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Effect of deceptively aggressive bike pacing on sprint-distance triathlon performance

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Abstract

Introduction: Whilst aggressive bike pacing has been found to impair subsequent run performance during triathlon, this strategy appears to enhance total cycle-run time over the sprint-distance format (Suriano & Bishop, 2010). As such, cycling at the highest sustainable intensity (i.e. isolated TT power output) is suggested as the best strategy to optimise overall performance time in the event. However, it is unclear how an athlete's expectations, beliefs and perceptions influence the effectiveness of such pacing during multi-modal events, such as triathlon. Taylor & Smith (2013) have suggested that practically meaningful changes in triathlon running may result from deceptive pace manipulation, equivalent to the smallest worthwhile change in performance. With this in mind, deceptively aggressive bike pacing may enable triathletes to maximise their sustainable intensity in this discipline, without the impairments in run performance typically associated with this strategy. However, this is yet to be confirmed by experimental evidence. This study therefore examined the effects of deceptively aggressive bike pacing on sprint-distance triathlon performance.

Methods: Having been misinformed that they would be taking part in a reliability and validity study, ten non-elite, competitive male triathletes (mean ± SD: age 36.8 ± 8.9 yrs, mass 76.3 ± 7.2 kg and $\dot{V}O_{2max}$ 54.3 ± 5.7 $ml \cdot kg^{-1} \cdot min^{-1}$) completed eight testing sessions (Figure 1). The first four trials served as familiarisation, after which all athletes completed an isolated 500 kJ (~20 km) cycling time-trial (TT) to establish their maximum sustainable intensity over this distance. Each athlete then completed three separate simulated sprint-distance triathlons (0.75 km swim, 500 kJ bike, 5 km run), the first of which established 'baseline' (i.e. personal best) simulated triathlon performance (BL). During the remaining two triathlon trials athletes maintained a cycling power output that was 5% greater than that achieved during BL, before completing the run in as short a time as possible (against an on-screen avatar of BL run performance). However, participants were correctly informed of this aggressive cycling strategy before and during only one of the two trials (Hon). Prior to the alternate trial (Dec), participants were misinformed that their mean cycling power output would equal that of BL, with on-screen feedback manipulated so as to display power output 5% below its true value.

Results: Mean performance times for TT and simulated triathlon trials are detailed in Table 1. Although these values suggest a trend for faster run performance during Dec, compared to both BL and Hon, this was only statistically significant versus BL ($p < .05$). Similarly, whilst there was a non-significant trend for overall triathlon time to be shorter during Dec than Hon (by ~17 sec), the only statistically significant differences were between each of these trials and BL, which was between 2-3% slower overall than both Dec and Hon.

Magnitude-based inferences (Table 2) suggest cycling time and power output were *almost certainly* better during TT, Dec and Hon, in comparison to BL. Whilst Dec and Hon cycling performances were *probably* worse compared to that of TT, there were *almost certainly* no differences between the Dec and Hon cycling. Interestingly, whilst any difference appeared of *trivial* practical importance, it was more likely that Hon running was meaningfully slower, than faster, compared to BL (i.e. 28:57:15% likelihood of Hon being slower, no different, or faster than BL). On the other hand, Dec running was *probably* faster than both BL and Hon. In terms of overall triathlon performance, there was *almost certainly* no difference between Dec and Hon, although both were *almost certainly* faster compared to BL.

Conclusion: An athlete's expectations, beliefs and perceptions regarding aggressive cycle pacing appear to play an important role in optimising subsequent run and overall performance during sprint-distance triathlon. Future studies should further examine how pacing beliefs and expectations influence performance across multi-modal (i.e. triathlon) or multi-stage (i.e. Tour de France) sporting competitions. In particular, more research is needed so as to better understand the importance of multiple perceptual responses (e.g. RPE and affect) to pacing decisions during successive modes of self-paced exercise.

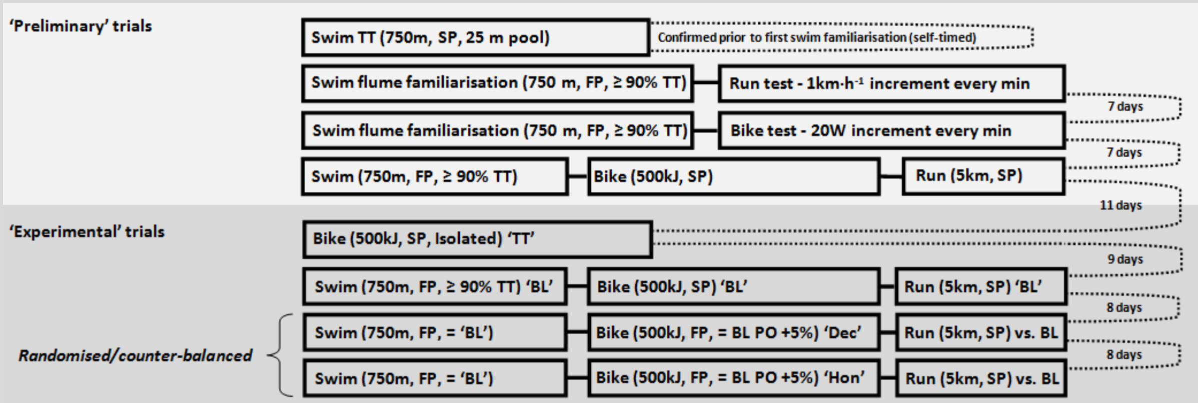

Figure 1 - Summary and order of each trial completed by participants and the mean number of days separating each trial. FP; fixed pace, SP; self paced, TT; time-trial, BL; baseline simulated triathlon, Dec; deceptively aggressive bike section, Hon; honestly aggressive bike section.

Table 1 Mean ± SD performance times during TT and triathlon trials (n = 10).

Trial	Swim (s)	Cycling (s)	Run (s)	Overall (s)
TT	-	2067 ± 312[b]	-	-
BL	848 ± 99	2270 ± 368[a,c,d]	1348 ± 140[c]	4465 ± 420[c,d]
Dec	848 ± 99	2158 ± 344[b]	1333 ± 129[b]	4339 ± 395[b]
Hon	848 ± 99	2159 ± 343[b]	1350 ± 135	4356 ± 384[b]

Significantly different from; TT, [a] $p < .05$; BL, [b] $p < .05$; Dec, [c] $p < .05$; Hon, [d] $p < .05$.

Table 2 Magnitude-based inferences and likelihoods of percentage change in performance being practically meaningful between triathlon trials.

		Bike		Run		Overall
		Time (s)	Power (W)	Time (s)	Speed ($km \cdot h^{-1}$)	Time (s)
Dec vs BL	Mean effect ± 90%	- 4.9 ± 0.2	5.2 ± 0.2	- 1.0 ± 0.6	1.0 ± 0.6	- 2.8 ± 0.3
	MBI	100%; *almost certain*		89%; *probable*		100%; *almost certain*
Hon vs BL	Mean effect ± 90%	- 4.9 ± 0.2	5.1 ± 0.2	0.2 ± 1.3	- 0.2 ± 1.3	- 2.4 ± 0.5
	MBI	100%; *almost certain*		28%; *possibly*		100%; *almost certain*
Hon vs Dec	Mean effect ± 90%	0.1 ± 0.2	-0.1 ± 0.2	1.2 ± 1.3	- 1.2 ± 1.3	0.4 ± 0.4
	MBI	0%; *almost certainly*		79%; *probable*		0%; *almost certainly none*

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