

Reliability of cycling performance during field-based uphill time-trials

Pedro LIMA¹, Guilherme MATTA¹, Arthur Henrique BOSSI², Leonardo PERTENCE¹, Maurício BARA¹, James HOPKER²

¹ Faculdade de Educação Física e Desportos, Universidade Federal de Juiz de Fora, Juiz de Fora, MG, Brazil.

² School of Sport and Exercise Sciences, University of Kent, Chatham Maritime, Chatham, Kent, UK.

Arthur Henrique Bossi

✉ asnb@kent.ac.uk

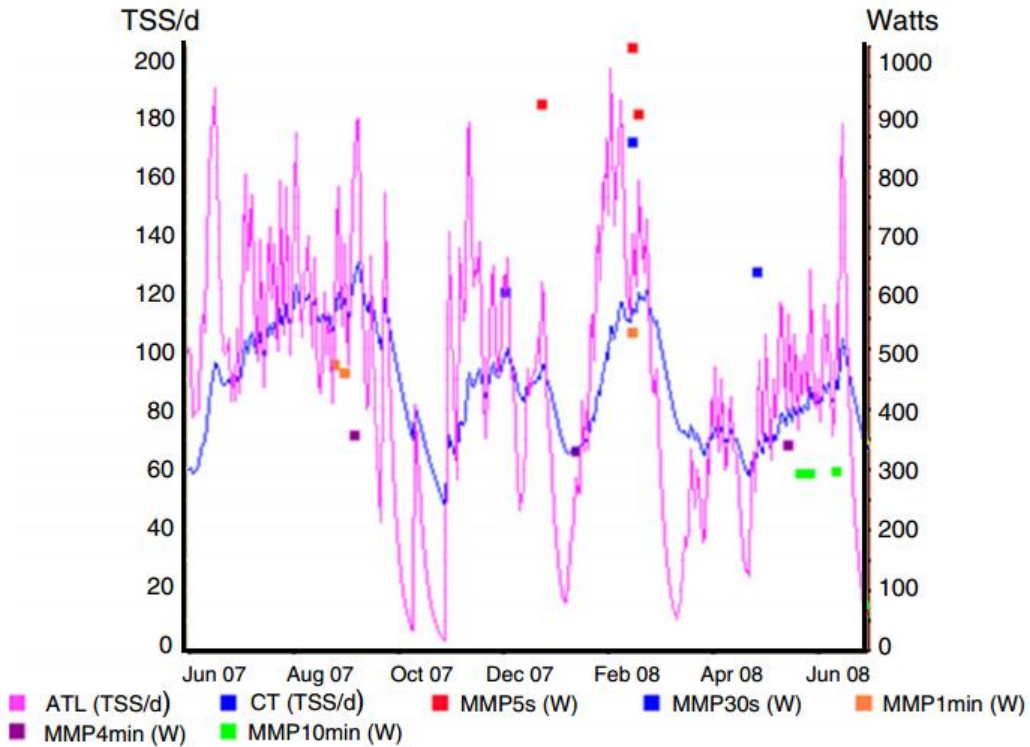


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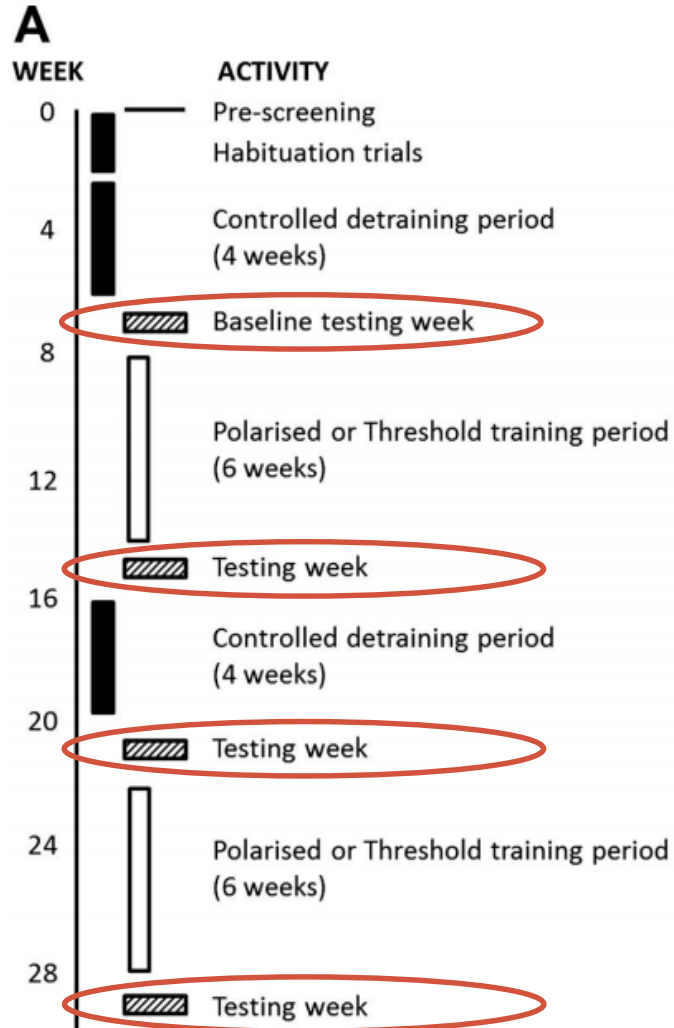
The logo for Universidade Federal de Juiz de Fora (UFJF). It consists of a stylized red and grey graphic above the letters 'ufjf' in a bold, lowercase font. Below this, the full name 'UNIVERSIDADE FEDERAL DE JUIZ DE FORA' is written in a smaller, uppercase font.

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Background



Halson (2014)



B

TESTING WEEK		
DAY	TIME	ACTIVITY
1	0700 - 0900	First void urine sample & skeletal muscle microbiopsy
	1500 - 2000	Lactate threshold and PPO testing followed by 95% PPO exercise capacity testing
4	1500 - 2000	40km TT performance testing

Neal et al. (2013)



[Int J Sports Med](#). 2001 May;22(4):270-4.

Reliability of mean power recorded during indoor and outdoor self-paced 40 km cycling time-trials.

[Smith MF¹](#), [Davison RC](#), [Balmer J](#), [Bird SR](#).

40-km flat

[J Sports Sci Med](#). 2005 Sep 1;4(3):278-84. eCollection 2005 Sep 1.

Reproducibility of outdoor flat and uphill cycling time trials and their performance correlates with peak power output in moderately trained cyclists.

[Tan FH¹](#), [Aziz AR¹](#).

36-km flat 1.4-km uphill

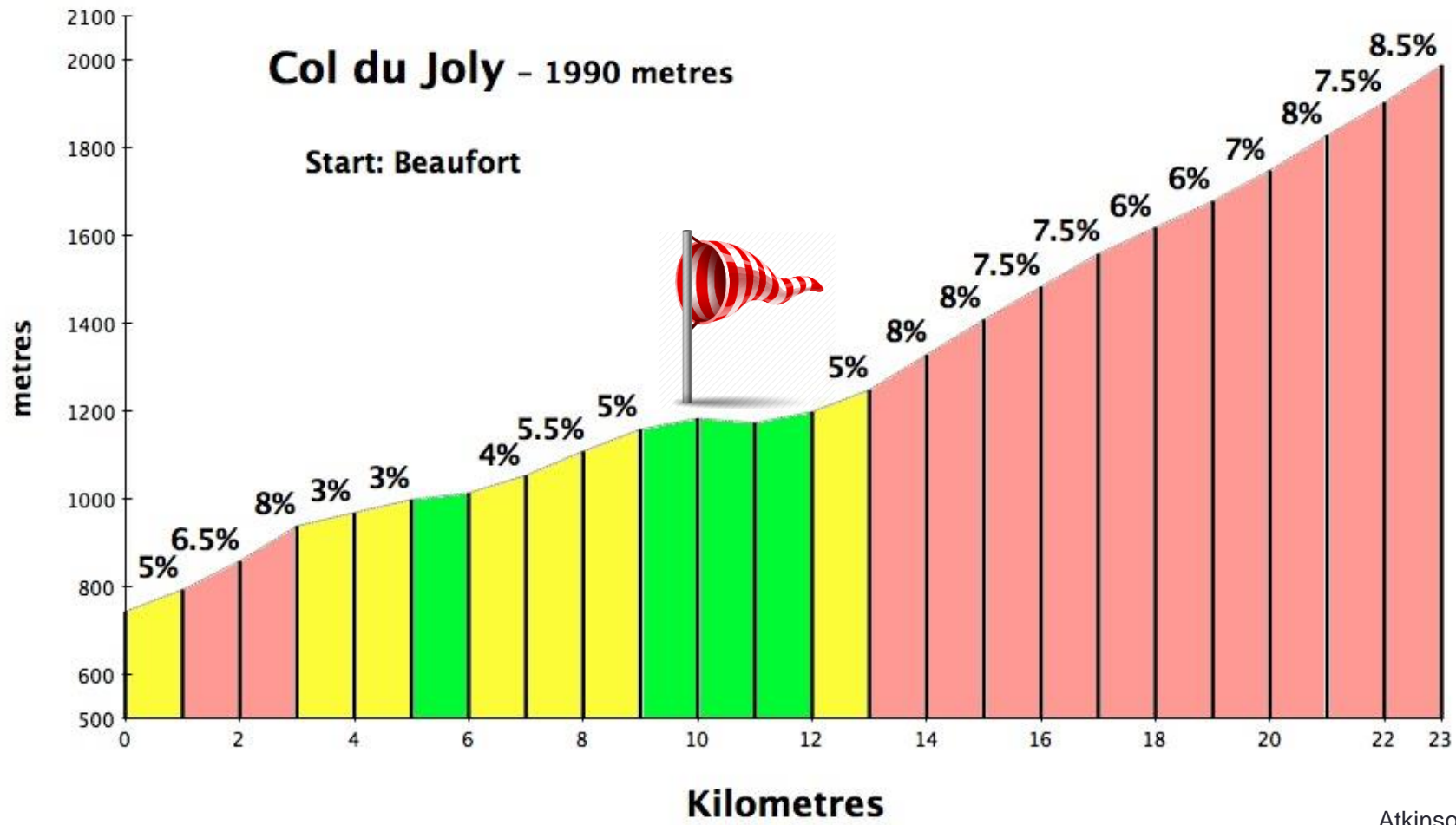
[Int J Sports Med](#). 2010 Mar;31(3):160-6. doi: 10.1055/s-0029-1243222. Epub 2009 Dec 17.

Evaluation of a field test to assess performance in elite cyclists.

[Nimmerichter A¹](#), [Williams C](#), [Bachl N](#), [Eston R](#).

4- and 20-min flat





Atkinson & Brunskill (2000)
 Cangle et al. (2011)

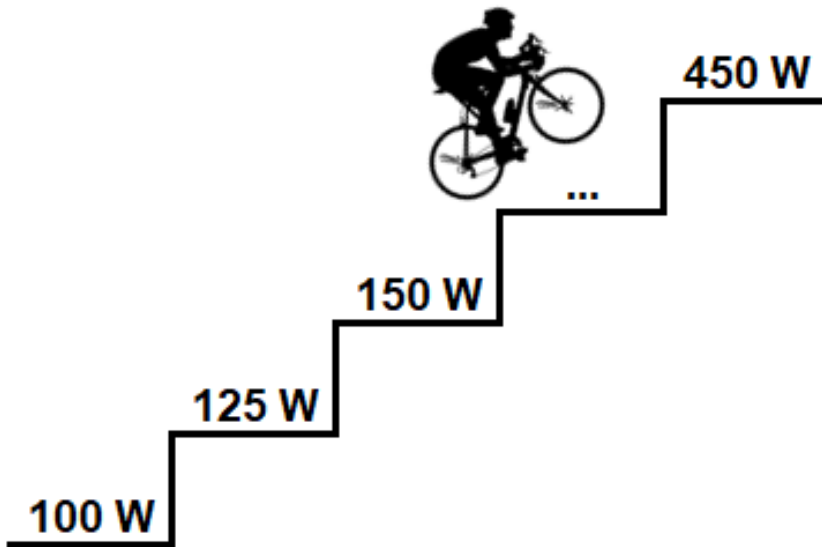
Study Purpose

- To assess the reliability of mean power output and pacing strategy during field-based uphill TTs and the influence of different courses and performance levels on the reliability measures.

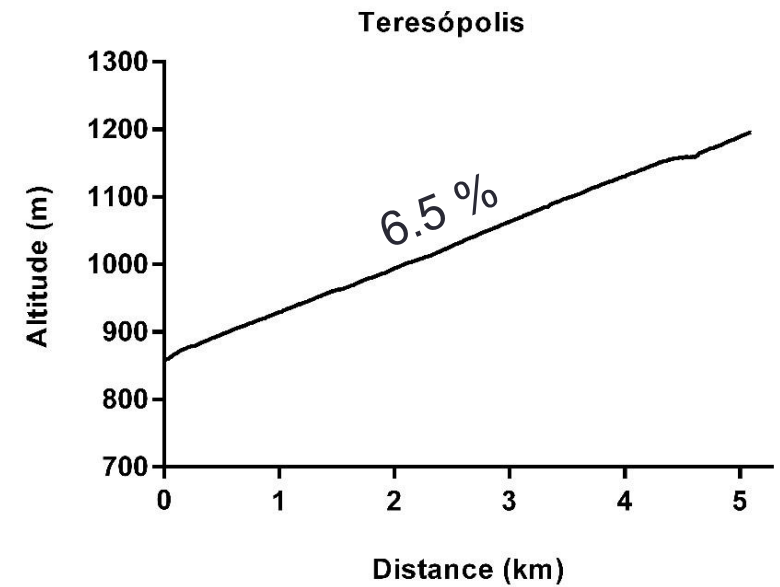


Methods

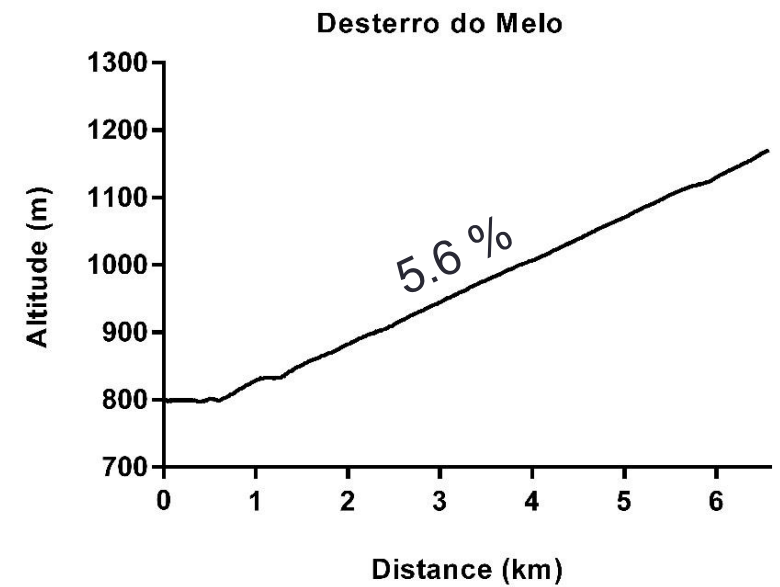
- 18 trained cyclists
 - 31.8 ± 7.6 years; 71.6 ± 8.3 kg; 1.74 ± 0.08 m



- **4** field-based 20-min uphill time-trials
 - 7 days apart
 - top 9 & bottom 9 performers



n = 8



n = 10

- Data were log-transformed to describe mean power output reliability
 - ICC, TE and CV

- Within-participant differences in mean power output

- One-way repeated measures ANOVA

$$PI = \frac{\text{segment mean power output}}{\text{overall TT mean power output}} * 100$$

Hover cursor for >6 trials: Read me Do not modify Any subject?

	1	2	3	4	2-1	3-2	4-3	
1	457,1	453,4	461,8	457,4	-3,7325958	8,3806	-4,3831	1
2	459,6	459,3	459,3	452,2	0,45234066	-1,9764	4,32868	1
3	457,1	461,8	461,8	460,3	-2,2361654	0	-2,4194	1
4	453,3	456,0	448,1	450,3	2,67574492	-7,8528	2,14661	1
5	452,6	462,2	463,4	457,5	9,59639883	1,2513	-5,9141	1
6	452,1	459,7	453,3	456,3	7,59198066	-6,4363	3,03261	1
7	464,1	460,2	458,2	457,1	-3,9531866	-1,9705	-1,0912	1
8	459,0	470,1	450,0	464,3	11,1115793	-20,09	14,2936	1
9	443,8	456,8	471,0	460,8	12,9275904	14,192	-10,133	1
10	450,8	450,4	463,9	454,0	-0,4075073	13,459	-9,8792	1
11	453,1	449,8	454,6	451,1	-3,3075698	4,8036	-3,4881	1
12	450,2	451,7	454,9	452,7	1,44525511	3,194	-2,1899	1
13	454,1	456,3	462,4	454,9	2,11562	-3,8856	2,54868	1
14	452,1	454,9	454,9	456,8	7,13083729	-4,3506	1,9058	1
15	461,3	460,1	458,2	465,4	-1,2343501	-1,843	7,14669	1
16	445,9	453,9	462,8	466,0	7,93321194	8,9489	3,16739	1
17	459,9	451,8	459,8	437,0	-15,428222	12,318	-26,762	1
18	462,1	456,3	449,3	469,8	36,4856811	-11,253	12,4544	1
Mean	454,18	458,02	458,40	457,56	3,8	0,4	-0,8	18
SD	8,53	5,90	5,90	7,45	10,6	9,1	9,2	9,6599
N	18	18	18	18	18	18	18	18

Davies et al. (2016)

include which trials?	1	1	1	1	Mean
Back-transformed mean	93,9	97,5	97,9	97,1	96,6
SD as a +/- factor	1,09	1,06	1,06	1,08	1,07
SD as a CV	0,9	0,9	0,9	0,9	0,9
Total no. of subjects	18	18	18	18	18

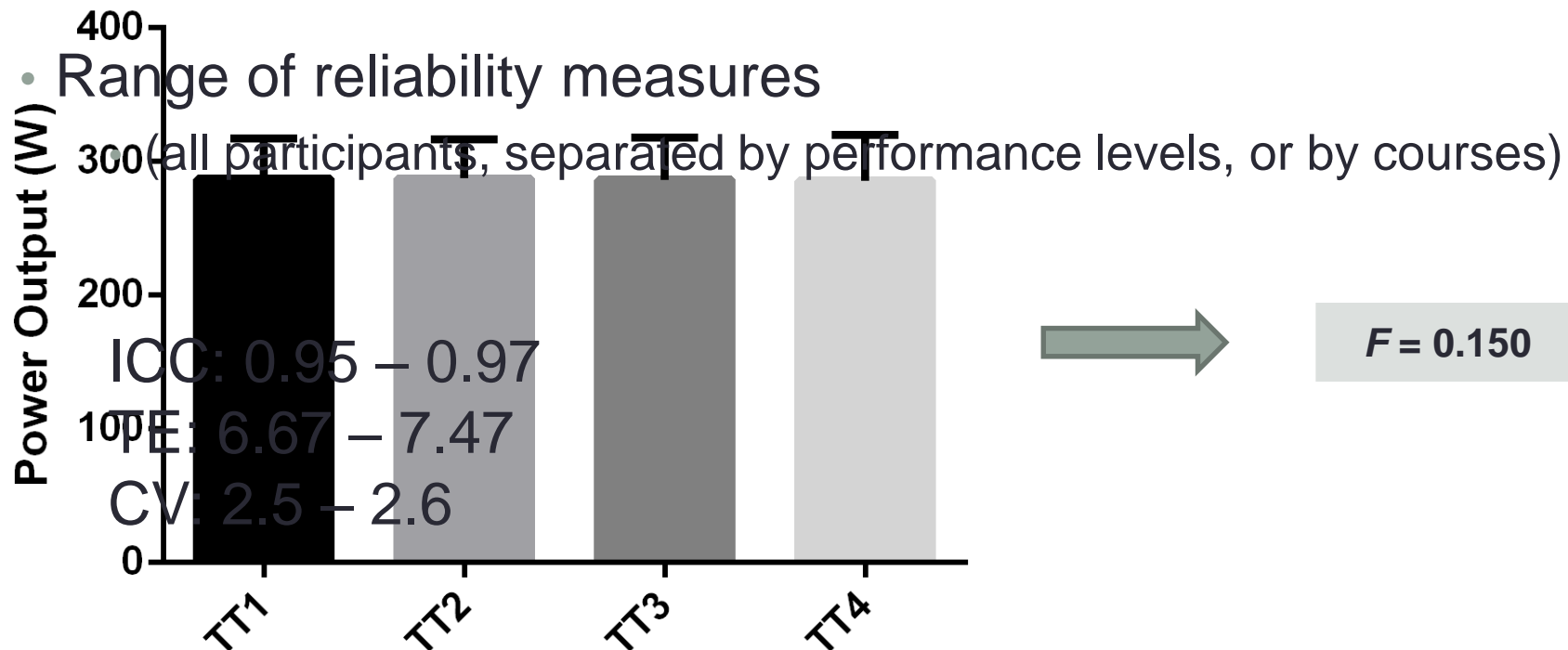
Measures of reliability via the LOG-TRANSFORMED variable	Factors	Trials 2-1	3-2	4-3	Mean
Factor change in mean		1,04	1,00	0,99	
Lower conf. limit		0,99	0,97	0,95	
Upper conf. limit		1,09	1,04	1,03	
Conf. limits as +/-factor		1,04	1,04	1,04	
Factor typical error		1,08	1,07	1,07	1,07
Lower conf. limit		1,06	1,05	1,05	1,06
Upper conf. limit		1,11	1,09	1,10	1,09

Clear "NUM" and "denom" from the log transformed cells to Restore the log-transformation formula to those cells if you enter new data.

pacing strategy \times TT order \times performance level \times course
 2-way and 3-way ANOVAs

Results

- GXT_{PPO} : 350 ± 36 W; 4.92 ± 0.45 W.kg⁻¹
 - PL 3 (trained) De Pauw et al. (2013)



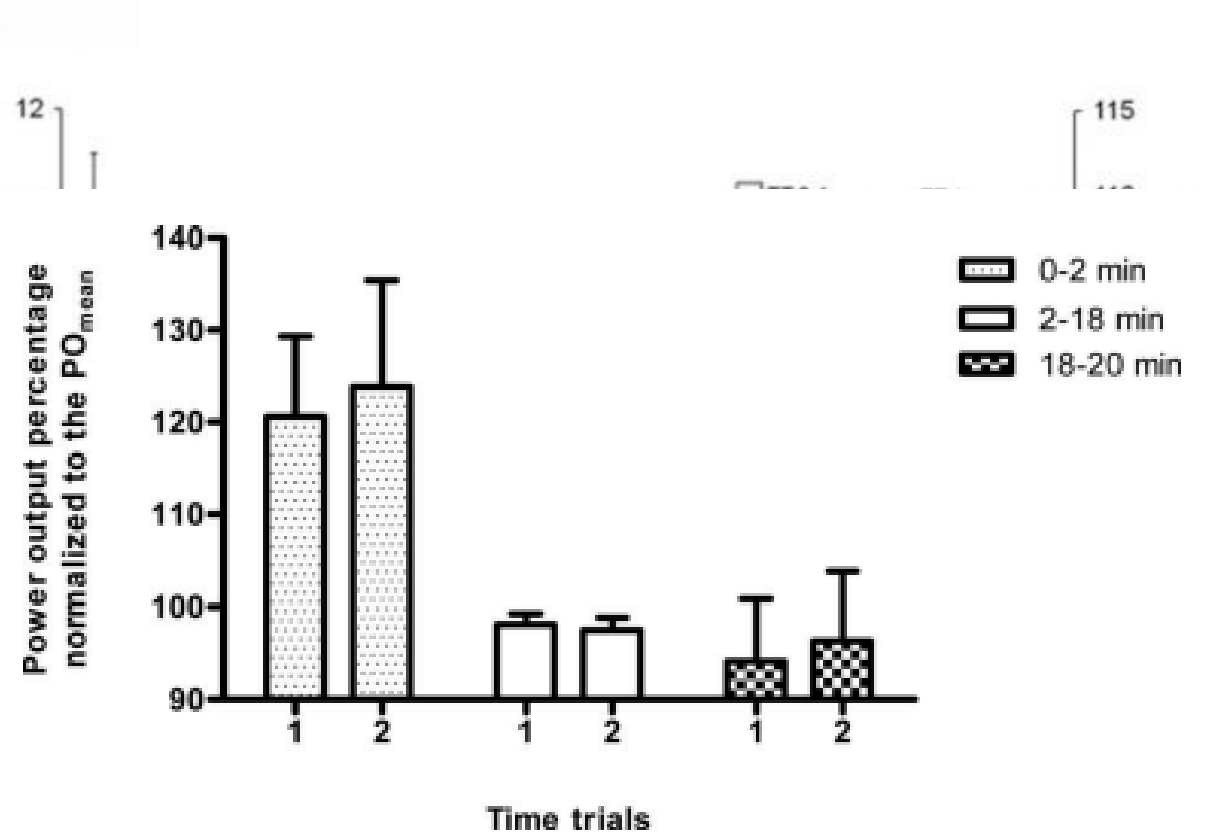
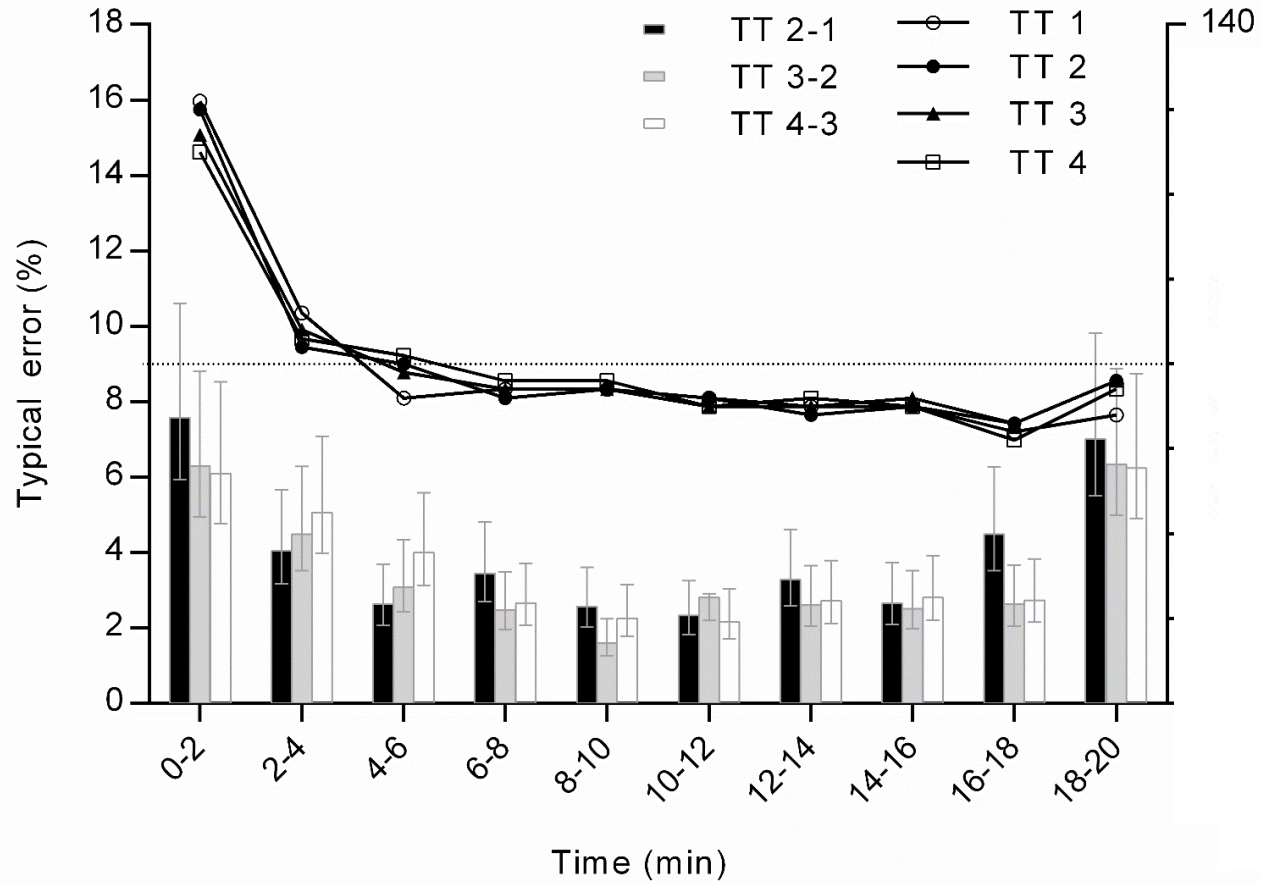
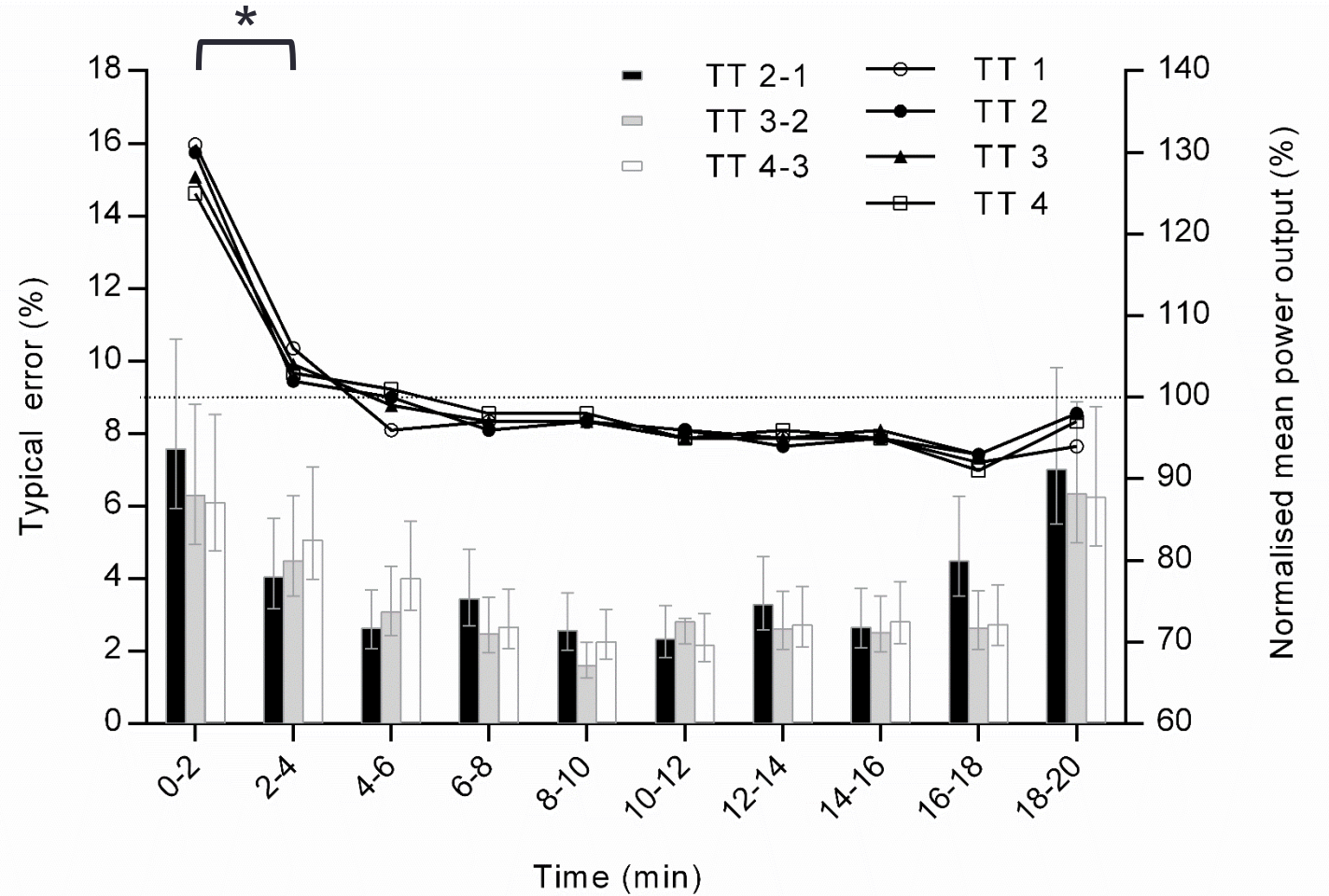


Table 1. Effects on pacing strategy

	<i>F</i>	<i>P</i>
Time segment	96.134	< 0.001
TT order	1.970	0.060
Performance	1.052	0.399
Courses	4.861	0.006



Summary



- High reliability of performance and no learning effects during 20-min uphill TTs, both overall and after splitting cyclists in groups
- Positive pacing strategies found in all TTs, with higher variability at the first and last time segments, but without a learning effect
- Cyclists' performance level does not seem to influence pacing strategy, but course selection does

Practical applications

- TE: $7 W * 2 = 14 W$
 - odds of a real change: 92%

- CV: 2.5 %

- Observed difference: 1.5% ∴ uncertainty: $1.5 \pm 2.5 = -1.0\% \text{ to } 4.0\%$
- Observed difference: 4.0% ∴ uncertainty: $4.0 \pm 2.5 = 1.5\% \text{ to } 6.5\%$

Arthur Henrique Bossi

✉ asnb@kent.ac.uk



Arthur H. Bossi

@ahbossi

Pursuing a PhD

📍 [United Kingdom](#)

📅 Participa desde junho de 2009

ResearchGate or



Arthur Henrique Bossi University of Kent, Canterbury

Medicine

MSc

il 6.25

Overview

Contributions

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