

## England Athletics Academic Research Series

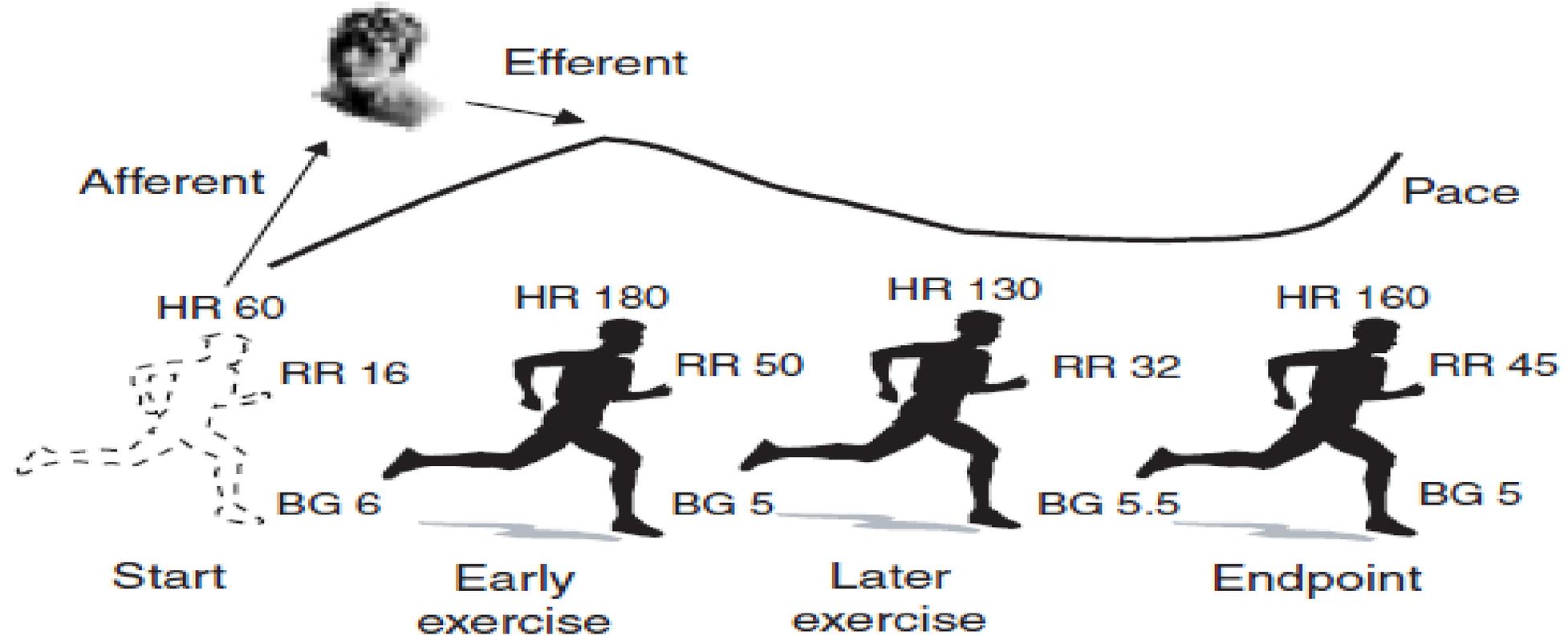
Ideas for  
implementing  
previous theory into  
design of training  
sessions

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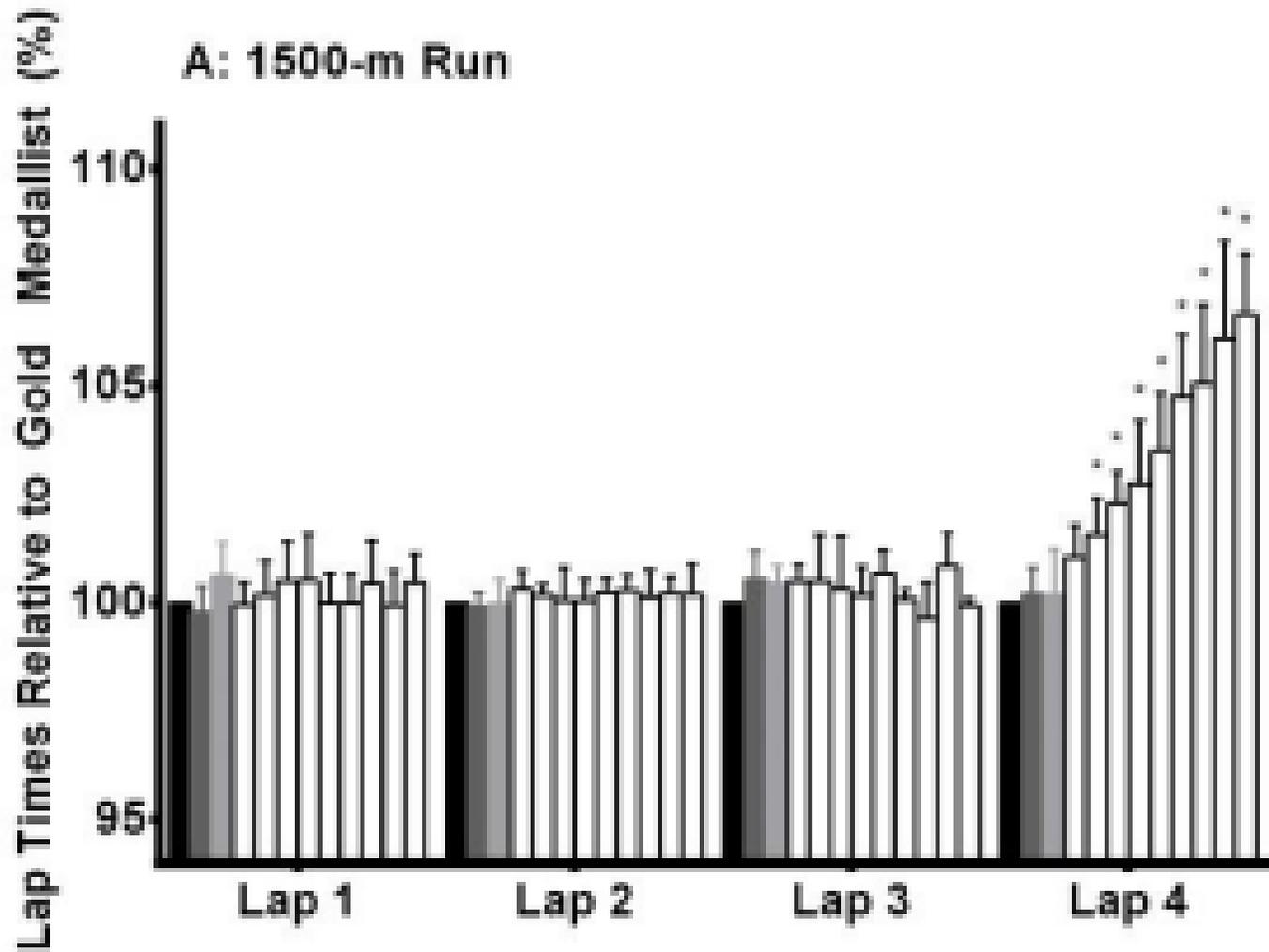


@AndyRenfree

# Developing pacing ability

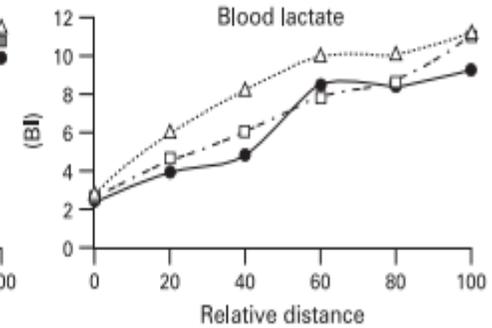
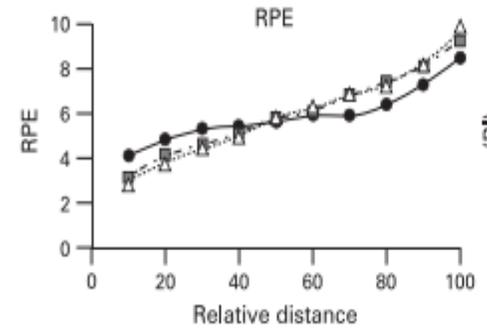
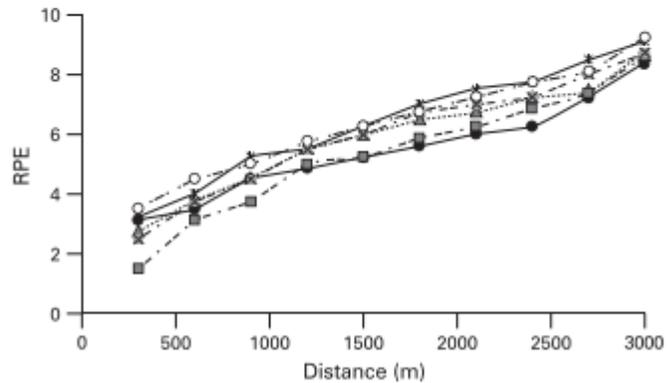
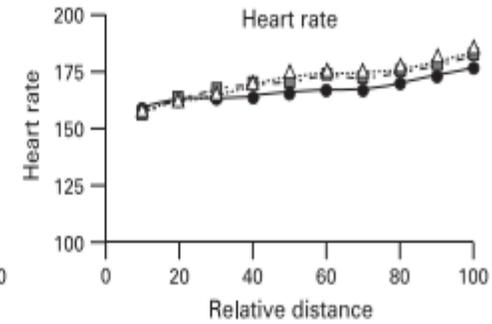
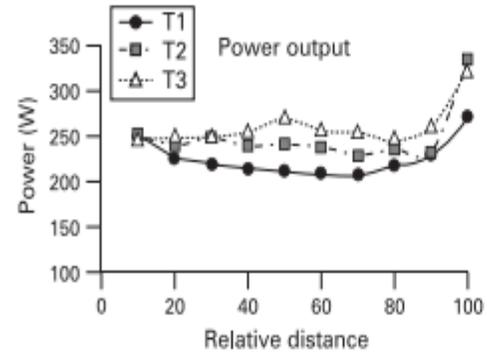
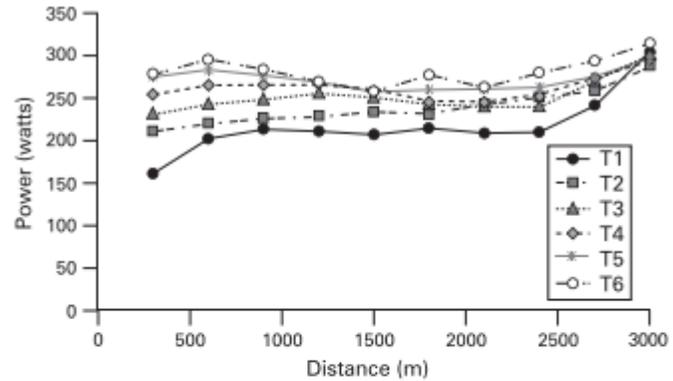


(St Clair Gibson *et al* 2006)



Mytton et al (2014)

# Development of the pacing 'template'



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TABLE OF CONTENTS

Abstract

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# Optimal Development of Youth Athletes Toward Elite Athletic Performance: How to Coach Their Motivation, Plan Exercise Training, and Pace the Race



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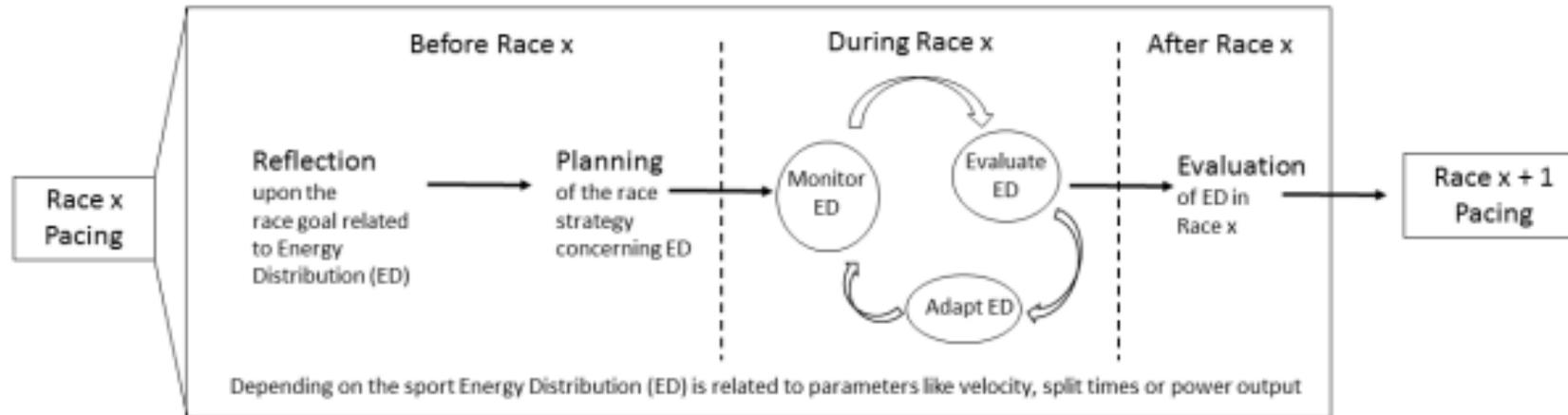


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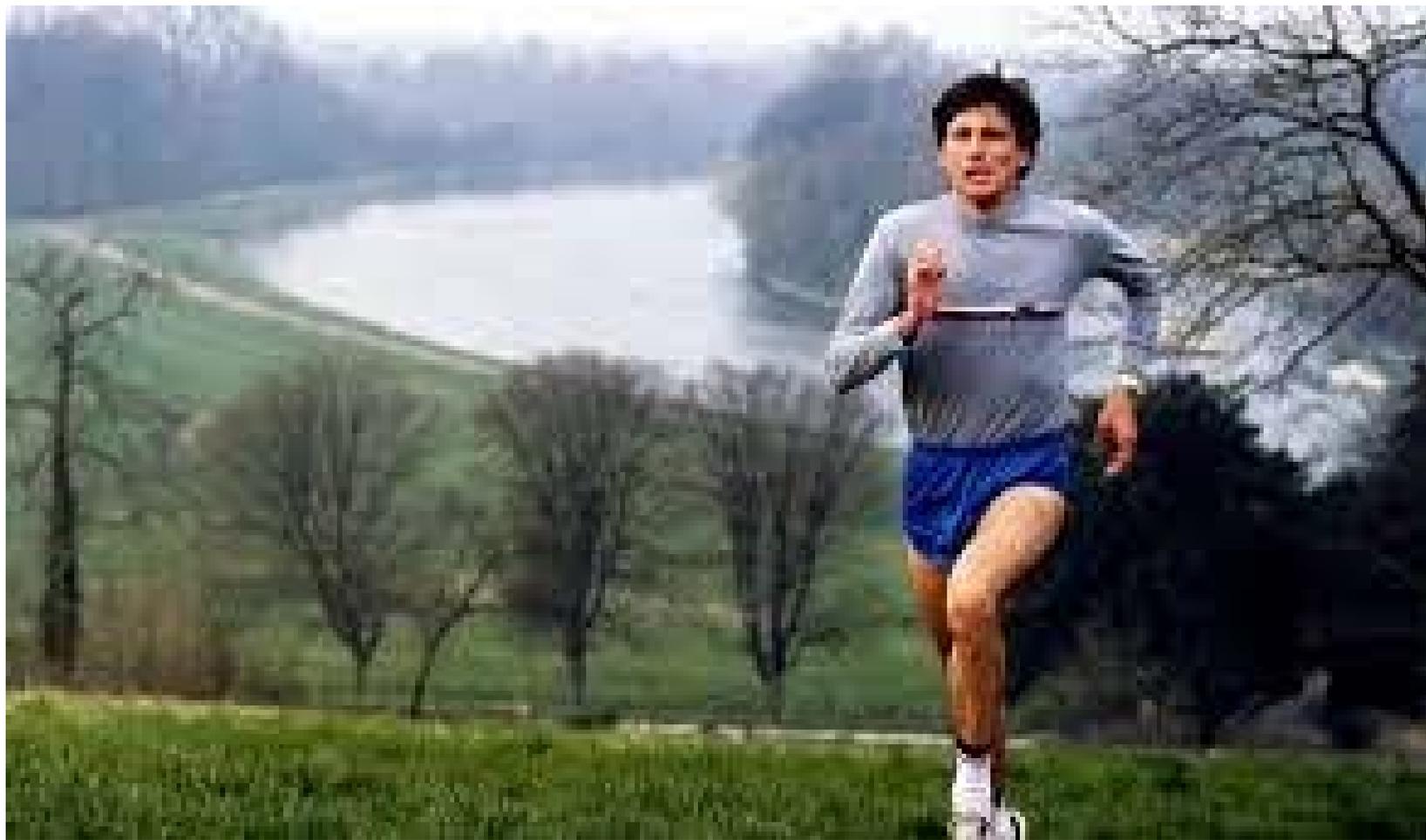
# Reflect on pacing performance



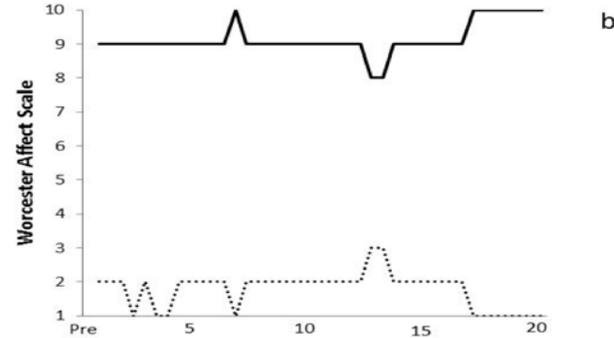
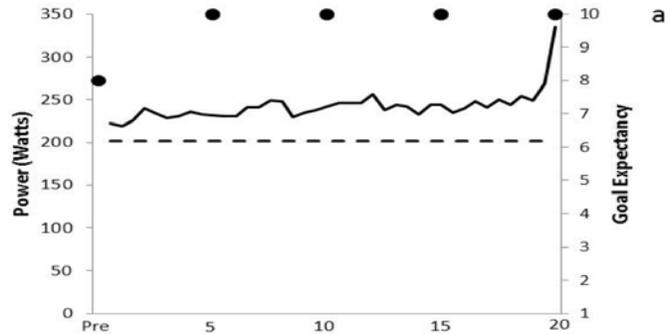
# How?

**Time trials** — Give your body a certain exercise to do often enough and it becomes efficient at it. The same is true of running over certain distances. The idea is to run trials under or at the distance being trained for — 600 and 700 metres trials for the 800; or 1000 and 1200 metres trials for the 1500; but the actual race distances for 3000 and 5000 metres runners; and 5000 metres with an occasional 10,000 for 10,000 metres runners. The under-distance trials for the shorter distances are best because of the high speeds used and the resulting oxygen debts.

How?

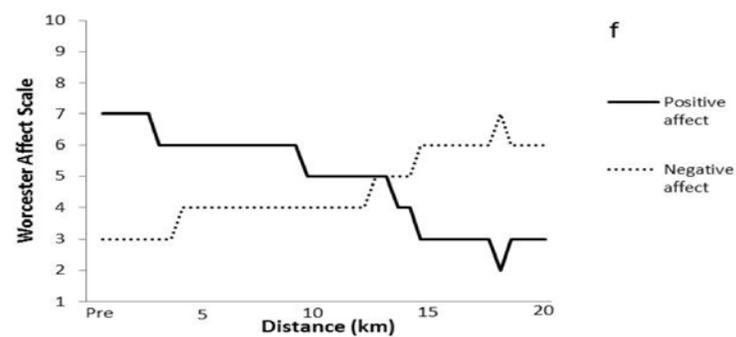
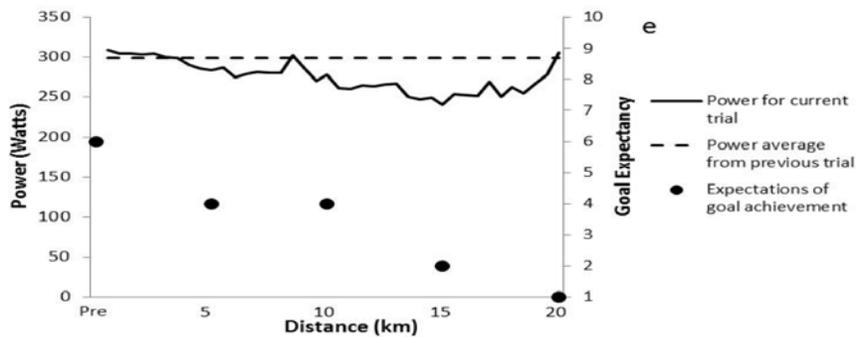
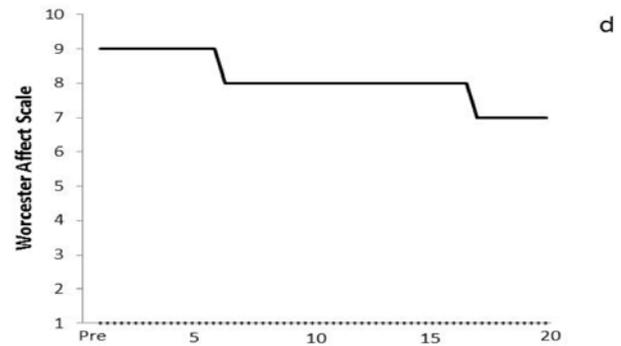
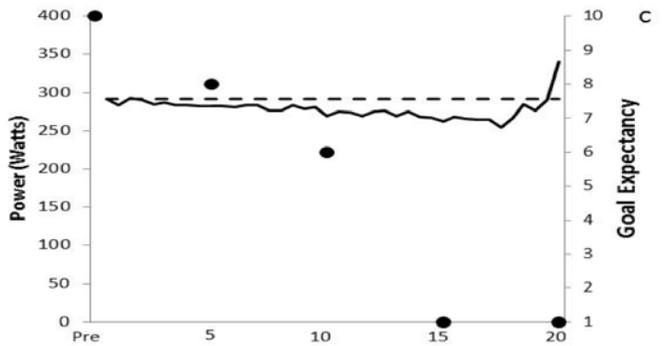


# What about the stopwatch?

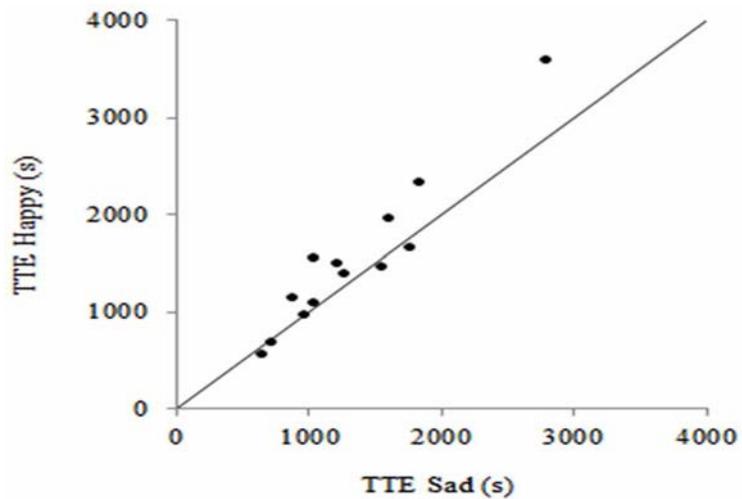


Use as 'evidence' post event, rather than prescriptively?

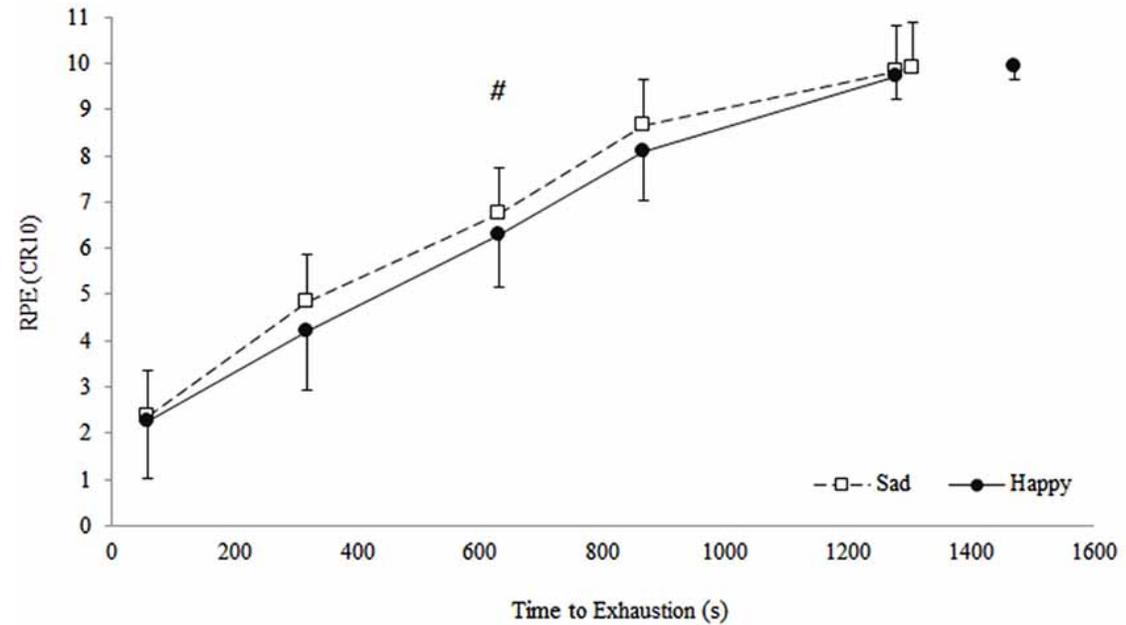
Deception?



# Affective priming



Average TTE 12% longer with happy faces

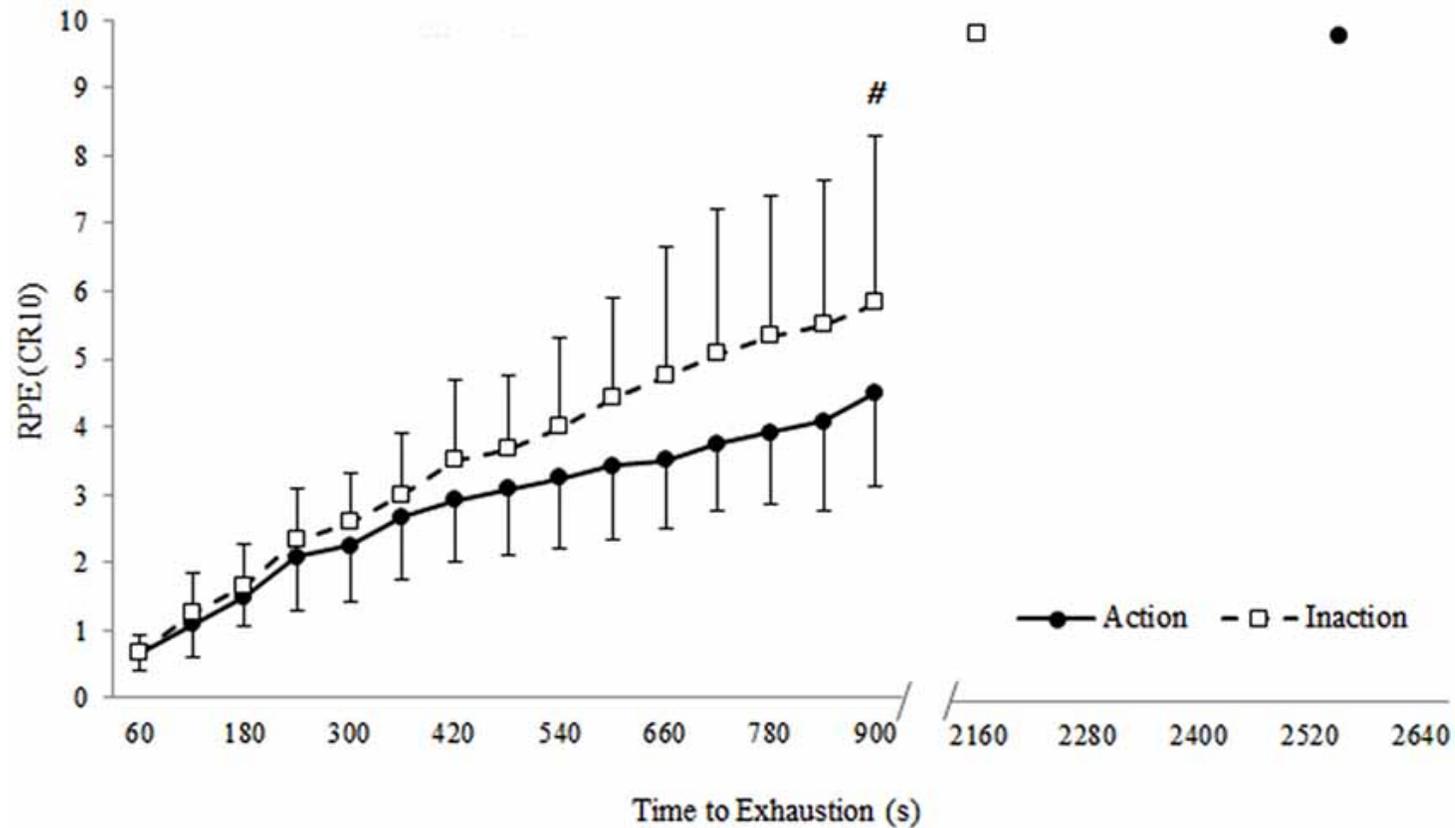


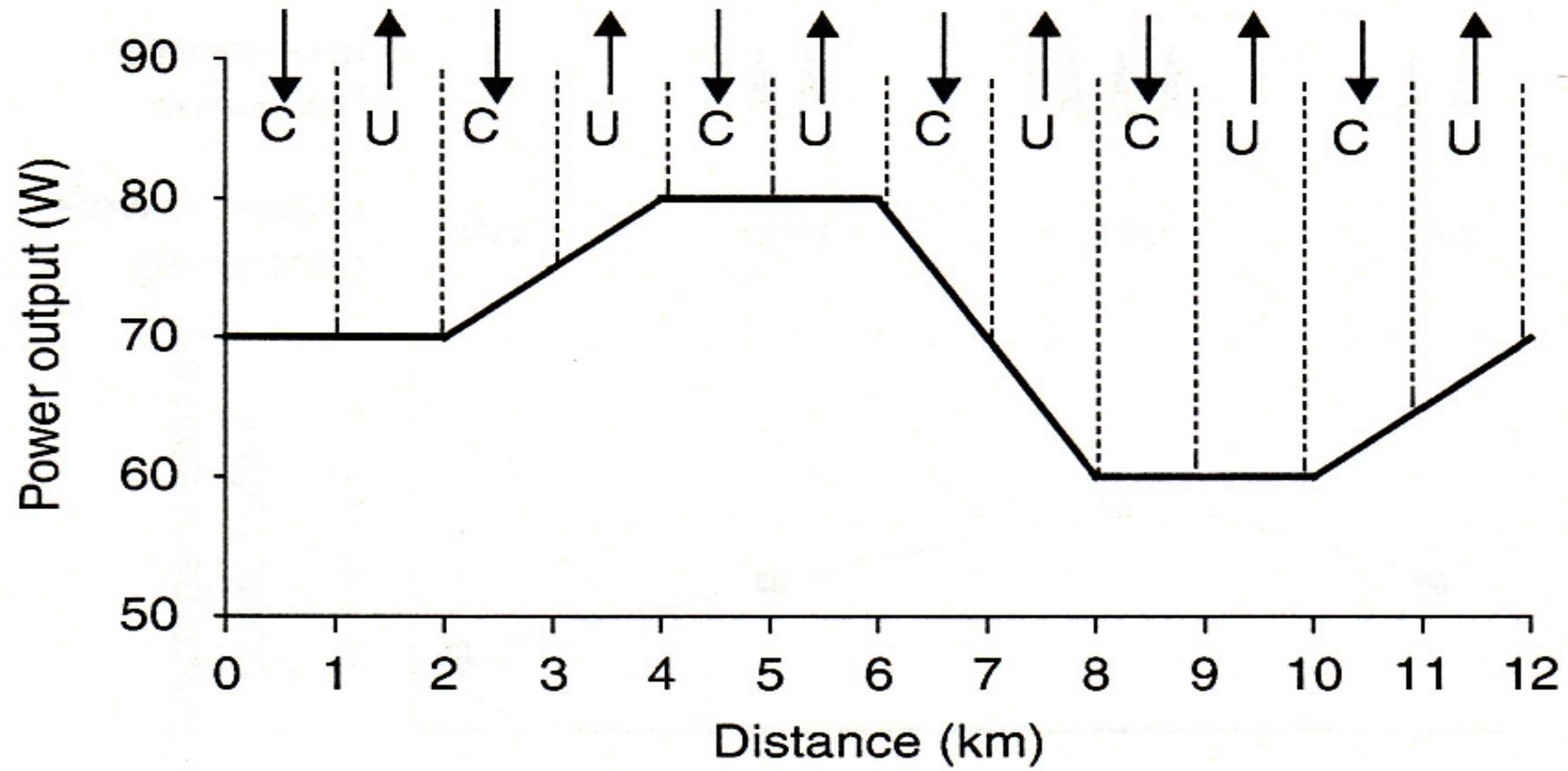
Blanchfield et al 2014

# Words work too

ACTION PRIMES: Action, go, lively, energy

INACTION PRIMES: Stop, toil, sleep, tired





(St Clair Gibson *et al* 2006)

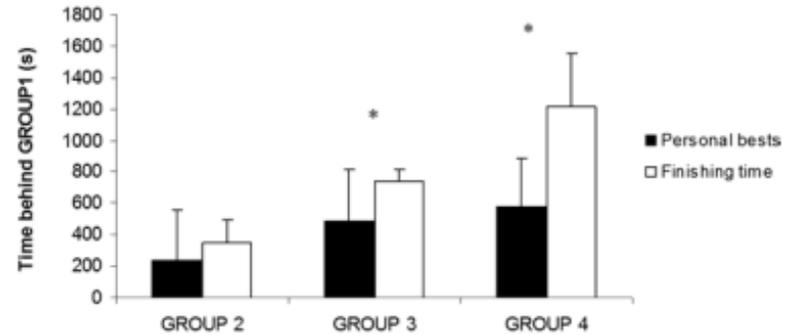
# Do your decision-making (strategic AND tactical before the event)

e.g. is it 1500m or is it 400 + 400 + 200 + 200 + 100 + 100 + 100 ?

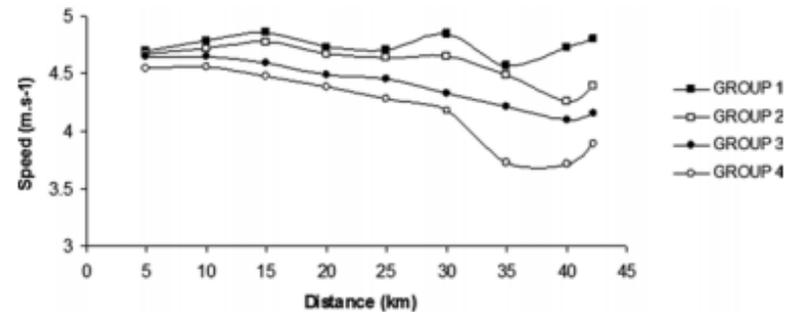
Visualise and rehearse your responses to all possible scenarios before competition.



# Run your own race!



**Figure 2** — Time behind personal best and finishing time of group 1 athletes for groups 2–4. \*Significant difference between personal best and finishing times behind group 1 ( $P < .01$ ).



**Figure 3** — Mean running speed in each intermediate 5-km segment (error bars and statistical significance removed for clarity).

tion to the impact on finishing time, underperformance by groups 2, 3, and 4 had potentially major implications for finishing position in the race. If all other competitors had performed in the manner reported, a relative level of performance similar to those achieved by group 1 (completion of the race at 98.5% of PB speed) would have seen an improvement of  $4.1 \pm 2.1$ ,  $10.7 \pm 3.5$ , and  $20.9 \pm 7.8$  positions for individual athletes in groups 2, 3, and 4, respectively.

Table 3. Relative speed (m/s) 100m segment within 'top' (T) and 'bottom' (B) performing competitors in each age group (difference between T and B).

	0-10 yrs	10-20 yrs	20-30 yrs	30-40 yrs	40-50 yrs	50-60 yrs	60-70 yrs	70-80 yrs	80-90 yrs	90-100 yrs
<b>50m</b>										
T	107.27 ± 4.60**	107.96 ± 4.60**	107.27 ± 4.30**	106.76 ± 3.86	104.90 ± 3.70	103.52 ± 4.40	95.90 ± 4.64	95.28 ± 4.19	91.18 ± 5.26	92.95 ± 5.45
B	114.94 ± 6.07	113.09 ± 6.05	113.52 ± 7.41	109.38 ± 7.30	105.14 ± 8.17	97.71 ± 6.71	95.55 ± 7.80	90.93 ± 6.40	89.72 ± 7.79	90.12 ± 9.22
<b>100m</b>										
T	108.40 ± 4.86	108.42 ± 4.75	108.73 ± 4.77	107.46 ± 4.54	105.30 ± 4.52	101.59 ± 4.40	95.62 ± 5.15	92.16 ± 4.46	88.63 ± 6.78	91.87 ± 6.58
B	114.97 ± 6.05	114.39 ± 7.46	113.29 ± 7.34	110.48 ± 5.45	105.76 ± 5.96	98.60 ± 6.26	94.00 ± 6.90	90.30 ± 5.11	87.27 ± 6.64	89.54 ± 7.75
<b>150m</b>										
T	112.69 ± 6.90	111.59 ± 6.69	110.45 ± 5.74	107.46 ± 3.88	102.10 ± 3.89	95.82 ± 6.06	94.71 ± 4.10	92.48 ± 5.10	90.66 ± 4.12	91.10 ± 5.02
B	116.42 ± 9.50	115.04 ± 9.75	113.68 ± 7.88	108.42 ± 3.80	102.21 ± 3.35	97.16 ± 4.90	91.00 ± 4.75	91.20 ± 5.48	89.13 ± 5.69	90.45 ± 5.43
<b>200m</b>										
T	108.97 ± 2.74	109.26 ± 2.99*	110.21 ± 1.94	109.49 ± 3.00	109.23 ± 3.20	99.77 ± 3.48	93.46 ± 4.05	89.77 ± 5.48	89.07 ± 2.77	93.5 ± 4.97
B	122.95 ± 13.90	124.56 ± 14.48	121.52 ± 14.36	116.49 ± 13.02	108.90 ± 12.48	99.94 ± 10.29	93.07 ± 7.49	85.28 ± 8.19	83.60 ± 11.27	89.65 ± 14.24
<b>250m</b>										
T	115.69 ± 6.97	115.29 ± 6.20	113.43 ± 6.79	108.46 ± 3.52	103.64 ± 3.96	96.47 ± 10.20	91.07 ± 5.45	90.69 ± 3.46	87.94 ± 4.49	90.91 ± 4.27
B	114.96 ± 4.95	114.25 ± 3.20	113.97 ± 4.98	108.85 ± 3.90	104.78 ± 5.01	97.30 ± 4.14	91.00 ± 7.07	85.94 ± 10.26	91.12 ± 4.09	93.99 ± 10.59
<b>300m</b>										
T	108.88 ± 3.52**	108.44 ± 4.76**	107.97 ± 3.13	106.85 ± 4.02	101.74 ± 1.82	93.91 ± 6.15*	96.93 ± 3.33	95.25 ± 4.00	94.72 ± 4.27	93.23 ± 4.08
B	123.84 ± 5.60	120.51 ± 0.51	117.20 ± 2.26	110.77 ± 3.99	98.52 ± 4.86	88.85 ± 4.75	91.24 ± 4.12	94.07 ± 4.01	89.06 ± 5.19	85.52 ± 2.41

\* $P < 0.05$ , \*\* $P < 0.01$ .

“This observation could suggest that athletes are using other athletes within their age groups as ‘anchors’ upon which their own pacing strategy is based. Tversky and Kahneman (1974) proposed that individuals display a form of cognitive bias, whereby they rely heavily (or anchor) on initially presented sources of information when decision-making. In the context of the event being analysed then, it could be proposed that individuals may be using the starting pace selected by other athletes within their own age category as the anchor which informs their own starting speeds”

Renfree et al 2015

# Race like a female!

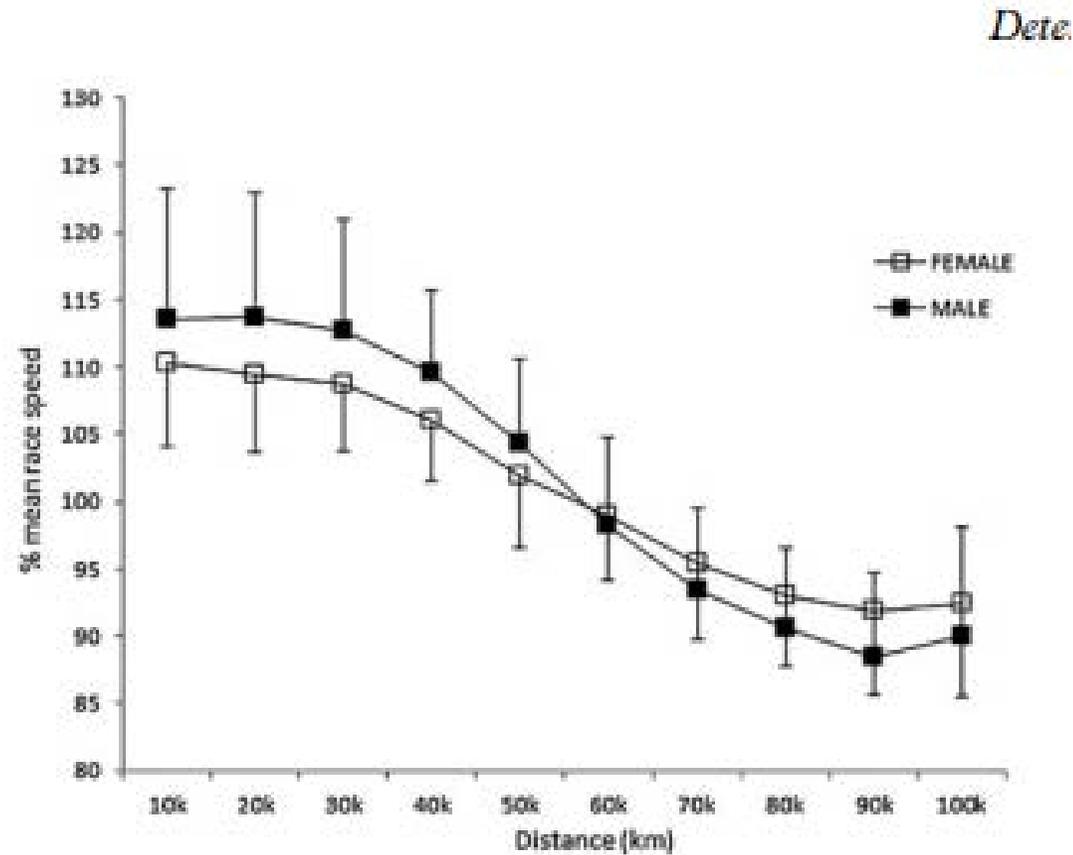
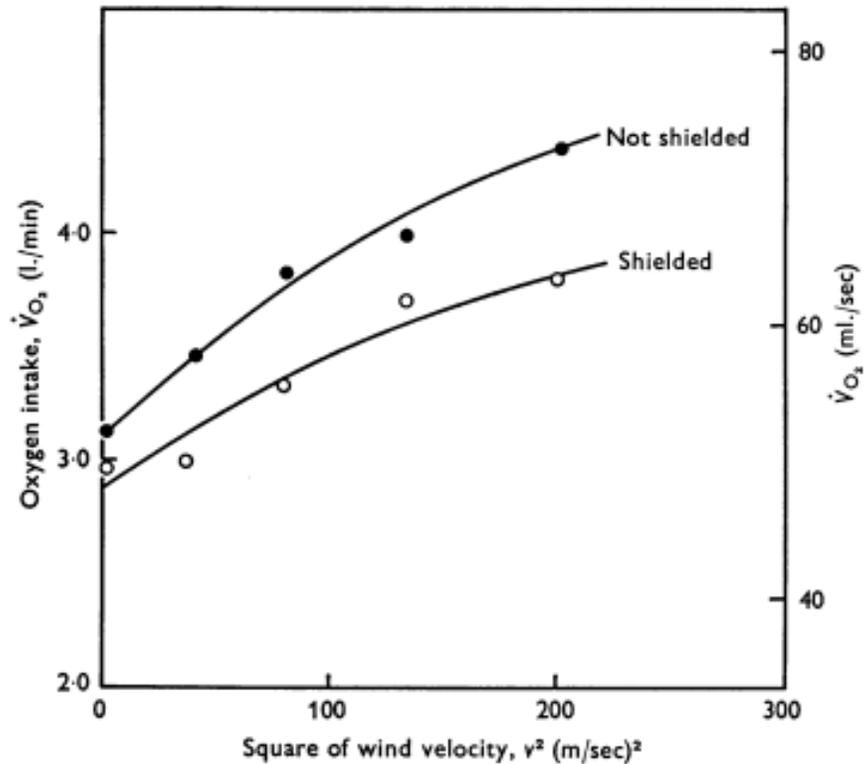


Figure 2. Relative speed in each intermediate segment for males and females ( $*P < 0.05$ ).

Renfree et al 2015

“This may provide further evidence for previous suggestions that gender differences in competitiveness and win orientation (Gill, 1988) may result in differences in strategy adopted (Renfree & St Clair Gibson, 2013). Attitudes to risk-taking have also recently been demonstrated to influence pacing during ultramarathon running (Micklewright et al., 2014), and it also seems that males typically are more apt to engage in risky behaviour (Byrne, Miller, & Schafer, 1999)”

# Drafting is energetically beneficial



“Thus 80 % of the energy cost of overcoming air resistance can be abolished by shielding.”

# 'Protocooperative' behaviour in cycle pelotons

**Low speeds (relative to MSO):** individuals naturally collaborate by sharing energetically costly leading positions

**Protocooperative threshold:** weaker cyclists are able to maintain contact with stronger cyclists only via drafting

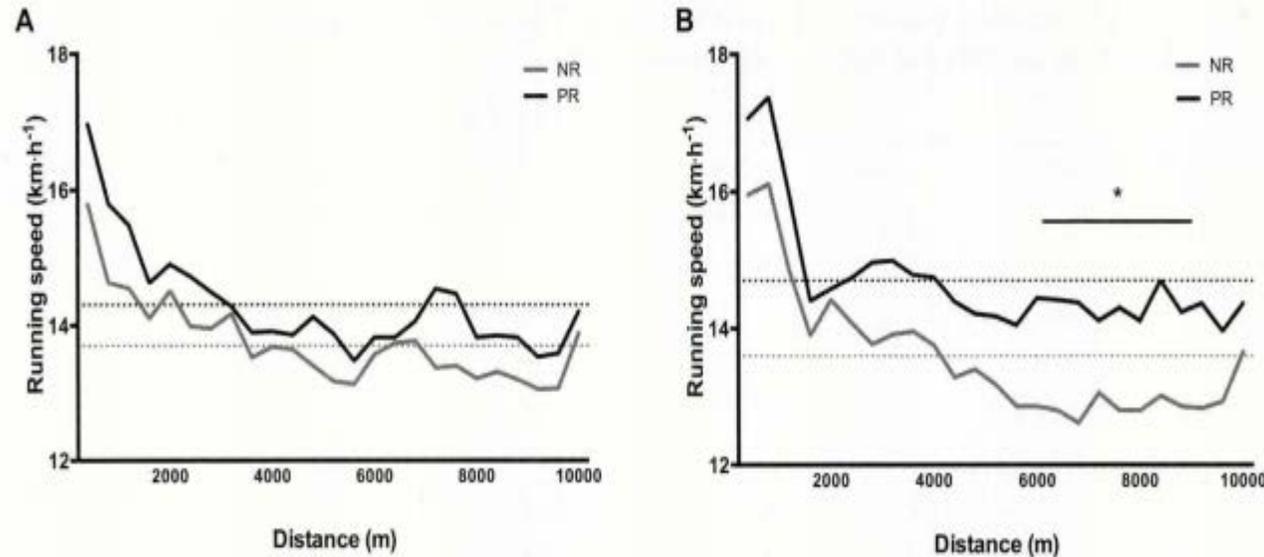
**Decoupling threshold:** weaker athletes cannot maintain contact despite drafting and peloton breaks up into subgroups.

**Both thresholds depend on differentials in MSO's and drafting benefits**

**Therefore, higher drafting quantities permit greater MSO differential before either threshold is reached**



# Specific physiological abilities may influence ability to tolerate a fast start?



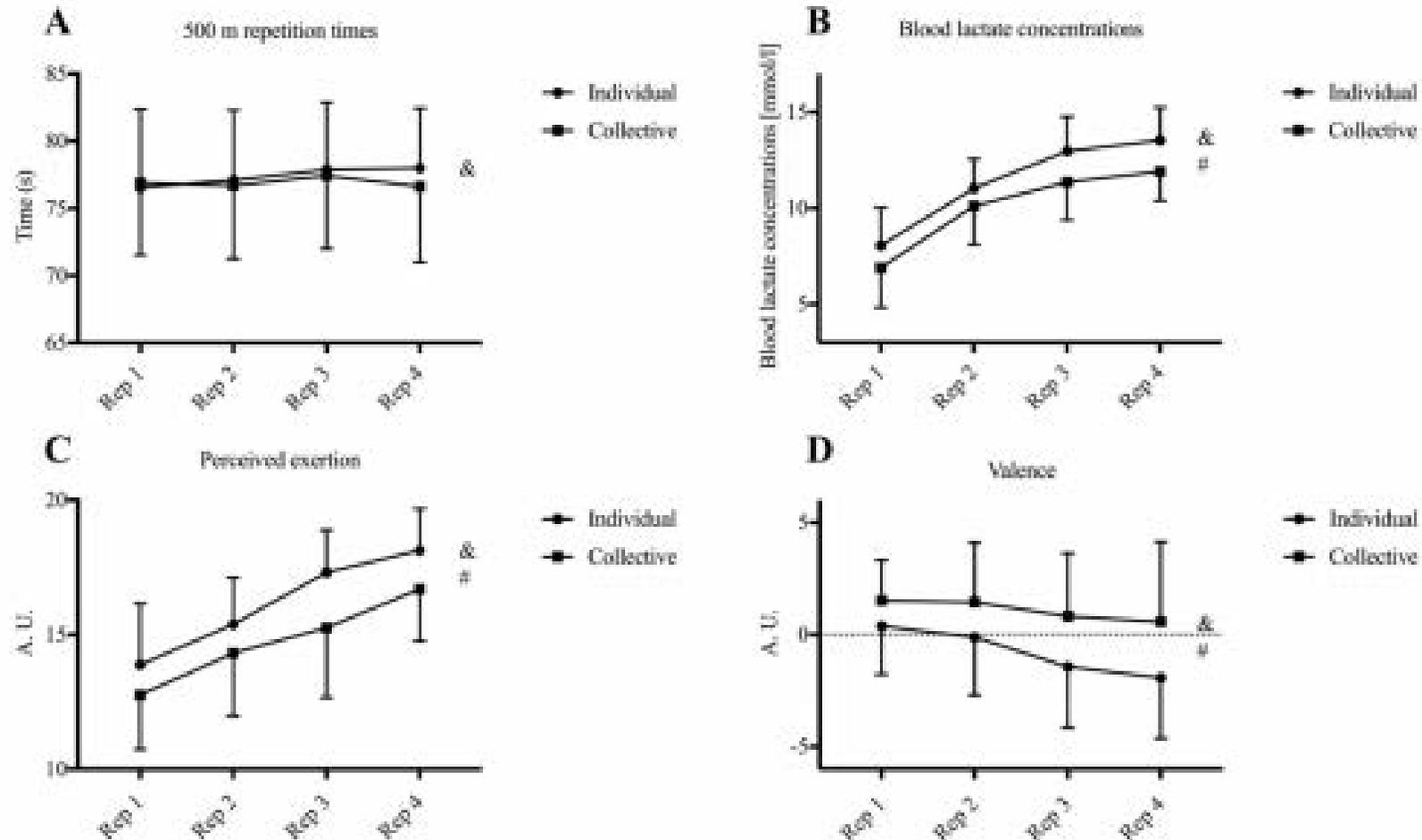
**Table 1 Anthropometric and Physiological Characteristics of Positive (PR) and Negative Responders (NR)**

	PR (n = 7)	NR (n = 8)	<i>P</i>
Age (y)	34.7 ± 6	31.3 ± 5	.51
Mass (kg)	67.4 ± 5.6	68.7 ± 4.6	.85
Height (cm)	170.1 ± 6.2	170.4 ± 4.6	.99
PV (km/h)	19.7 ± 1.2	18.4 ± 0.5	.02*
<i>v</i> VO <sub>2max</sub> (km/h)	18.5 ± 0.9	17.3 ± 0.5	.01*
VO <sub>2max</sub> (mL · kg <sup>-1</sup> · min <sup>-1</sup> )	56.6 ± 3.8	52.5 ± 4.8	.14
HR <sub>max</sub> (beats/min)	183.7 ± 10.8	180.7 ± 10.2	.6
RPE	19.8 ± 0.4	19.4 ± 0.5	.2

Abbreviations: PV, peak treadmill velocity; *v*VO<sub>2max</sub>, minimum velocity at which maximum oxygen uptake (VO<sub>2max</sub>) occurred; HR<sub>max</sub>, maximum heart rate; RPE rating of perceived exertion.

\*Significant difference between PR and NR.

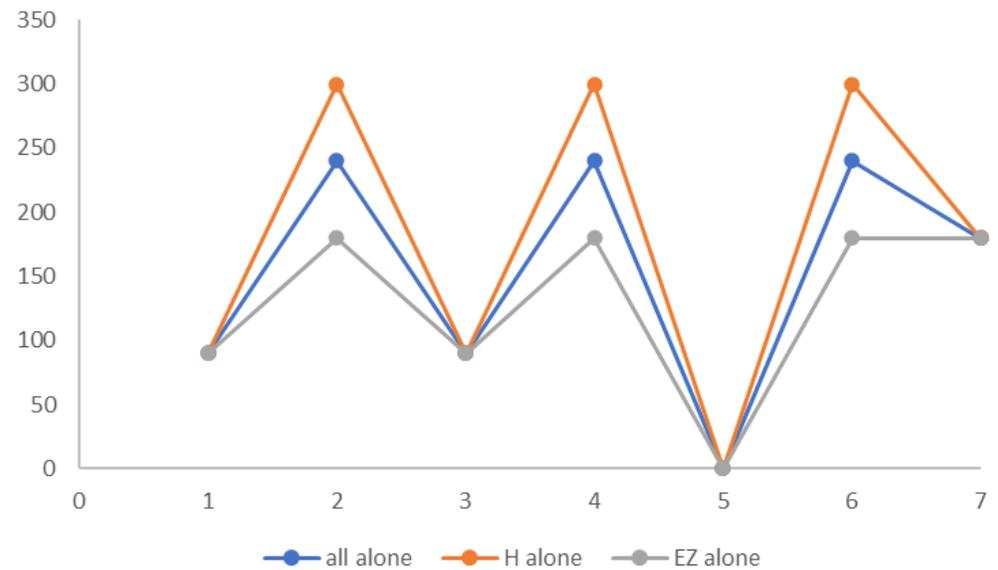
# Implications for training sessions



# Influence of training partners on total psychophysiological load?

<b>Day</b>	<b>Training Session</b>	<b>Duration (min)</b>	<b>RPE</b>	<b>Load</b>
Sunday	Cycle (100 km)	180	5	900
Monday	Weight training	120	7	840
Tuesday	Cycle 10 km	20	2	40
Wednesday	Inline roller intervals	90	6	540
Thursday	Plyometrics	75	7	525
Friday	Cycle (10 km)	20	2	40
Saturday	Weight training	120	7	840
Daily Mean Load				532
Daily standard deviation of load				367
Monotony (Daily mean/standard deviation)				1.44
Weekly load (daily mean load * 7)				3725
Strain (Weekly load * Monotony)				5397

	RPE			LOAD				
	Duration (all alone	H alone	EZ alone	all alone	H alone	EZ alone		
Mon	30	3	3	3	90	90	90	
Tue	30	8	10	6	240	300	180	
Wed	30	3	3	3	90	90	90	
Thu	30	8	10	6	240	300	180	
Fri					0	0	0	
Sat	30	8	10	6	240	300	180	
Sun	60	3	3	3	180	180	180	
					Daily mean load	154.2857	180	128.5714
					SD of daily load	95.54356	123.6932	70.81162
					Monotony (mean/SD)	1.614821	1.455214	1.815683
					Weekly load	1080	1260	900
					Strain (load*monoto	1744.006	1833.569	1634.114



# Summary

- Pacing ability is a skill that takes practice to develop
- Development requires extensive practice and reflection
- Consider carefully how you utilise the stopwatch
- Run your own race (caveat: but ideally you draft behind someone of similar ability)
- Specific physiological abilities may influence ability to cope with a fast start
- Emotional & perceptual responses to training are influenced by who you train with
- Consider influence of group vs individual training on total psychobiological stress load

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