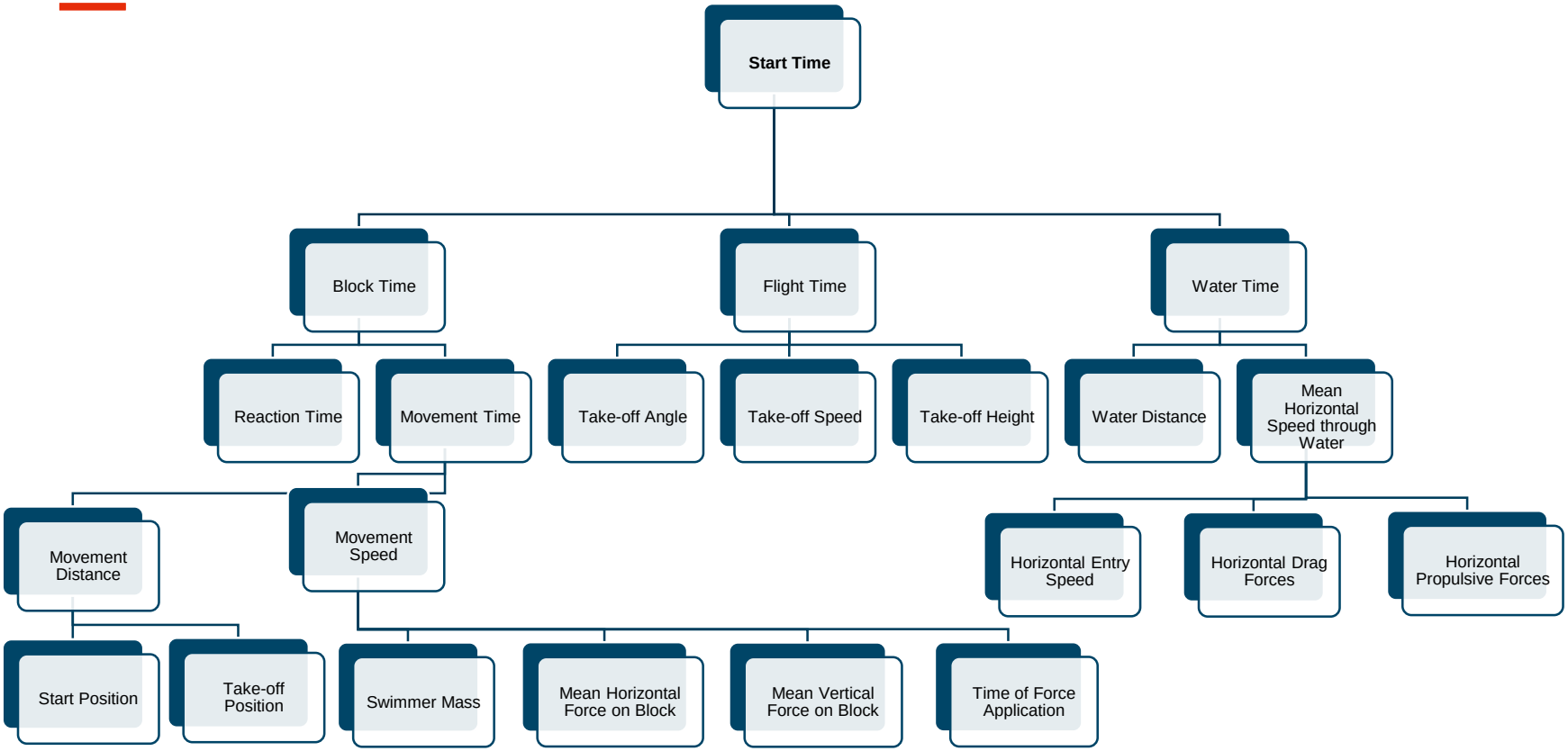
Power/strength

Skills in swimming

- Open skill (or dual task)
- Closed skill
- Pacing

- Endurance
- Power/strength

Swimming is based on:



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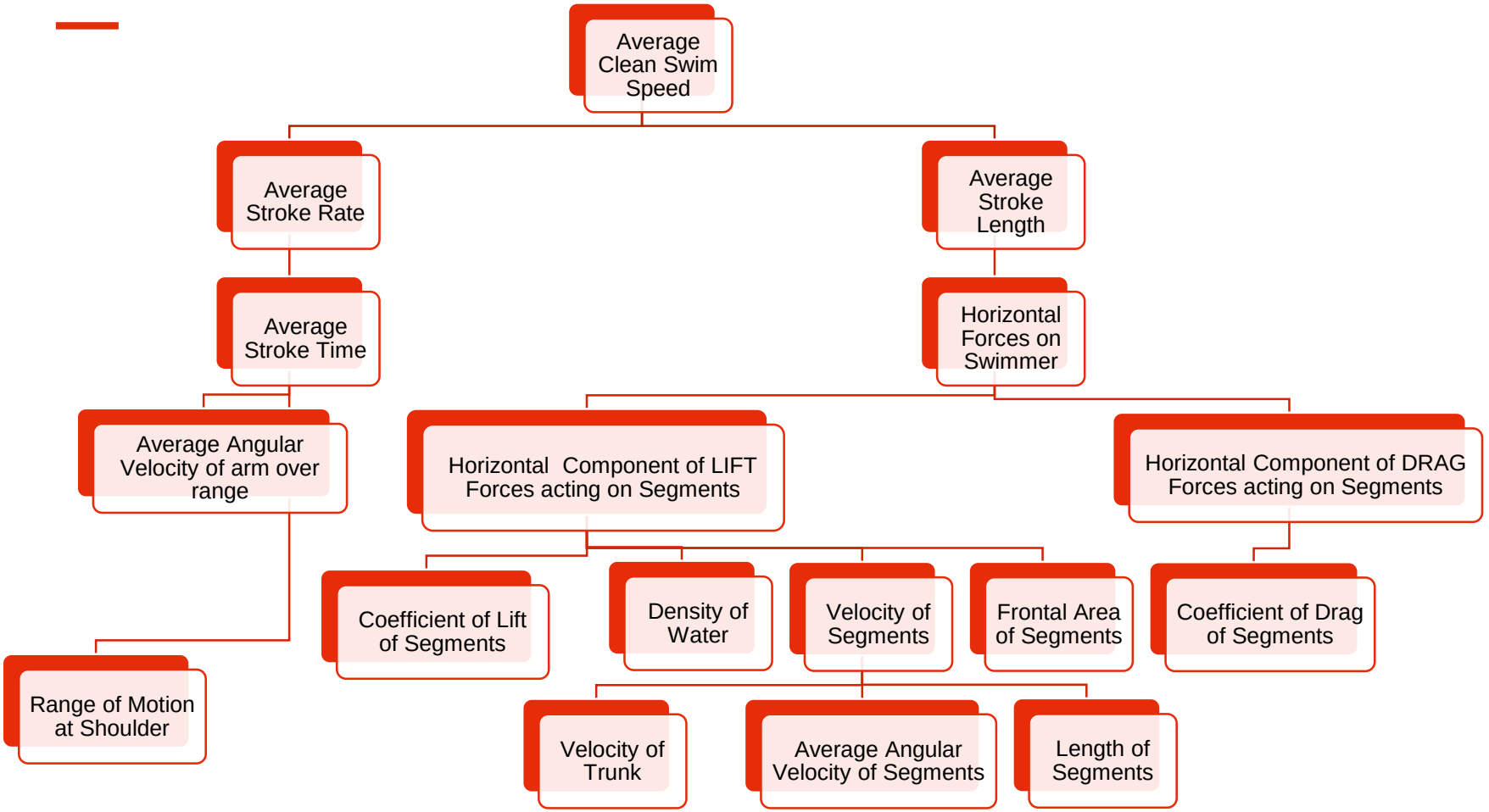

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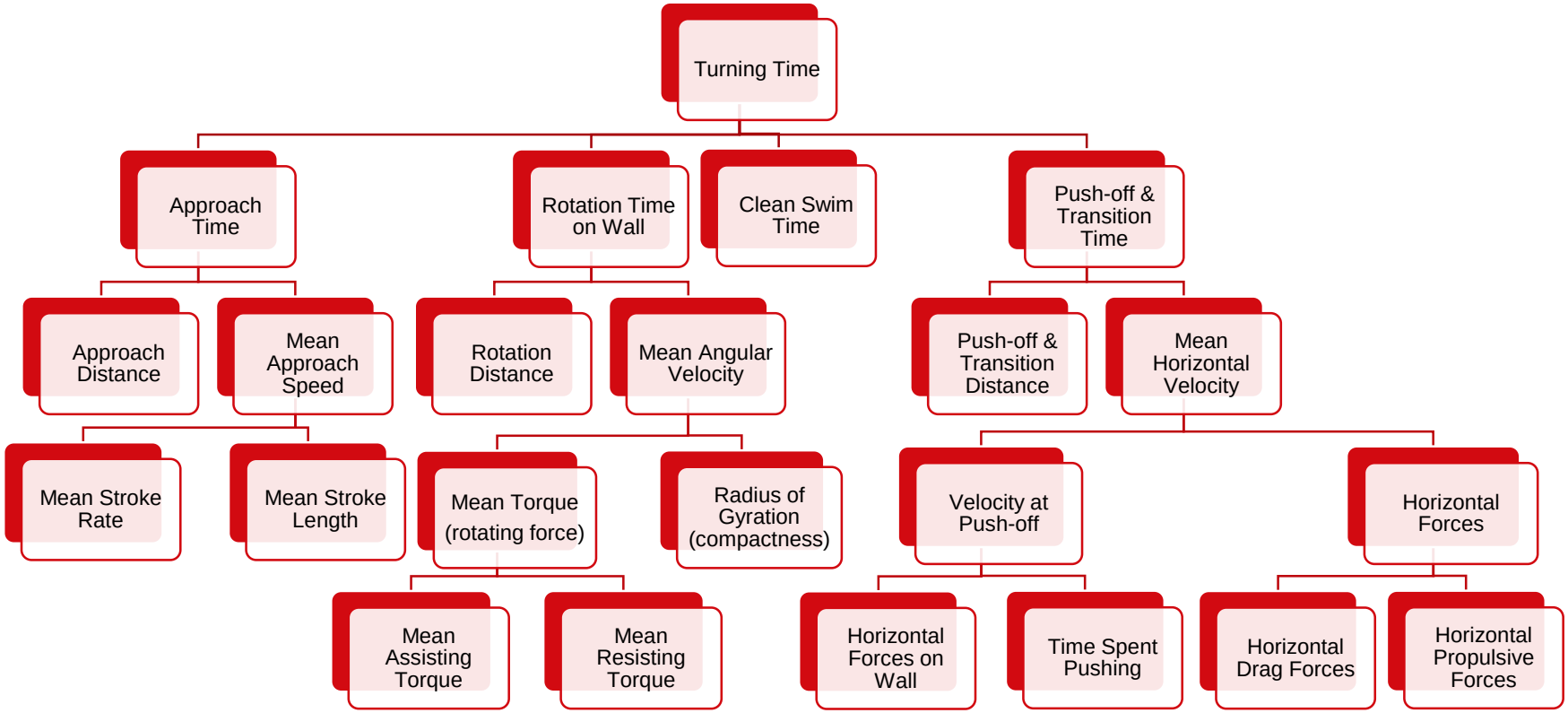
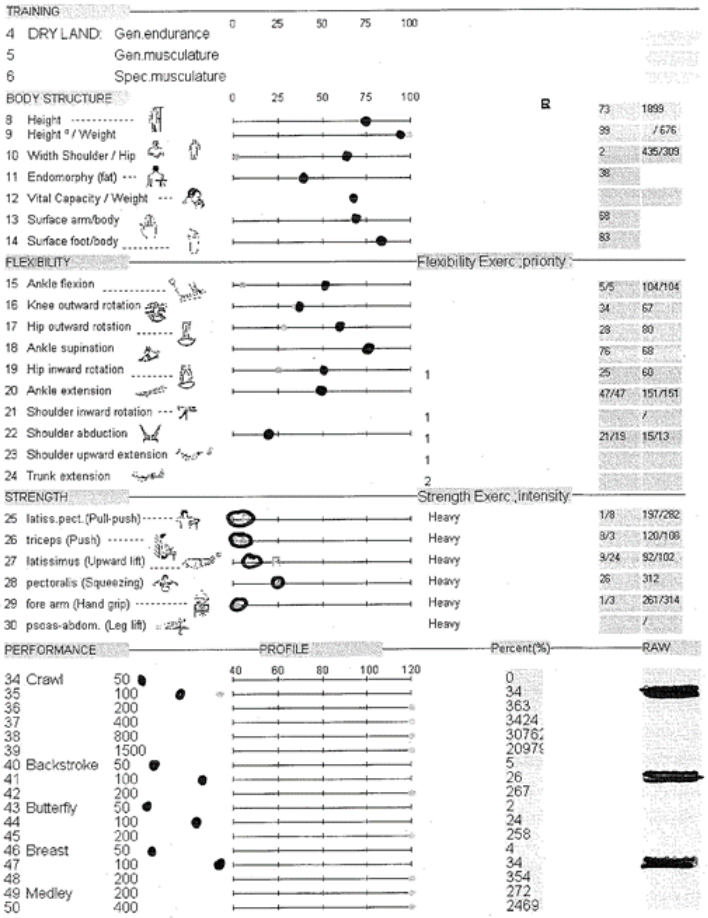
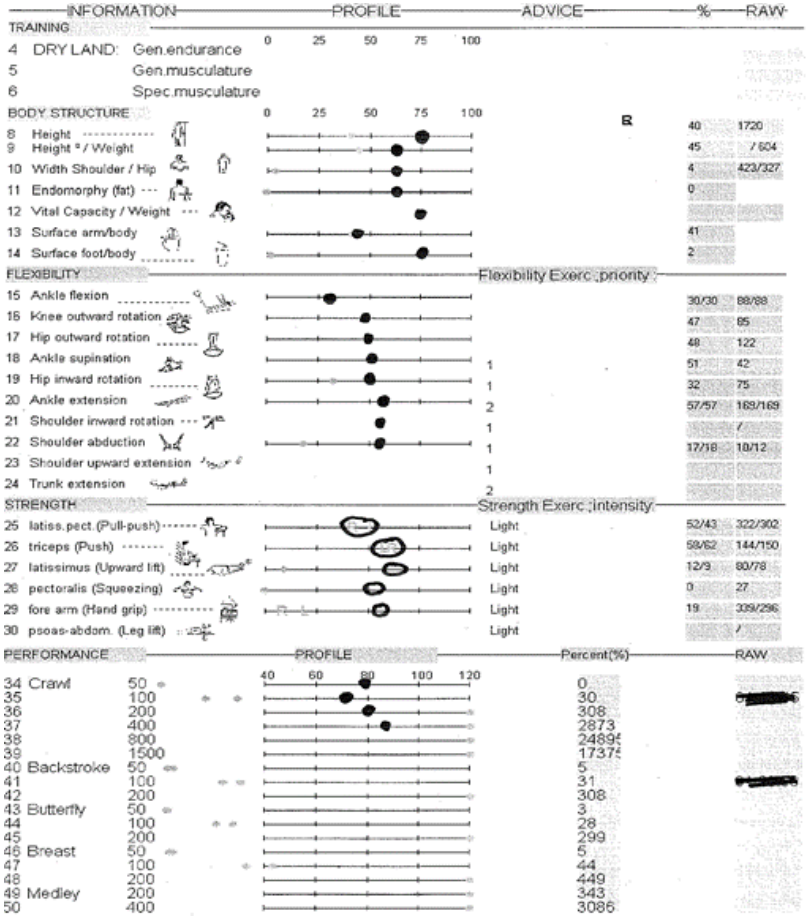


KUL physical fitness test battery for swimmers

- We tested 16 AB and 16 II swimmers All variables controlled for gender and age





KUL test battery summary

- II and AB had same:
  - Flexibility

Individuals with intellectual disability have lower voluntary muscle activation level

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  - Absolute strength
  - Swimming performance
  - Training hours at the gym

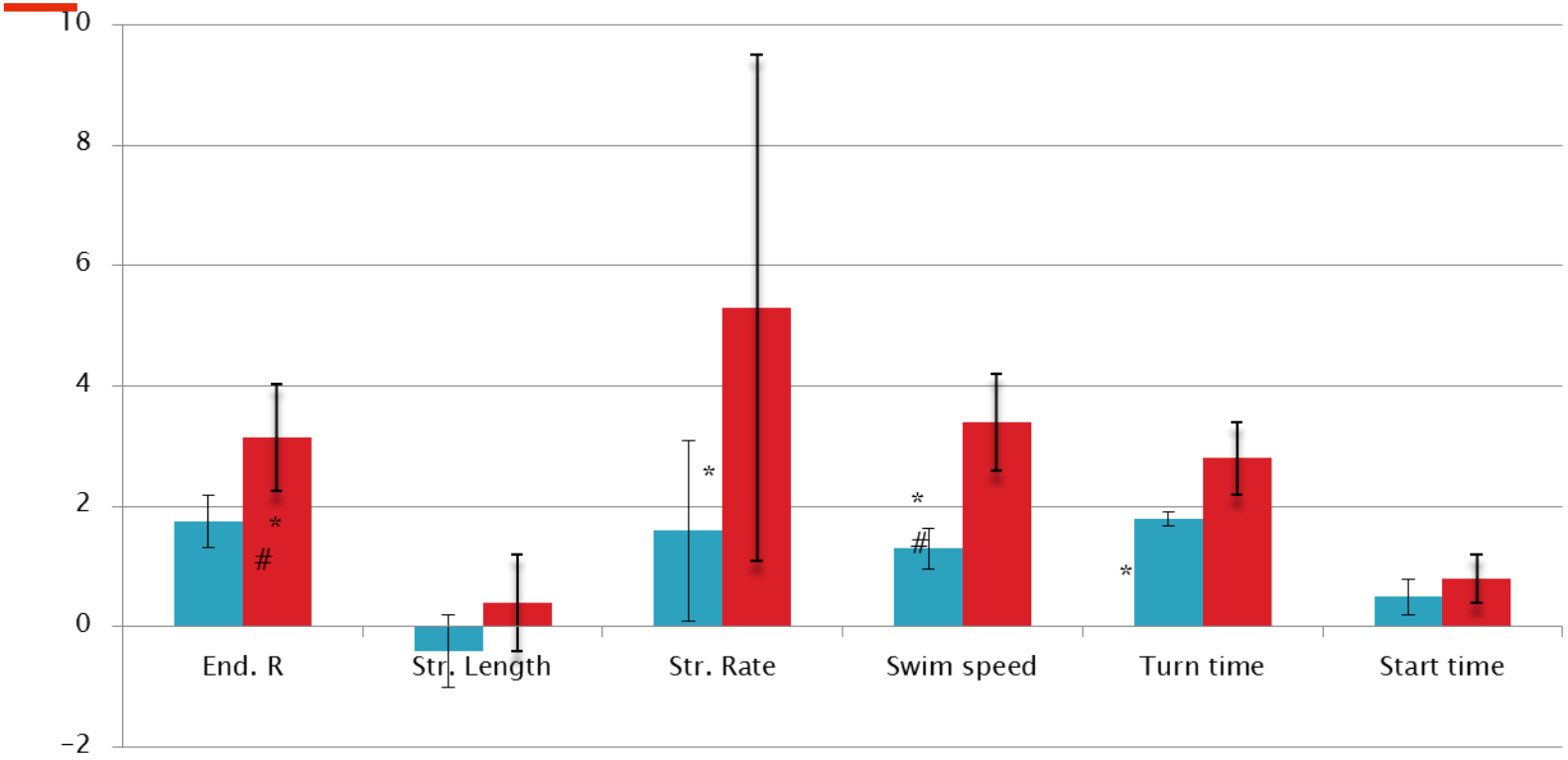
Longitudinal monitoring

- We followed 16 II swimmers and 16 TDI swimmers over whole year to monitor the stability of their race performance. (5-6 races)

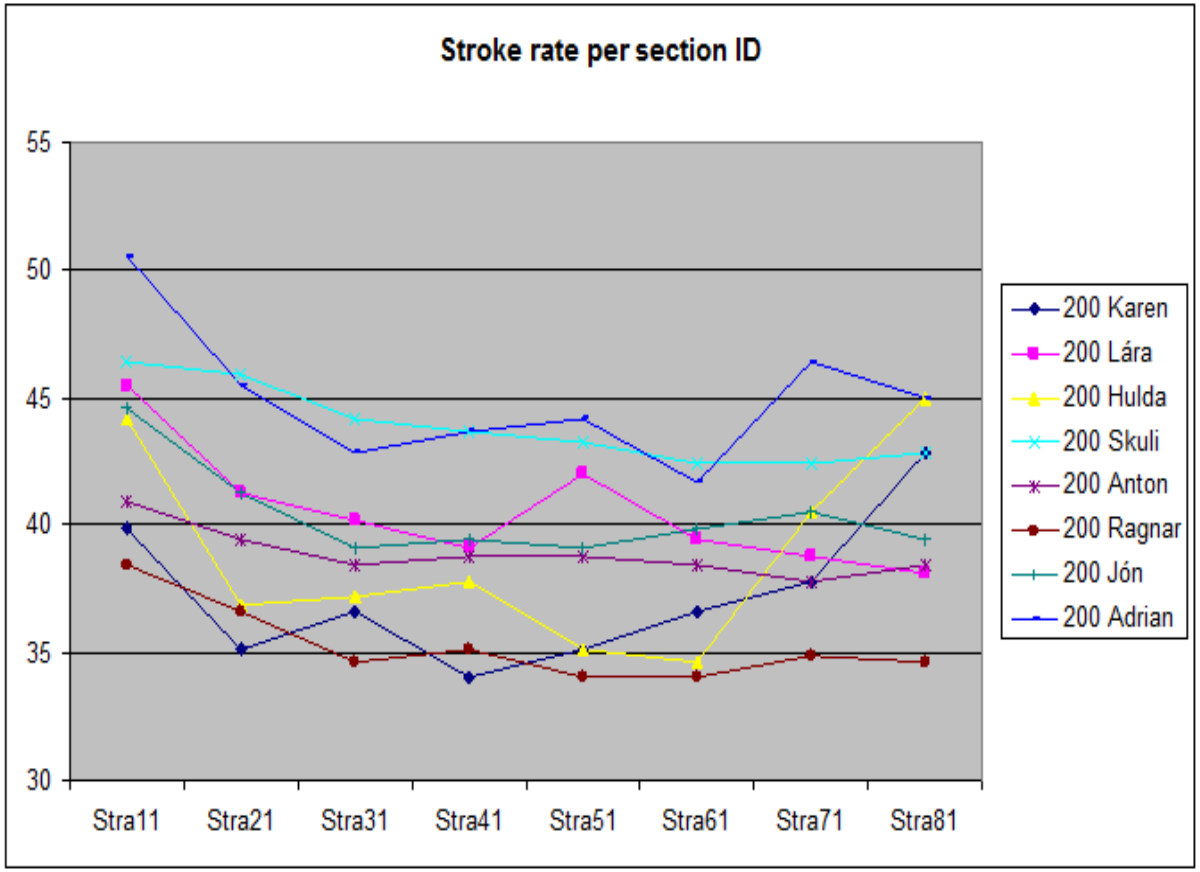
- Much more in race- and between race variability with II than TDI swimmers

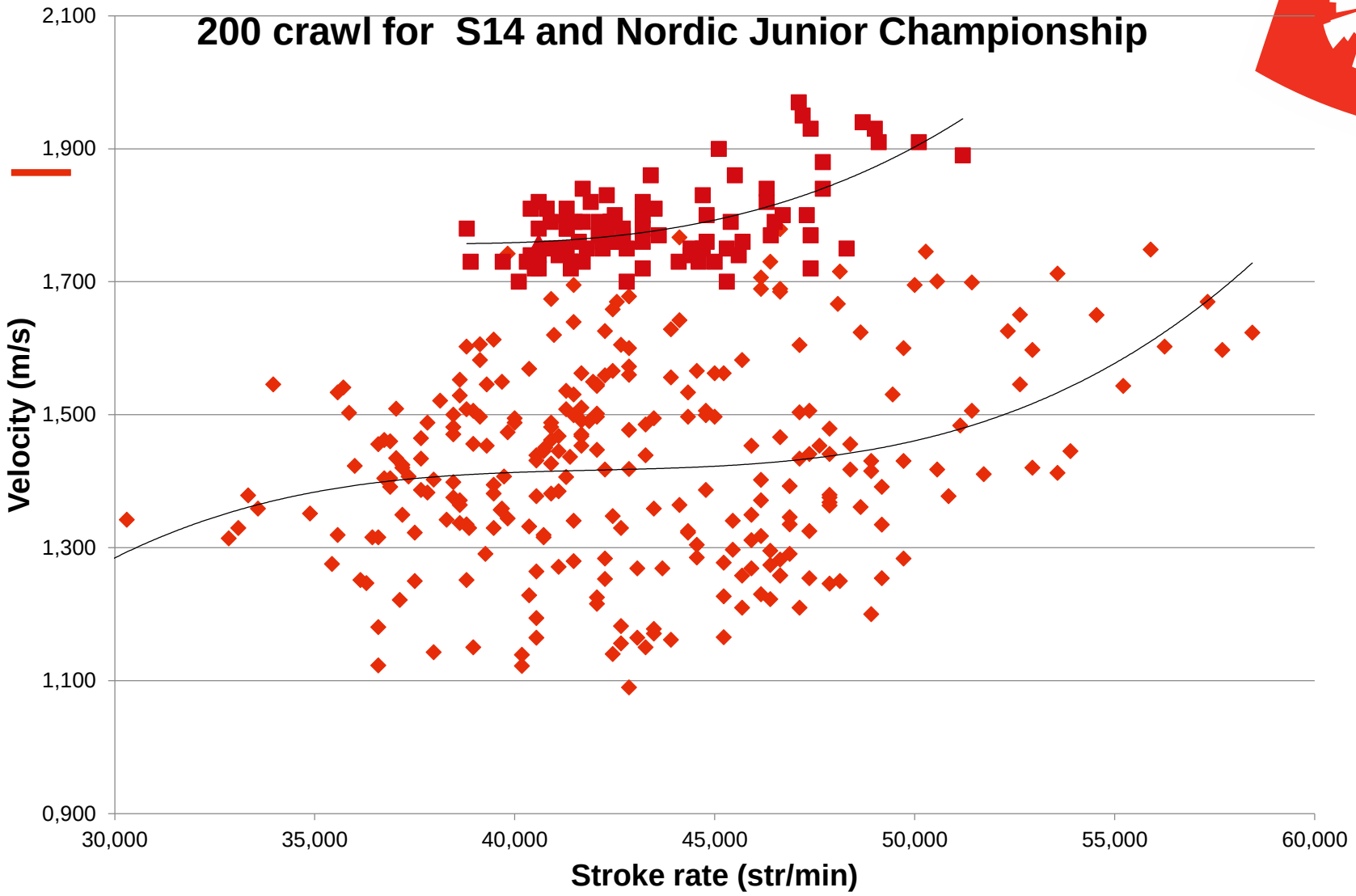
- Peaking at the right competition was difficult

Variability between races (1-3)



Variability in the race




200 crawl for S14 and Nordic Junior Championship
2,100
1,900
1,700
1,500
1,300
1,100
0,900
Velocity (m/s)
30,000
35,000
40,000
45,000
50,000
55,000
60,000
Stroke rate (str/min)

Swimming classification system

- Late 2009 we got the call from IPC that we have 3 weeks to come up with a swimming sport specific classification system
- Based on big data sets we had from swimming competition (all out races)

	Regression equations	P5	P25	P50	P75	P95
MEN						
200mCrawl	Relative Speed = Real mid pools speed - (-3.59397+0.35696*stra-0.00855*stra2+0.00006875*stra3)	-.2535	-.1061	-.0005	.0960	.2630
100m Breaststroke	Relative speed = Real speed - (0.55664+0.01661*stra-0.00007148*stra2)	-.3082	-.0893	.0127	.1028	.2123
100m Backstroke	Relative Speed = Real Speed - (0.70478+0.01554*Stra)	-.1488	-.0797	-.0057	.0733	.1623
WOMEN						
200-m Crawl	Relative Speed = Real Speed - (-10.98848+0.83351*Stra-0.01916*Stra2+0.00014848*Stra3)	-.2122	-.0662	.0071	.0808	.1943
100 Breaststroke	Relative Speed = Real Speed - (1.11129-0.01403*Stra+0.00025391*Stra2)	-.2105	-.0778	.0079	.0791	.1902
100 Backstroke	Relative Speed = Real Speed - (0.66938+0.01634*stra-0.00011496*stra2	-.1965	-.0641	.0017	.0754	.1693

Scoring 0-5: 0 = <P5; 1 = ≤P25; 2 = ≤P50; 3 = ≤P75; 4 = ≤P95; 5 = >P95

pacing test (best time 2:02 – 2:30)
8*50 on 1:30

	time		ID (time) (s) n=5	TDI (time) (s) n=4
1	+7	Paced	(0,4/0,1)	(0,3/0,1)
2	+5	Paced	(0,5/0,1)	(0,2/0,1)
3	+3	Paced	(0,3/0,1)	(0,2/0,1)
4	+1	Paced	(0,5/0,1)	(0,3/0,1)
5	+7	Un-paced	(4,0/1,7)	(1,2/0,3)
5	+5	Un–paced	(3,2/1,2)	(1,0/0,3)
7	+3	Un-Paced	(2,1/0,9)	(0,5/0,2)
9	+1	Un-Paced	(0,7/0,3)	(0,3/0,1)

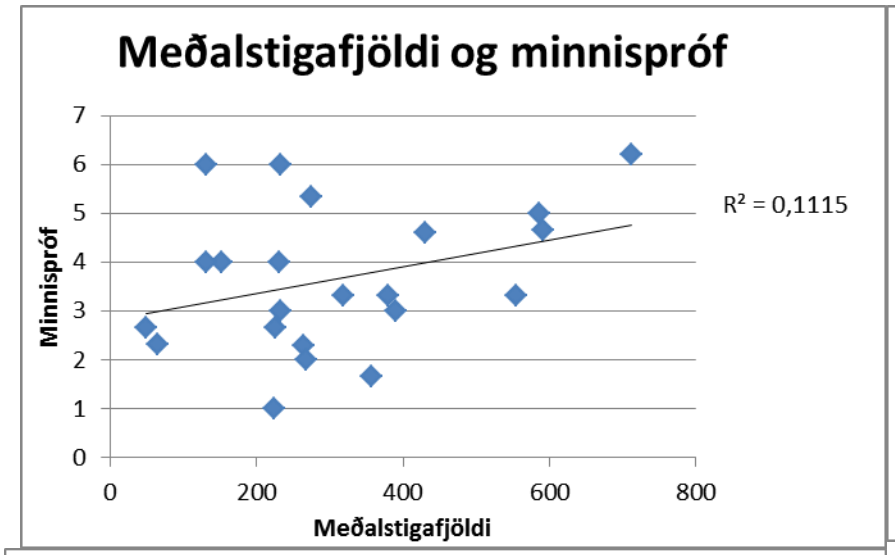
Also completely different variability on stroke rate

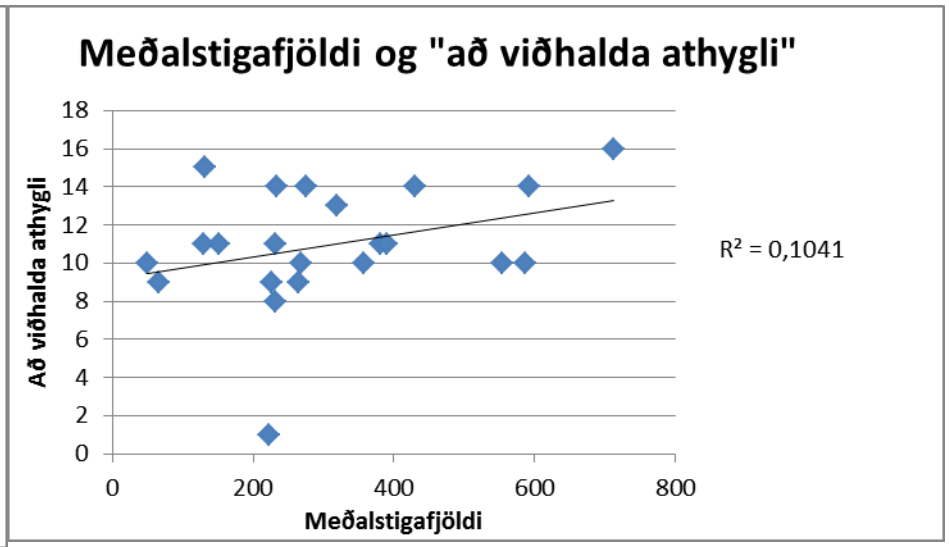
Test of feet placement in turn 16*50 at 1:30

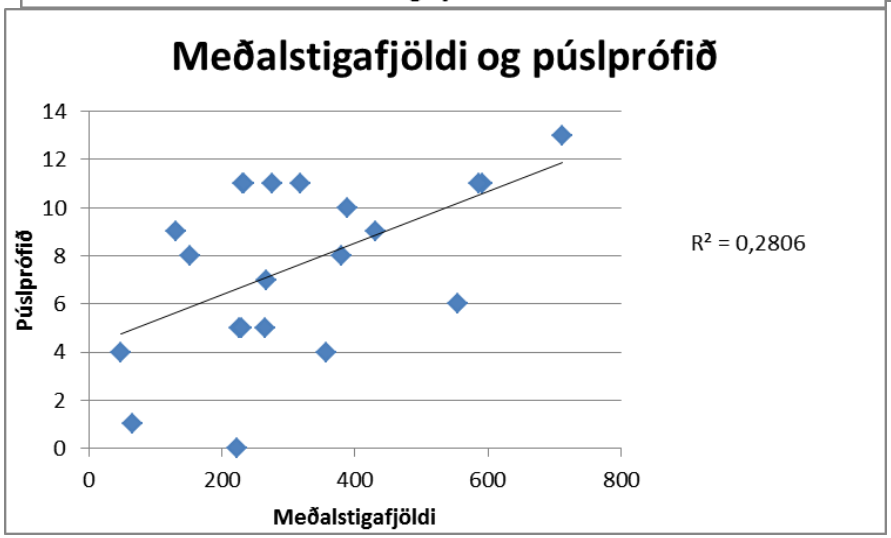
sprint	Time (Paced)	II N=5	AB N=5
1-4	+7	25 (13) cm	13 (5) cm
5-8	+5	19 (8) cm	11 (5) cm
9-12	+3	15 (6) cm	11 (6) cm
13-16	+1	18 (9) cm	13 (5) cm

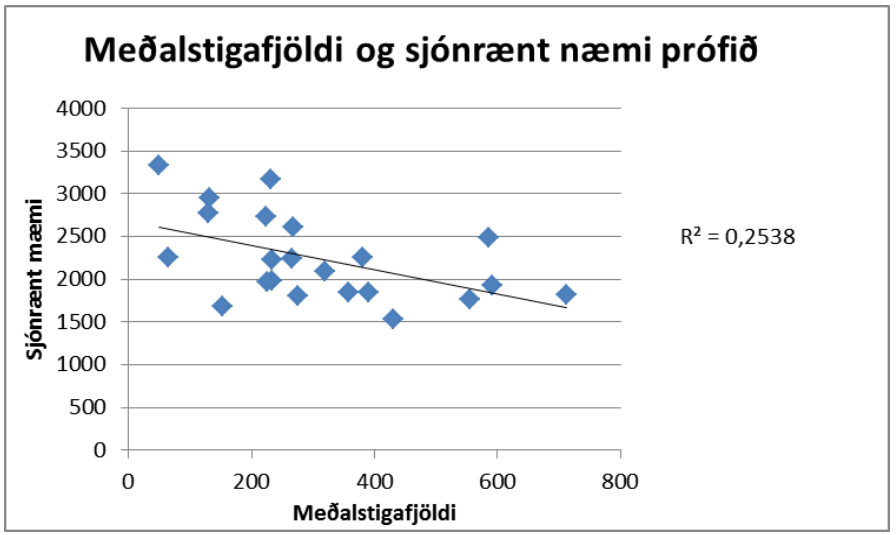
We drew the smallest circle around all feet placements on the wall and measured the radius

Swimming performance and Cognitive performance

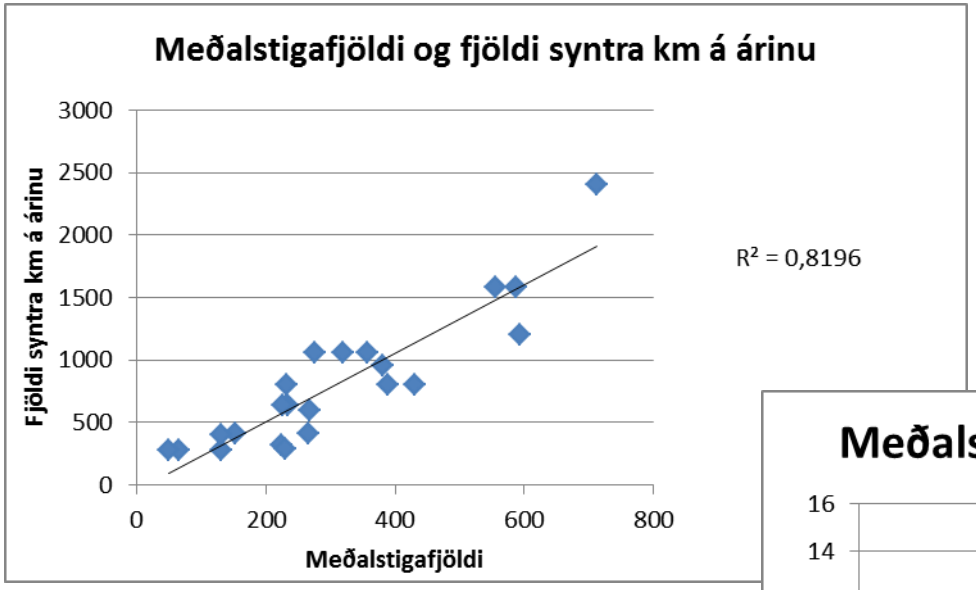


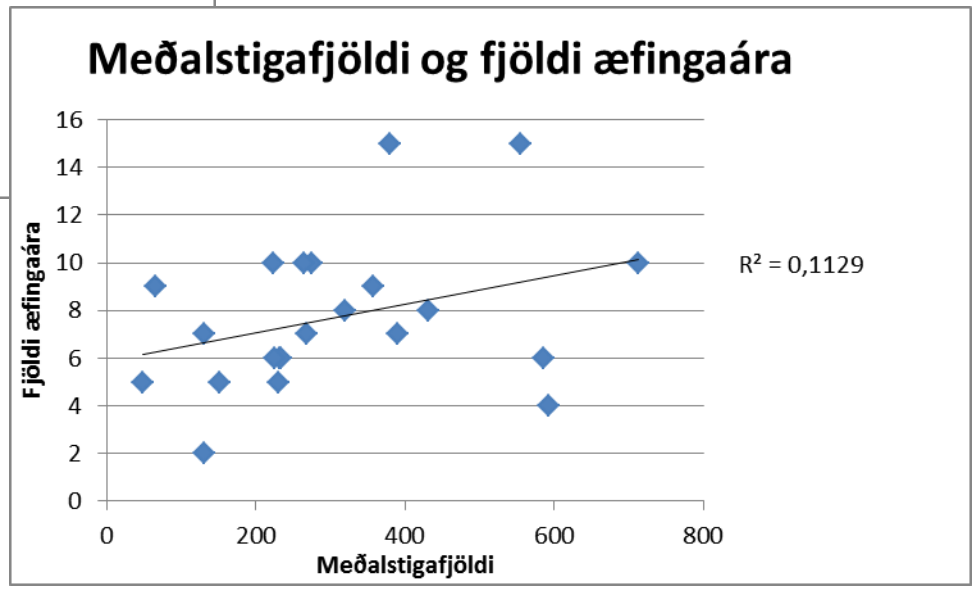






Performance and Training among II swimmers





Summary for the S14 classification system

- Current swimming sport specific classification system is outdated
- All data we have was collected between 2004 and 2009
- Cut-offs are based on this data (Pool)
- Swimmers are much faster now and bigger proportion is now training full program

- Only matter of time we have many more major cases on out hands

Next steps

- Urgently we need to:
- Update the swimming cut-off norms
  - Collect data like before and make new norms like before
    - 4 people, 4 cameras 4-5 big swimming meets with few swimmers in all competitions
    - IPC never collected the any results
  - Base the norms on FINA swimmers
    - Define which group to compare with
    - Good for high end swimmers, need more testing for slower swimmers

Next steps

- Urgently we need to:
- S, SB and SM makes no sense for S14
  - Data really indicates that it should be SFR, SBR, SBA, SFL and SME
- Decide if we (including IPC) want pre-competition sport specific tests
  - Pacing, Turns, MVC, LA
- Decide if we want or need more classes for II athletes