universität wien

Guide.Me

Guiding athletes through heartrate and power based tasks

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Motivation

Structured training

- **Heart Rate**
- **Power**

(Performance) Testing

- **Reproducibility**
- **Accuracy**

120‘ @ 130-140 bpm

4x4‘ @ 120%FTP, 4‘Rest

How to remember?

How to follow?

Novice athletes?

Aim of the study

Investigation of different feedback variants

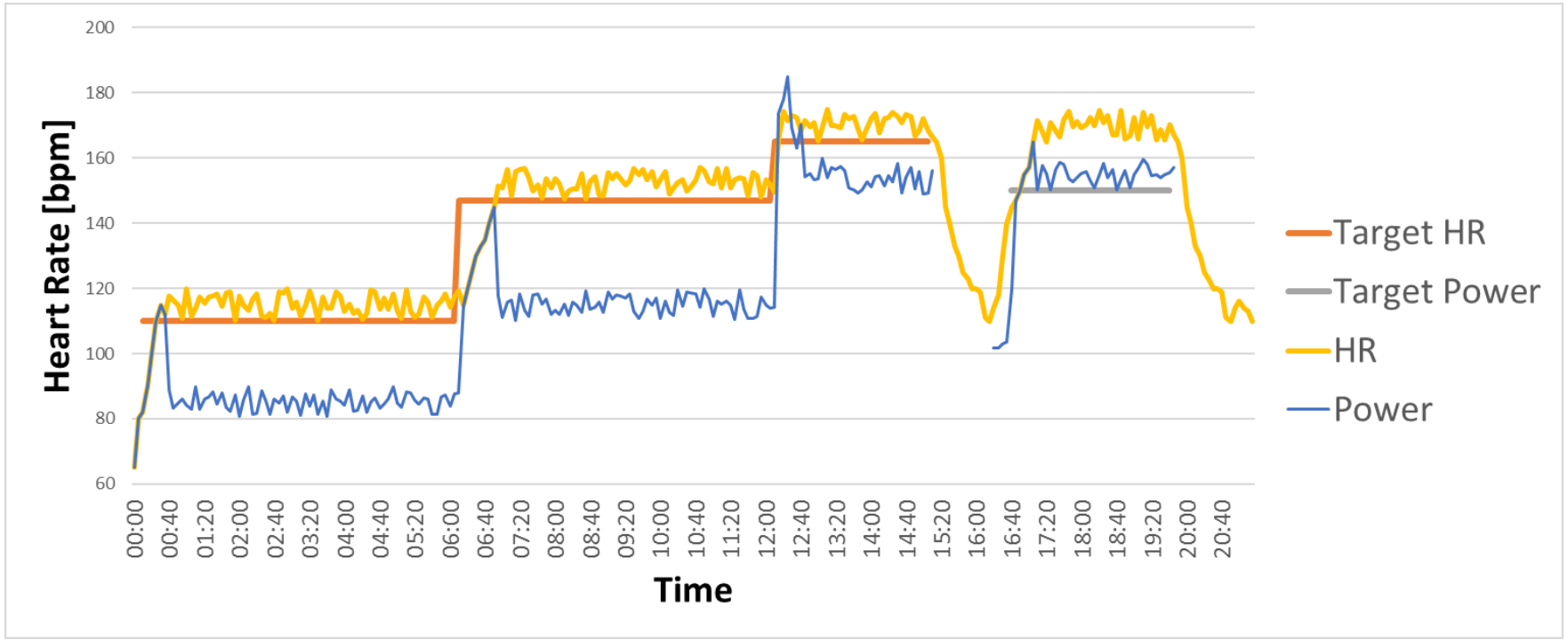
Using (novel) smartphone apps

Study-Design

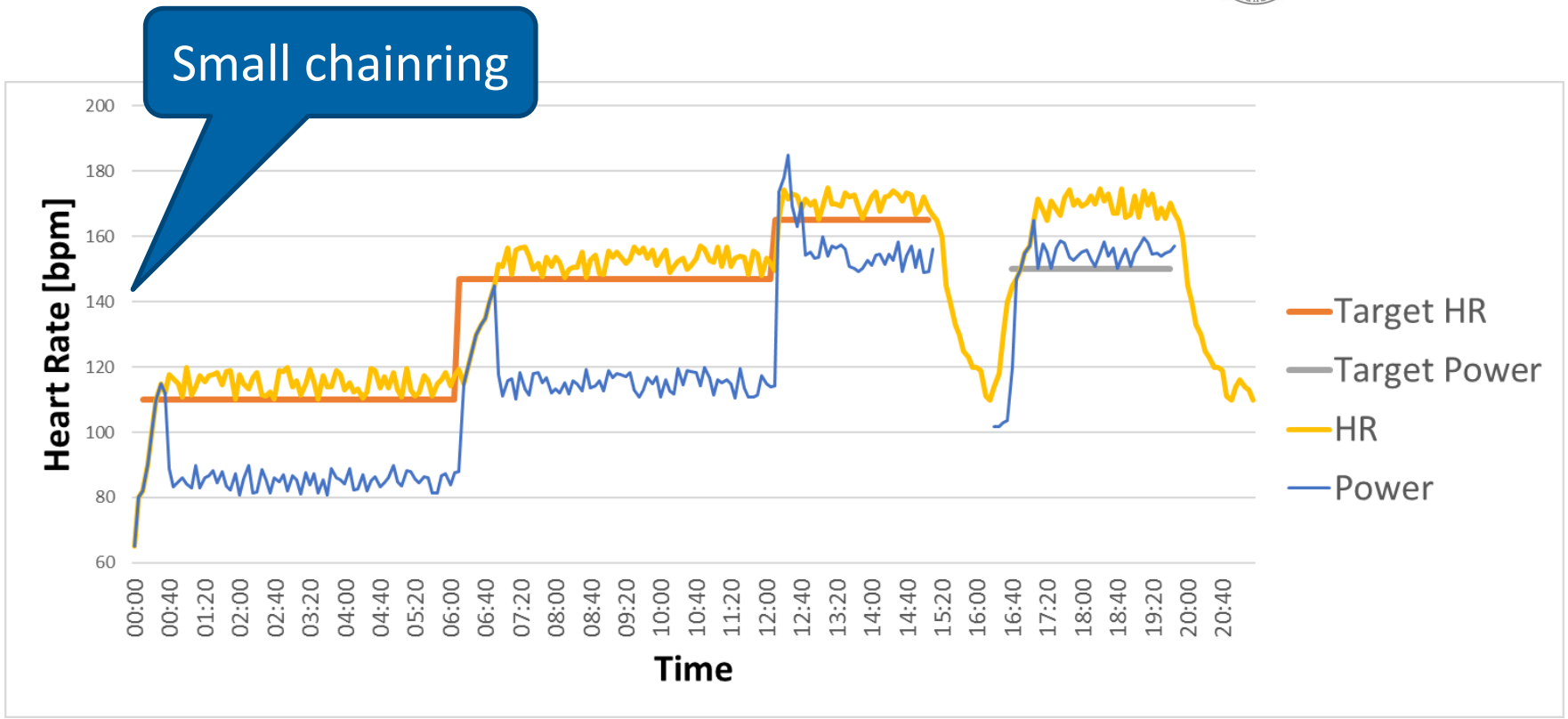
Submaximal Cycling Test

Variation of Lamberts and Lambert Submaximal Cycling Test
+ Power based task

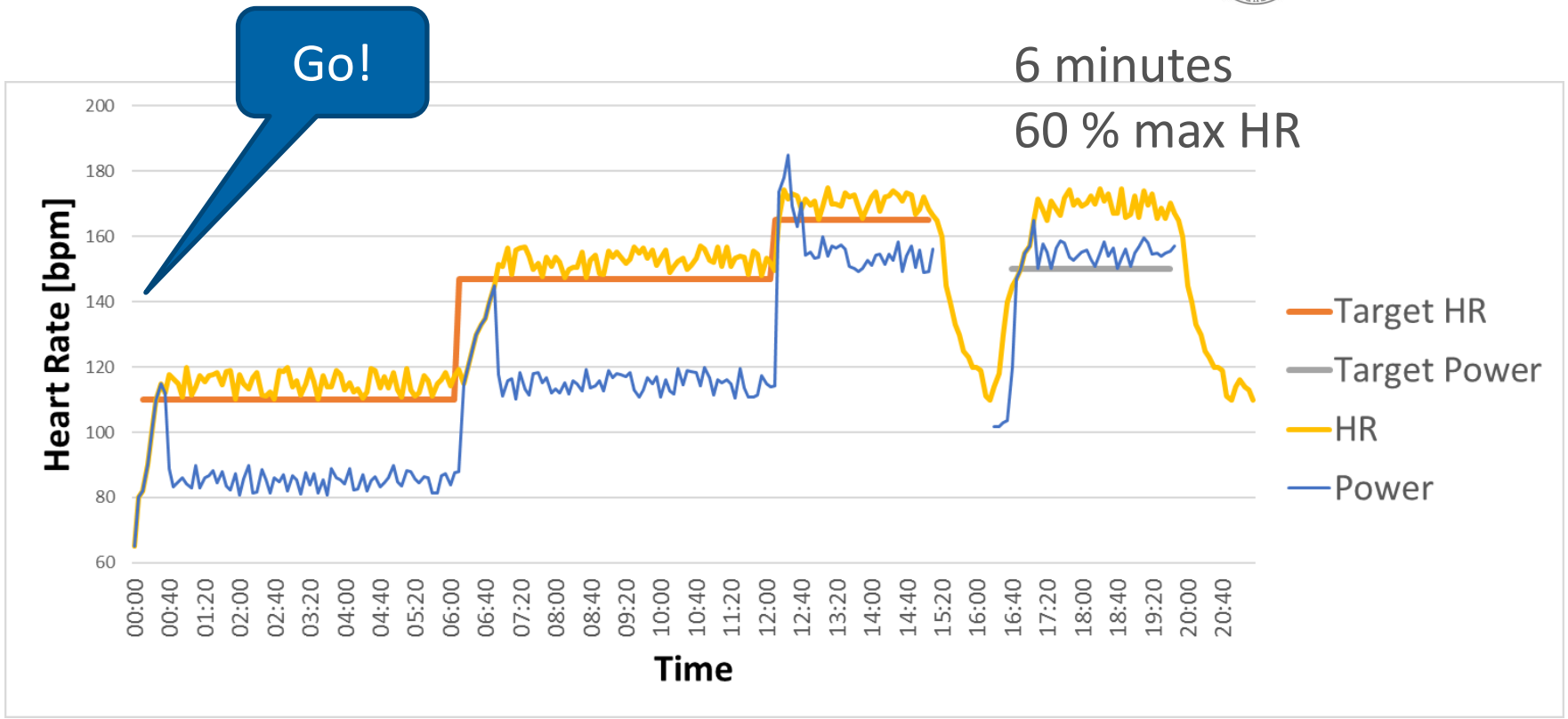
Procedure


Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

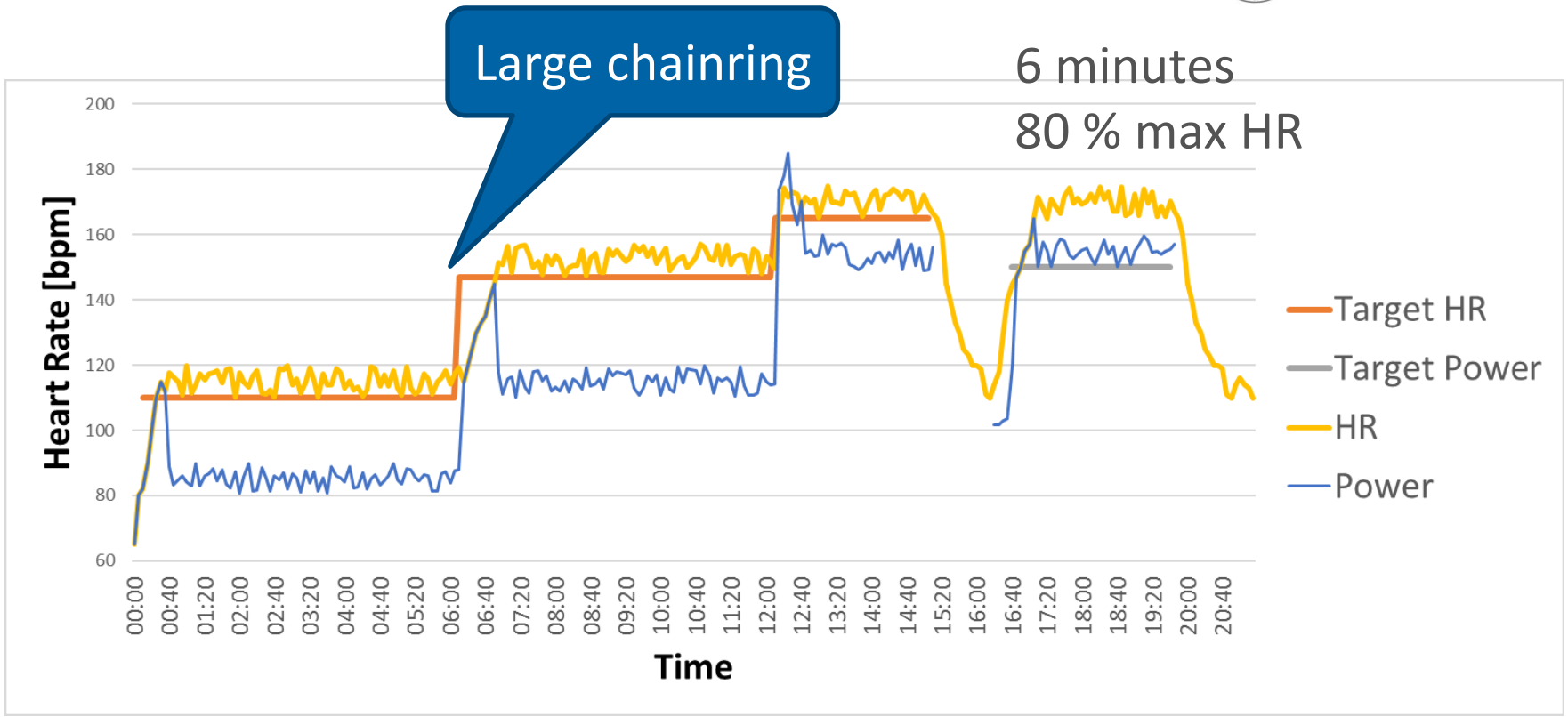
Procedure


Small chainring
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

Procedure


Go!
6 minutes
60 % max HR
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

Procedure


Large chainring
6 minutes
80 % max HR
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
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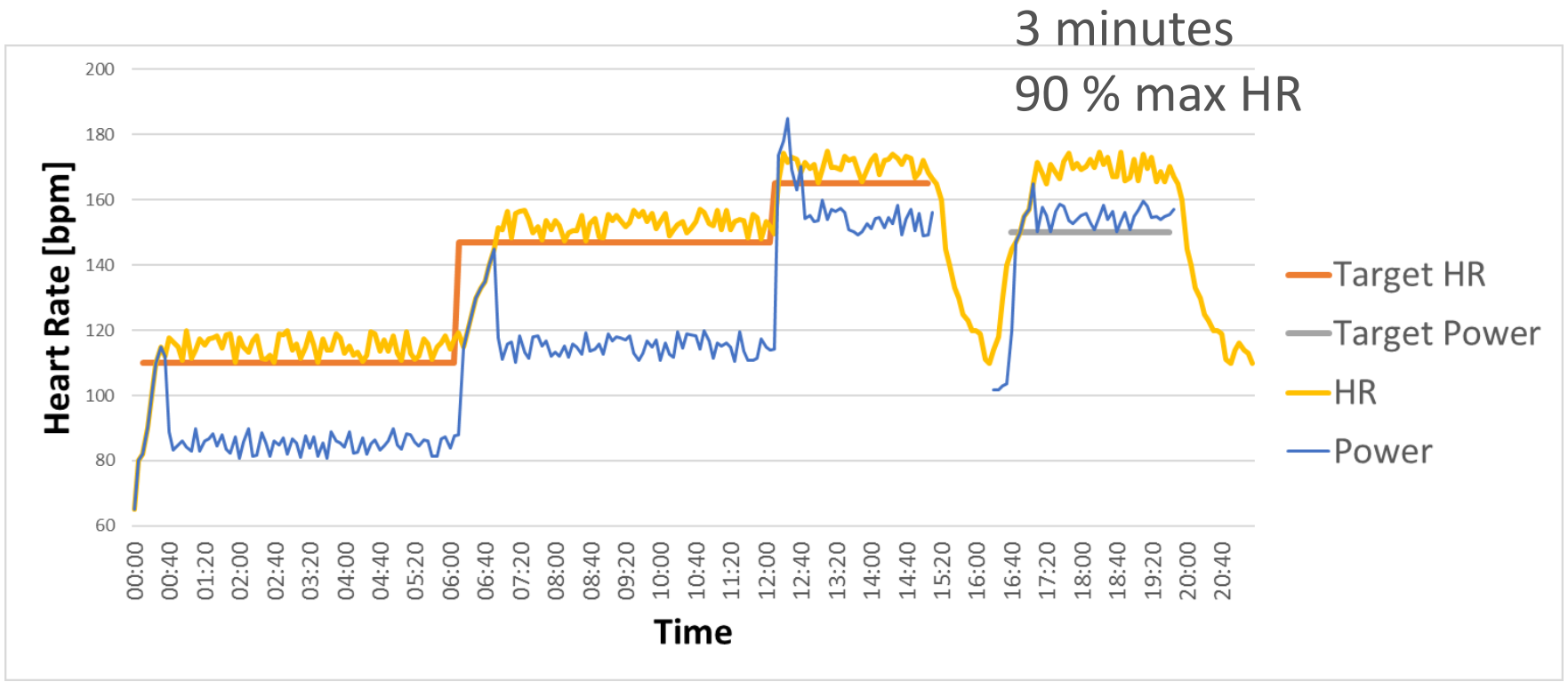
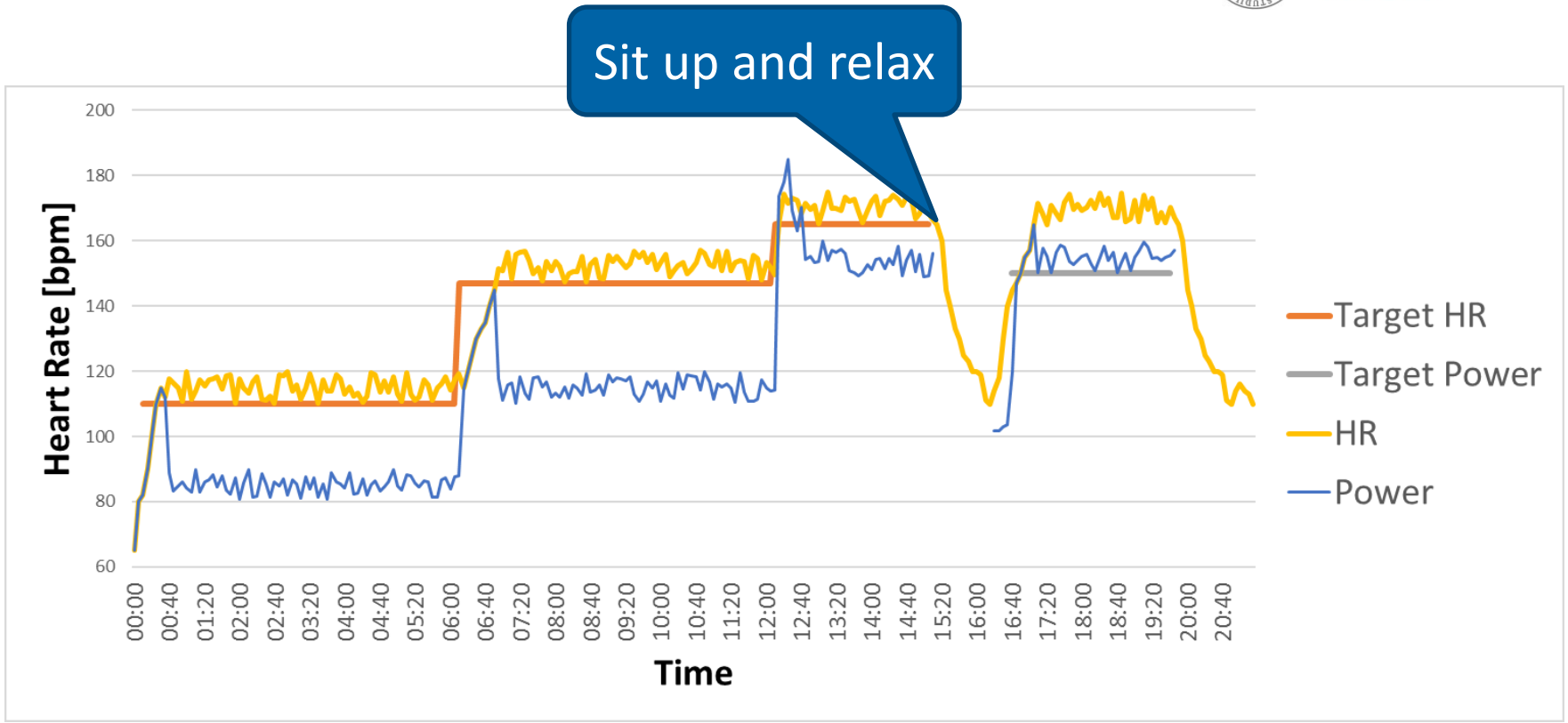
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

Procedure

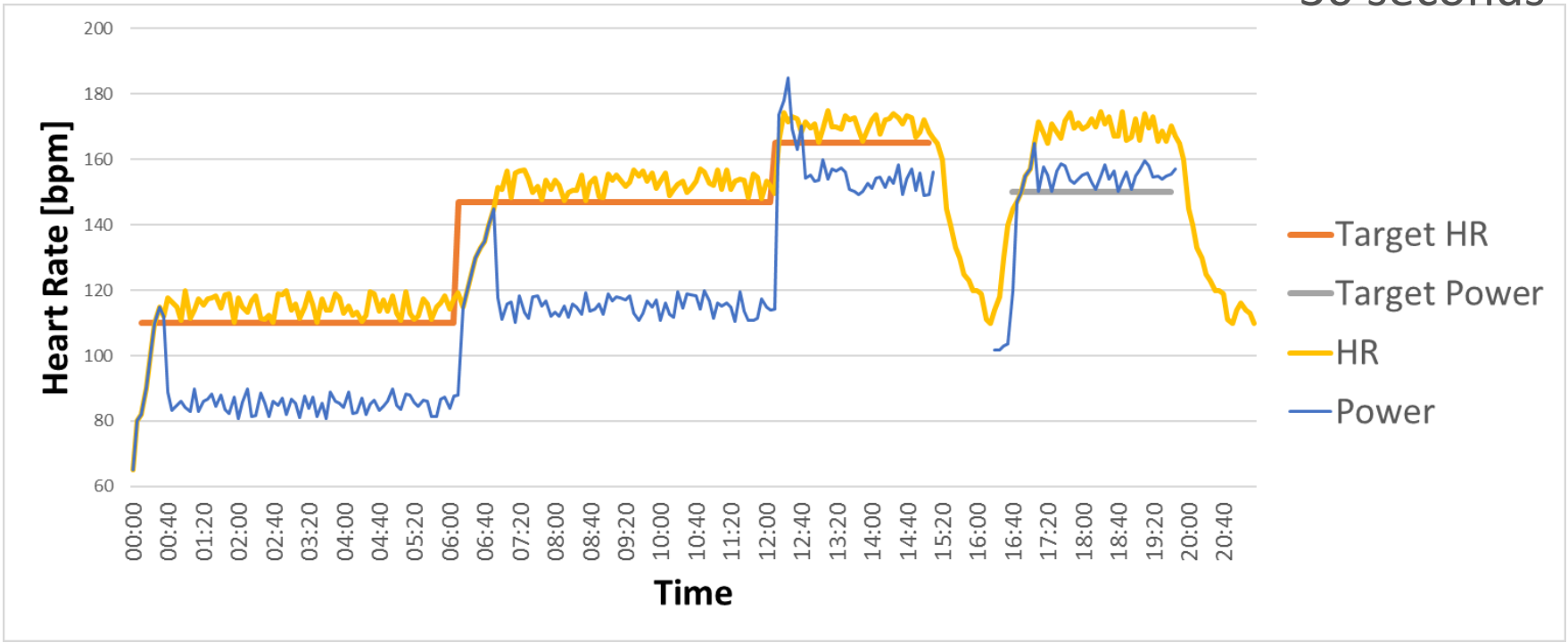

3 minutes
90 % max HR
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

Procedure


Sit up and relax
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
08:00
08:40
09:20
10:00
10:40
11:20
12:00
12:40
13:20
14:00
14:40
15:20
16:00
16:40
17:20
18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

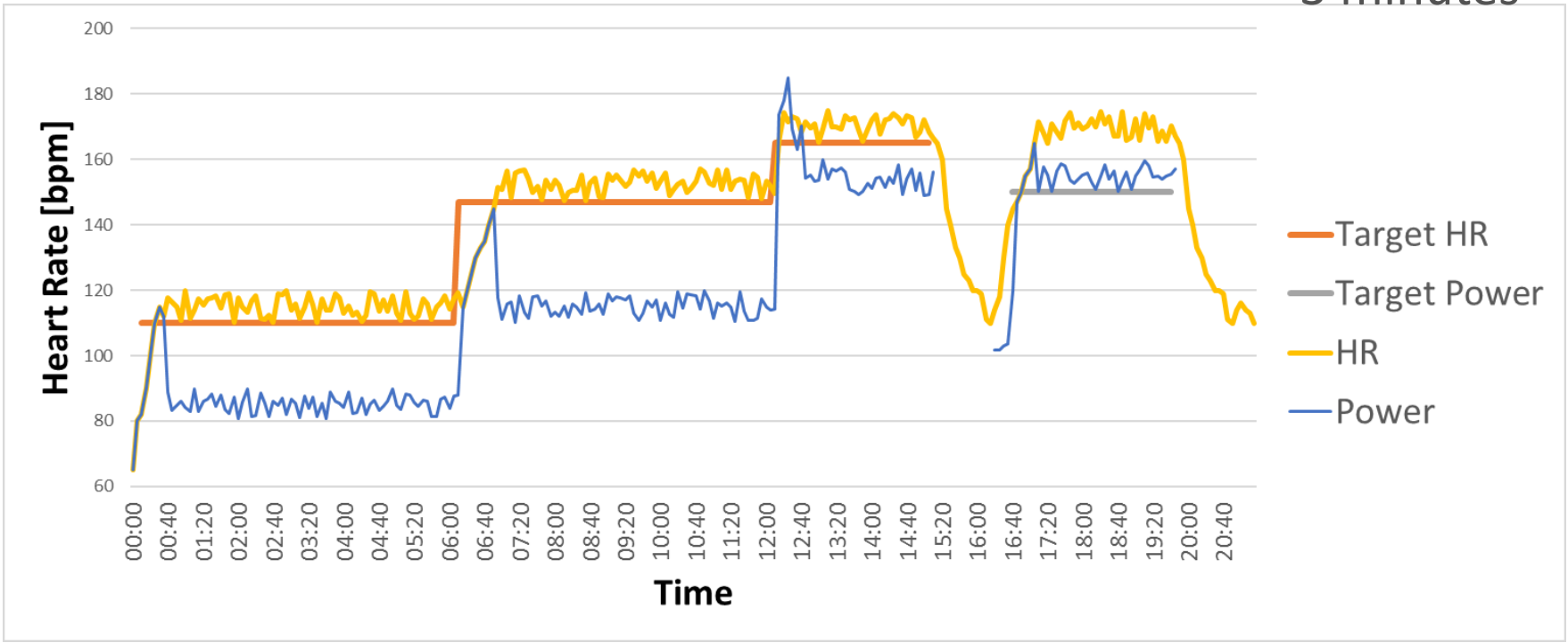
Procedure

30 seconds

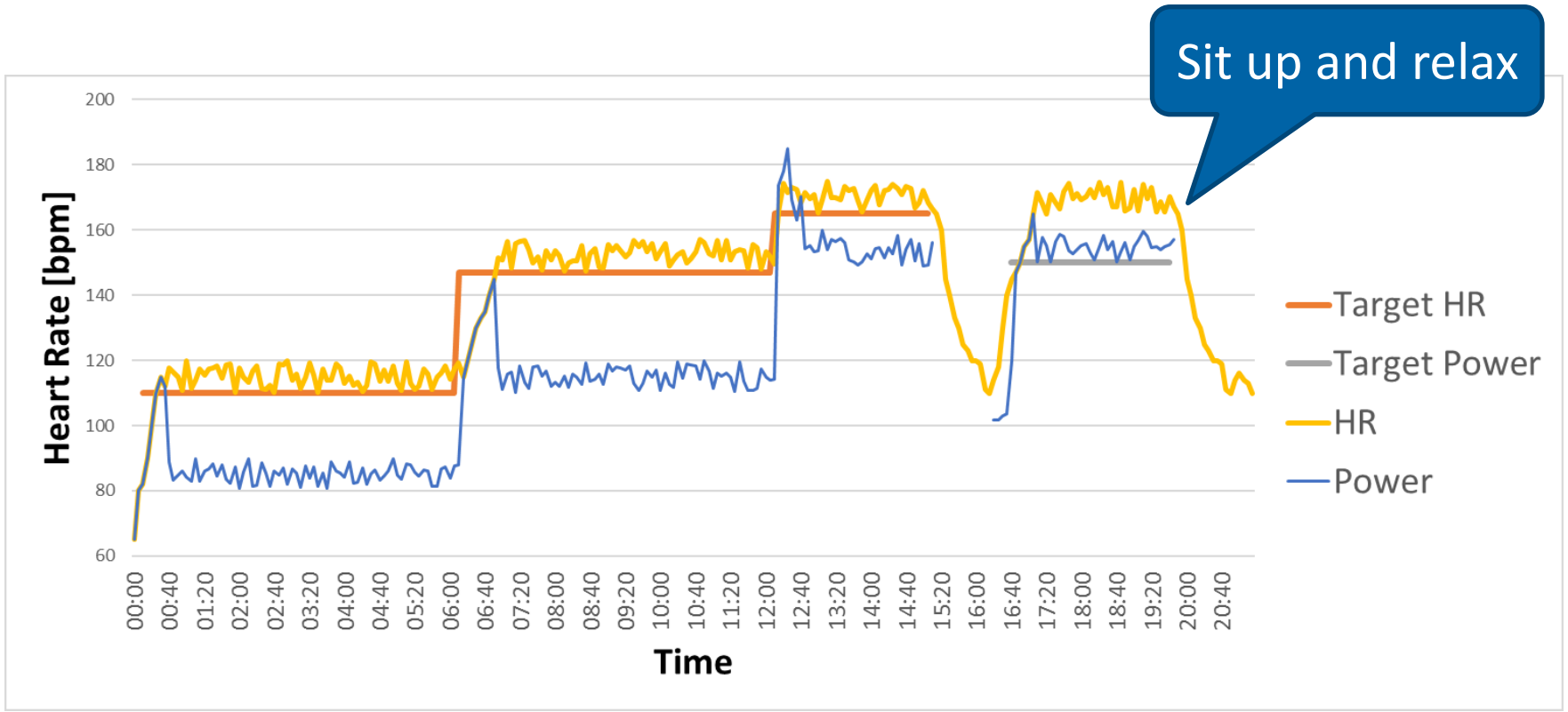


Procedure

3 minutes



Procedure


Sit up and relax
Heart Rate [bpm]
200
180
160
140
120
100
80
60
00:00
00:40
01:20
02:00
02:40
03:20
04:00
04:40
05:20
06:00
06:40
07:20
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18:00
18:40
19:20
20:00
20:40
Time
Target HR
Target Power
HR
Power

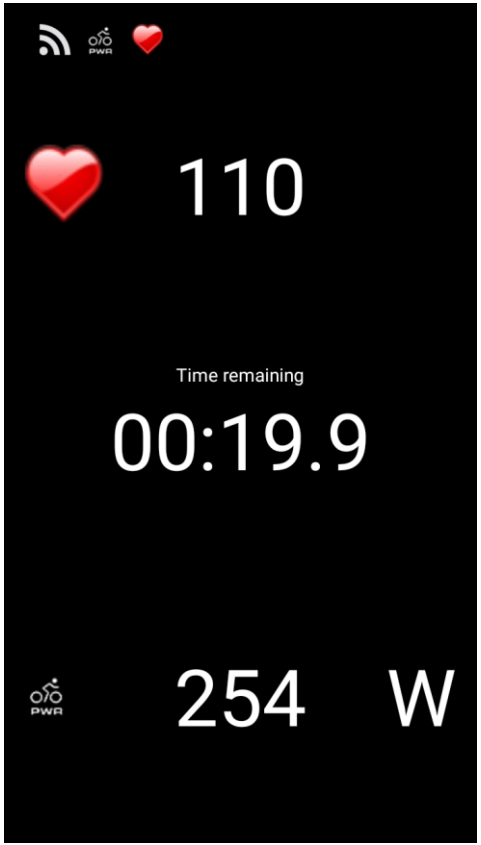
Study-Design

Submaximal Cycling Test

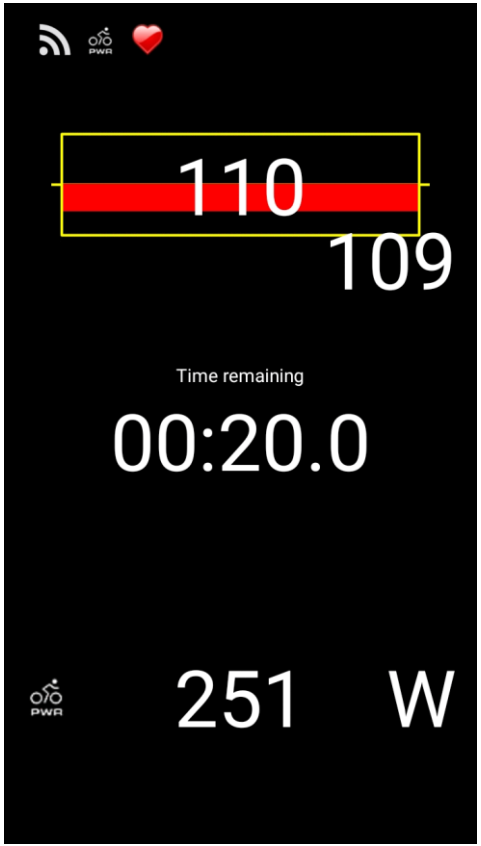
Variation of Lamberts and Lambert Submaximal Cycling Test
+ Power based task

3 different Layouts

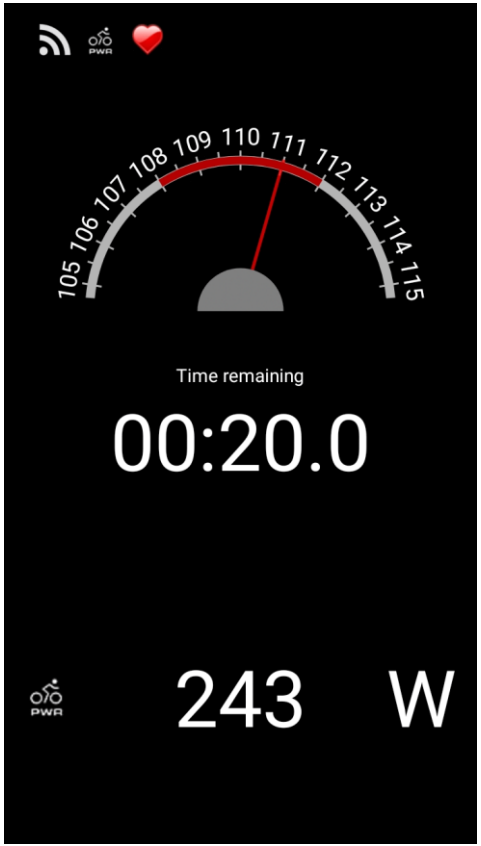
Numbers



Bars



Tacho


105 106 107 108 109 110 111 112 113 114 115
Time remaining
00:20.0
243 W

Participants

20 participants (14 male, 6 female)

30.66 ± 10.89 years

179.45 ± 7.98 cm (self reported)

72.87 ± 9.93 kg (self reported)

Results:
Accuracy Heart Rate

	All Stages	Stage 1	Stage 2	Stage 3
Bars	56.2% ± 18.8	63.7% ± 23.8	48.8% ± 15.0	56.1% ± 27.9
Numbers	54.1% ± 17.5	64.9% ± 21.1	49.5% ± 15.5	48.8% ± 26.8
Tacho	61.7% ± 13.5	70.5% ± 12.9	47.9% ± 20.1	66.8% ± 22.3

Repeated Measurements Anova

$F=0.9394$, $Df= 2$, $P > 0.05$

Results:
Accuracy Power

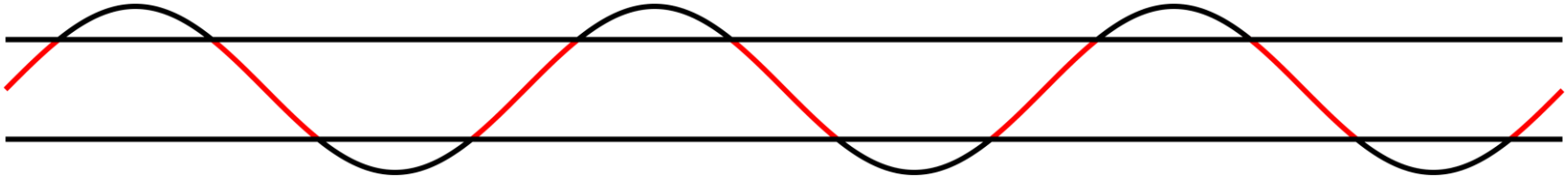
	Full Stage	Minutes 2+3	First 30sec	First 45sec
Bars	61.8% ± 15.2	65.5% ± 16.5	75.1% ± 26.1	50.1% ± 17.4
Numbers	62.2% ± 18.2	65.6% ± 19.0	79.5% ± 32.9	53.0% ± 20.7
Tacho	61.7% ± 19.6	64.3% ± 20.1	78.5% ± 32.2	52.4% ± 21.5

Numbers: 17, Tacho: 16

Repeated Measurements Anova

F=0.005, Df= 2, P > 0.05

Stability



Length of segments

Can have good accuracy but low stability

Stability Results

	Stage 1	Stage 2	Stage 3	Power-Stage
Bars	20.7s ± 22.1s	15.5s ± 16.1s	20.9s ± 21.5s	14.4s ± 31.2s
Numbers	20.2s ± 25.5s	16.7s ± 18.6s	19.6s ± 22.3s	13.7s ± 31.4s
Tacho	22.1s ± 24.9s	16.7s ± 17.4s	22.9s ± 23.2s	17.0s ± 39.1s

Repeated Measurements Anova

F=0.359, Df= 2, P > 0.05

Conclusion & Outlook

Novel designs offer opportunities

- **Accuracy**
- **Stability**

Athletes prefer novel designs

Extend study