

England Athletics Academic Research Series

The Role of Decision-Making in Endurance Performance

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Dr Jose Joaquin Diaz (University of Seville)

Fatigue is the Problem

Origins of fatigue can be central or peripheral in origin.

However, a useful **functional** definition is “the inability to maintain a desired or expected power output” (Edwards 1983)

Some of the things that can ‘go wrong’:

Low pH, glycogen depletion, dehydration, hyperthermia, ion fluxes, mechanical damage, reduced motivation etc etc...

Review

Testing for maximum oxygen consumption has produced a brainless model of human exercise performance



Article
Text

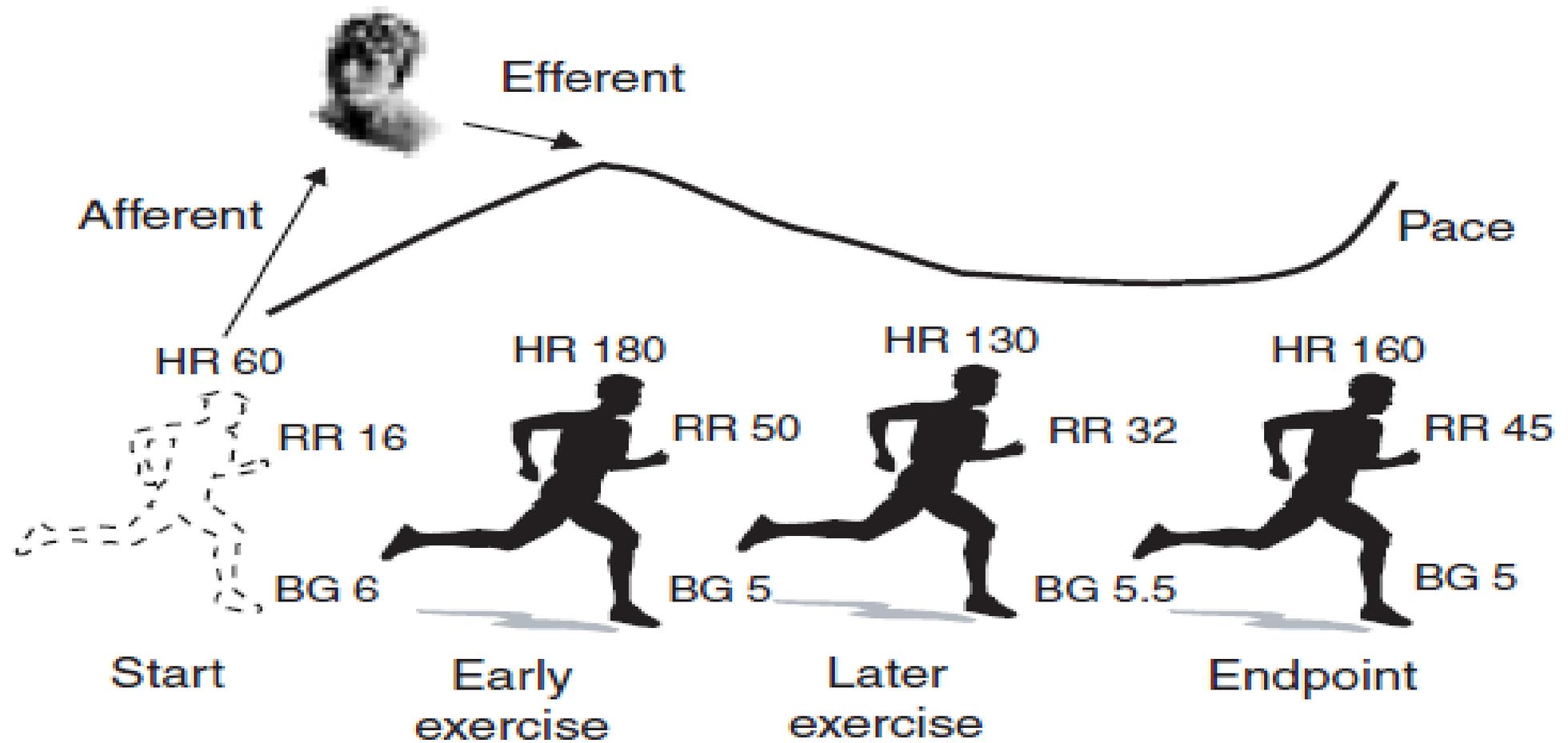


Review

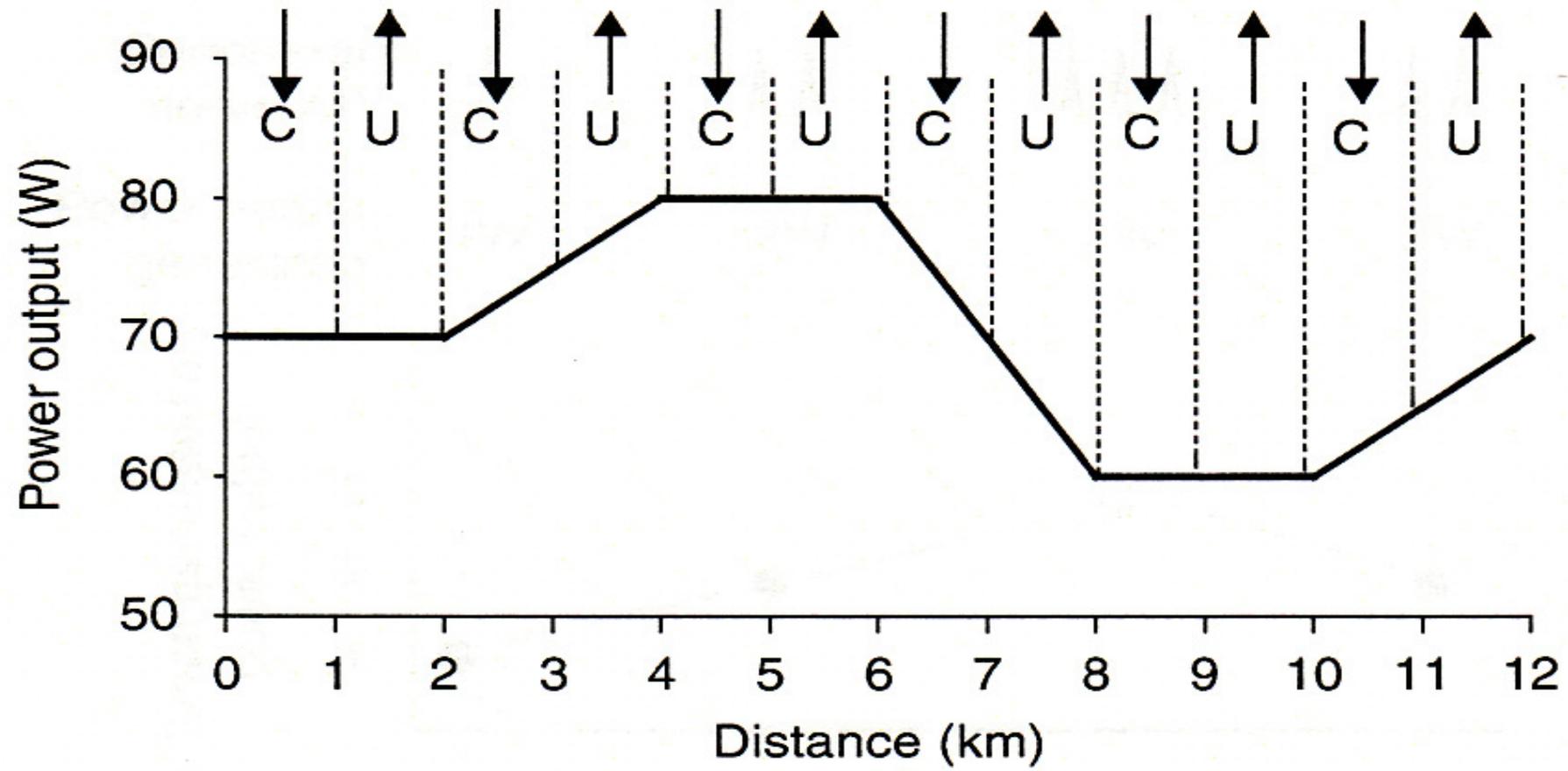
Testing for maximum oxygen consumption has produced a brainless model of human exercise performance



PDF



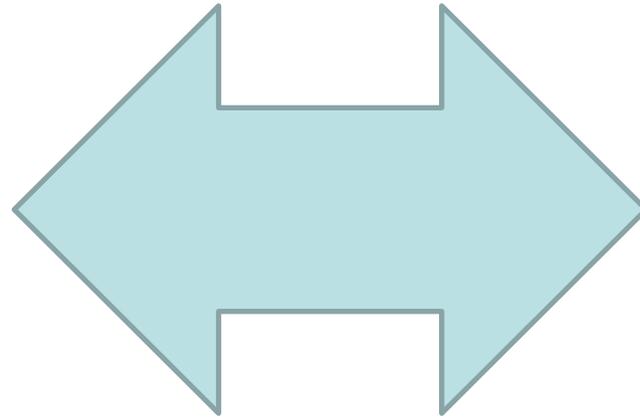
(St Clair Gibson *et al* 2006)



(St Clair Gibson *et al* 2006)

Pacing requires management of conflicting goals for the 'mind' and the body

FASTEST TIME POSSIBLE



MAINTAIN PHYSIOLOGICAL RESOURCES

(St Clair Gibson *et al* 2018)

Maintaining adequate resources

Prevent catastrophic substrate depletion

Prevent catastrophic metabolite accumulation

Prevent physical system failure



In order to maintain psychological homeostasis, goal setting is a requirement

Goals

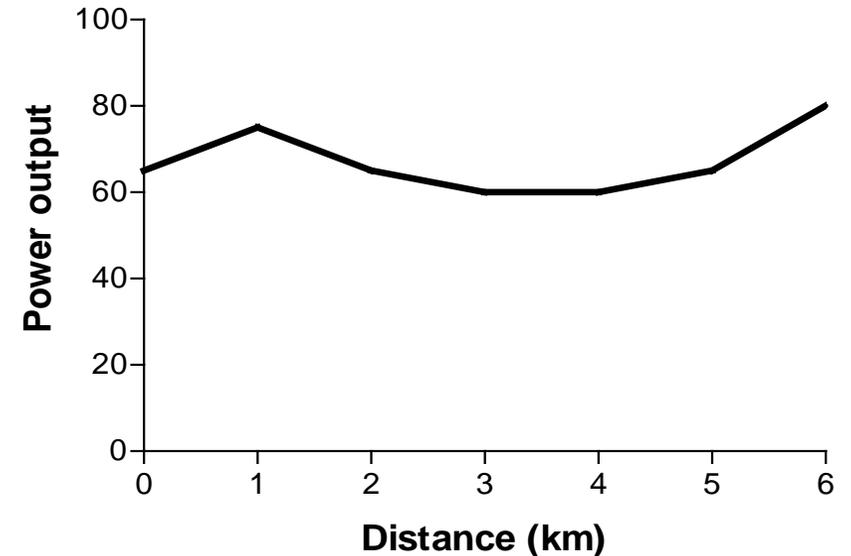
A projected state of affairs which a person plans or intends to achieve or bring about a personal end-point



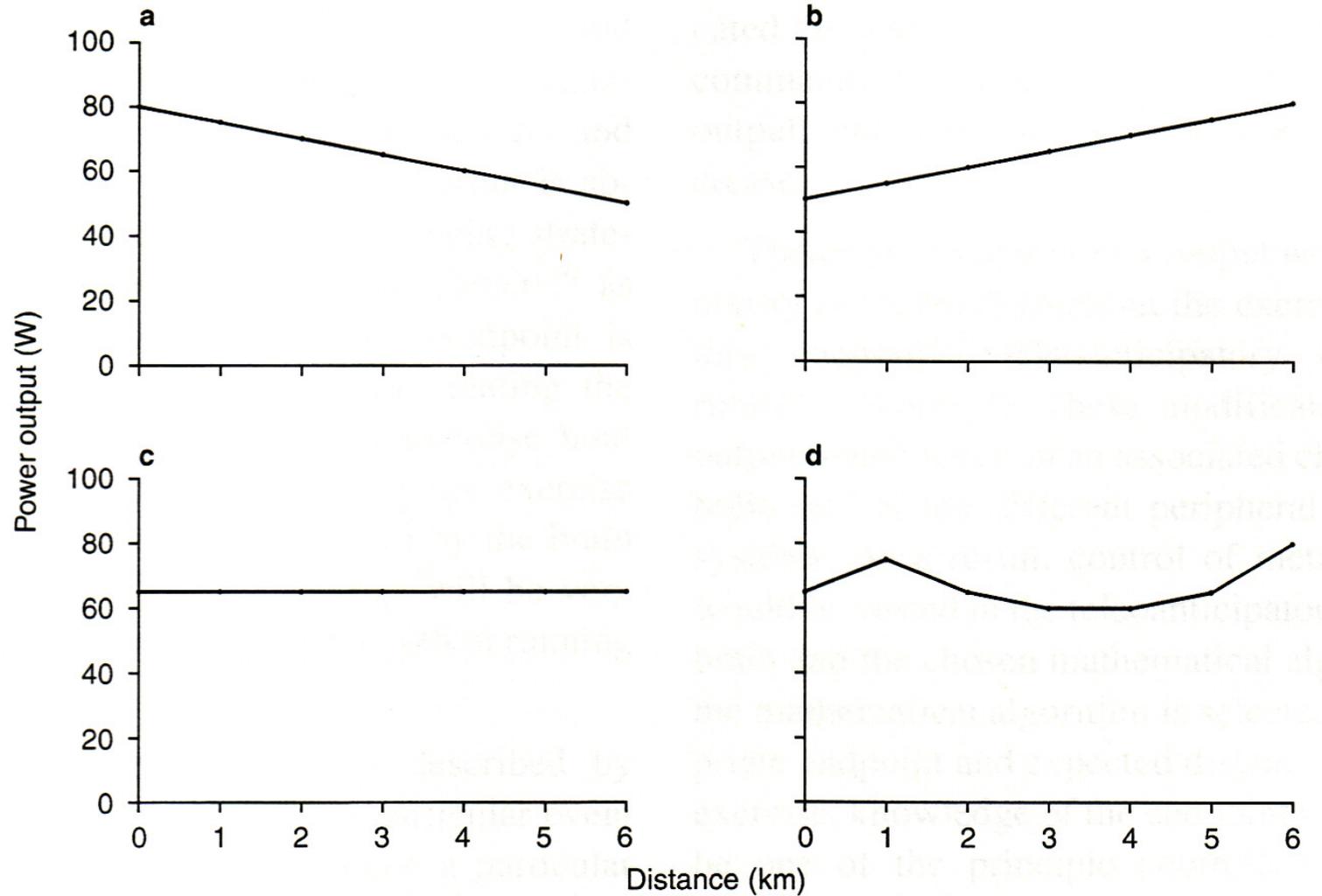
In order to achieve these goals a **STRATEGY** must be set **IN ADVANCE**

Strategy – A pre-meditated plan of action designed to achieve a particular goal

BUT – The strategy is complicated by the need to maintain **PHYSIOLOGICAL** as well as **PSYCHOLOGICAL** homeostasis.

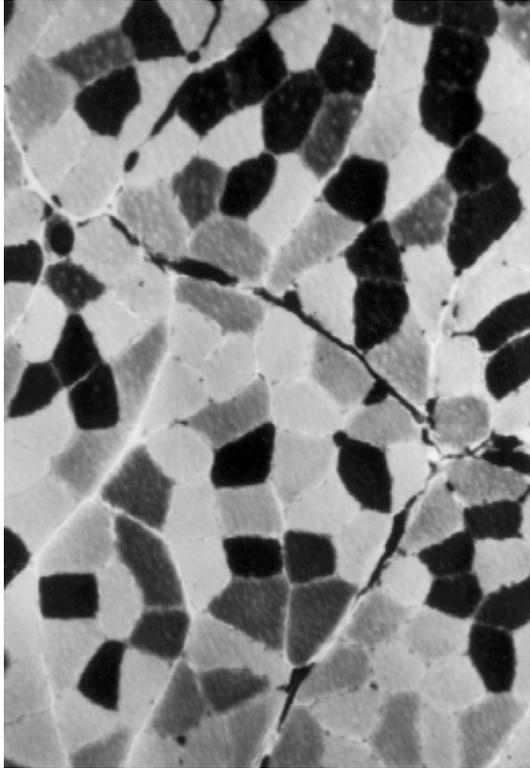


**Several
different
pacing
'strategies'
have been
described**

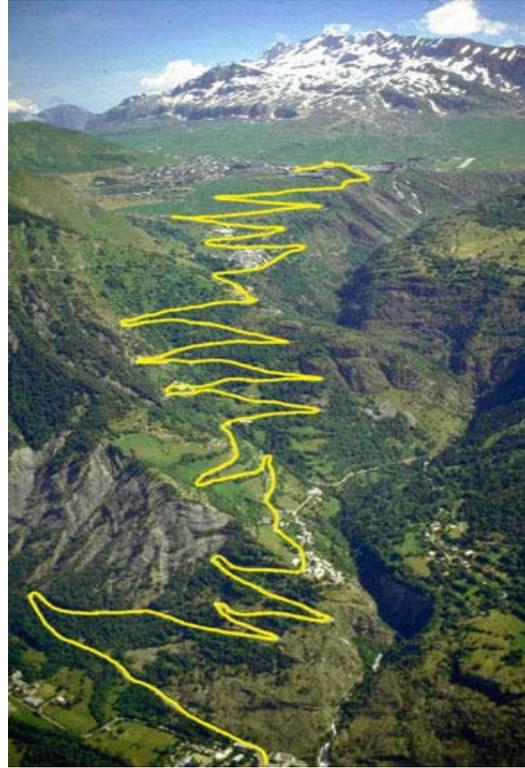


(Foster, De Koning *et al* 1994 – 2008)

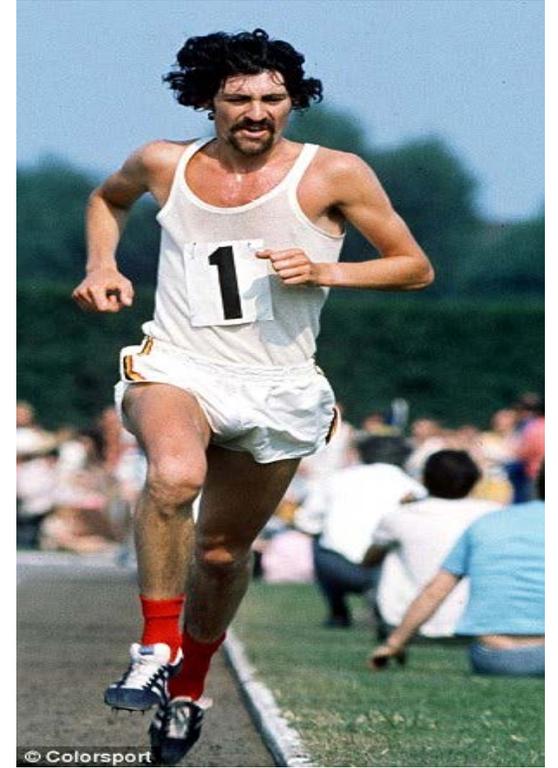
Strategies must be based on expectations



You



What?



Who?

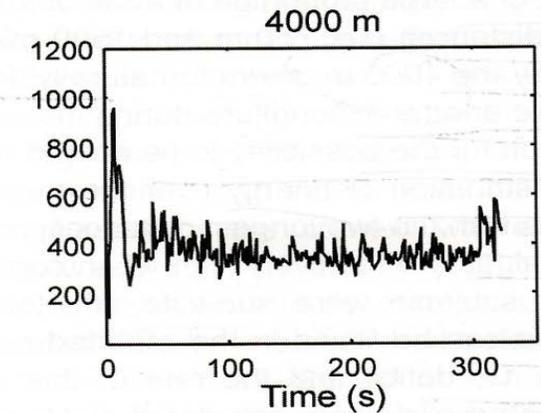
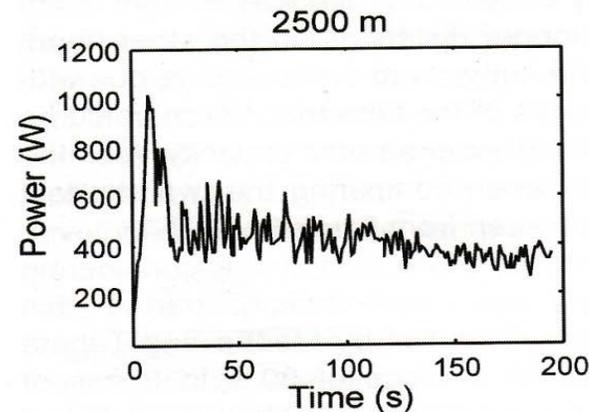
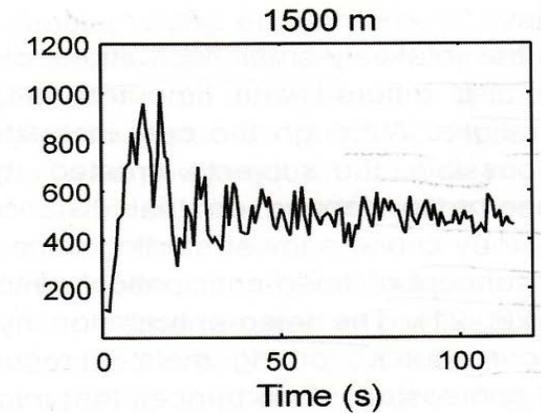
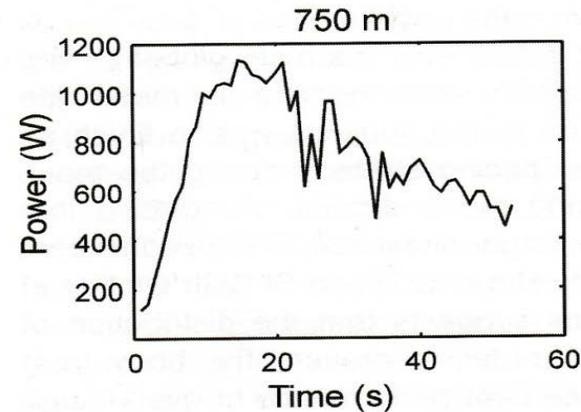
**Even the best
plans can go
wrong if they are
not modified as
events unfold**



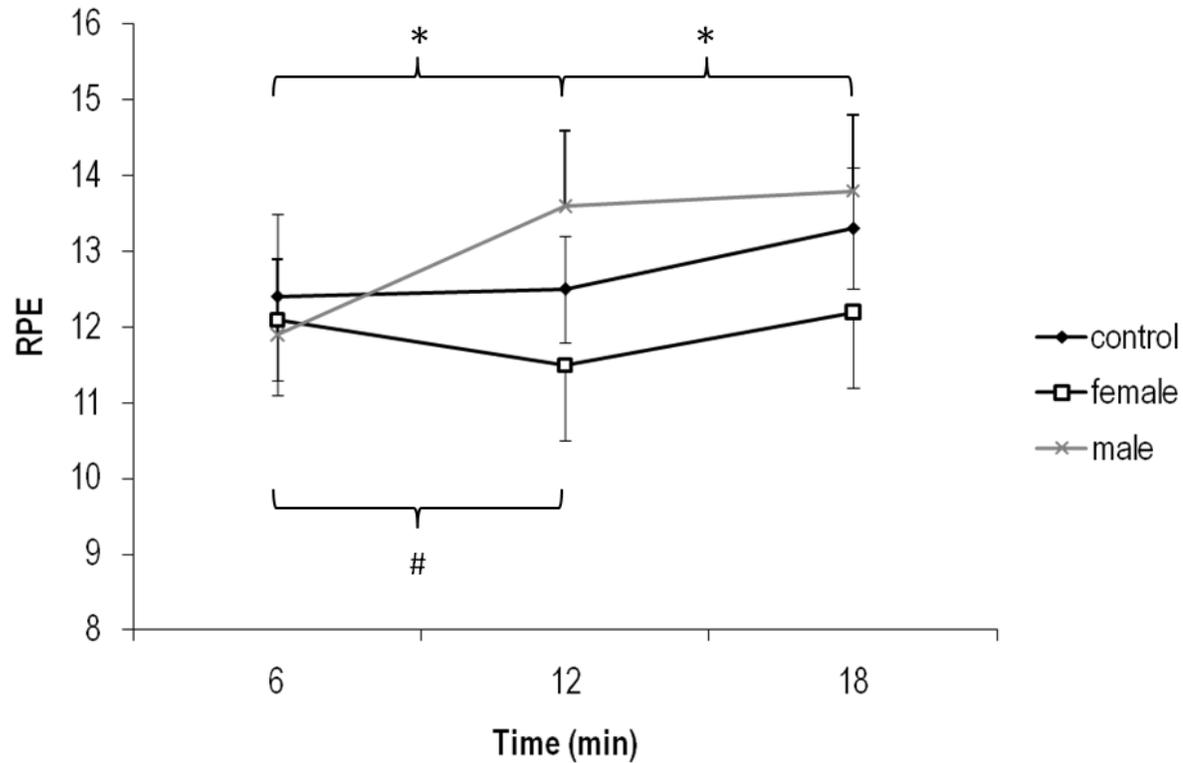
How can STRATEGY be maintained in face of factors that attempt to 'sabotage' it?

TACTIC

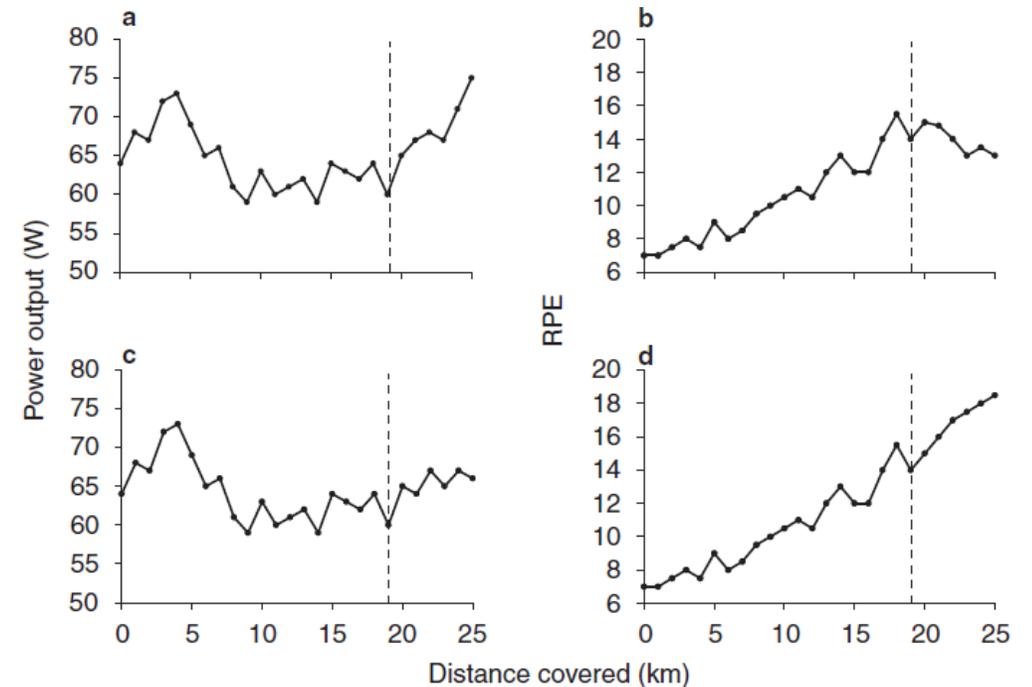
An action used to enable a strategy to be successfully implemented, while advancing towards a specific goal



But, RPE is easily dissociated from physiological variables.



Winchester et al (2010)



St Clair Gibson et al (2006)

Models of decision-making

Decision-making is the process of making a choice from a set of options where the consequences of that choice are crucial (Bar Eli et al 2001).

Rational Decision Making (Simon 1955) requires certain criteria to be met.

-the individual must be faced with a set of behaviour alternatives.

-the individual must have access information relating to all possible outcomes of the choices made.

Such decision making behaviour place severe demands on cognitive processing abilities. As such, effective rational decision making can only occur in 'Small World' environments where the decision maker has perfect knowledge of all relevant behaviour alternatives, consequences, and probabilities

Models of decision-making *cont'd*

Heuristic decision-making takes into account only a limited fraction of available information.

Heuristics may be the preferred method of decision-making in situations where the outcome of actions cannot be calculated with confidence (Gigerenzer & Gaissmaier 2011). Heuristics therefore place lesser demands on individuals.

In contrast to the theoretical small world environments described previously, “large worlds” exist where some relevant information is unknown or estimated.

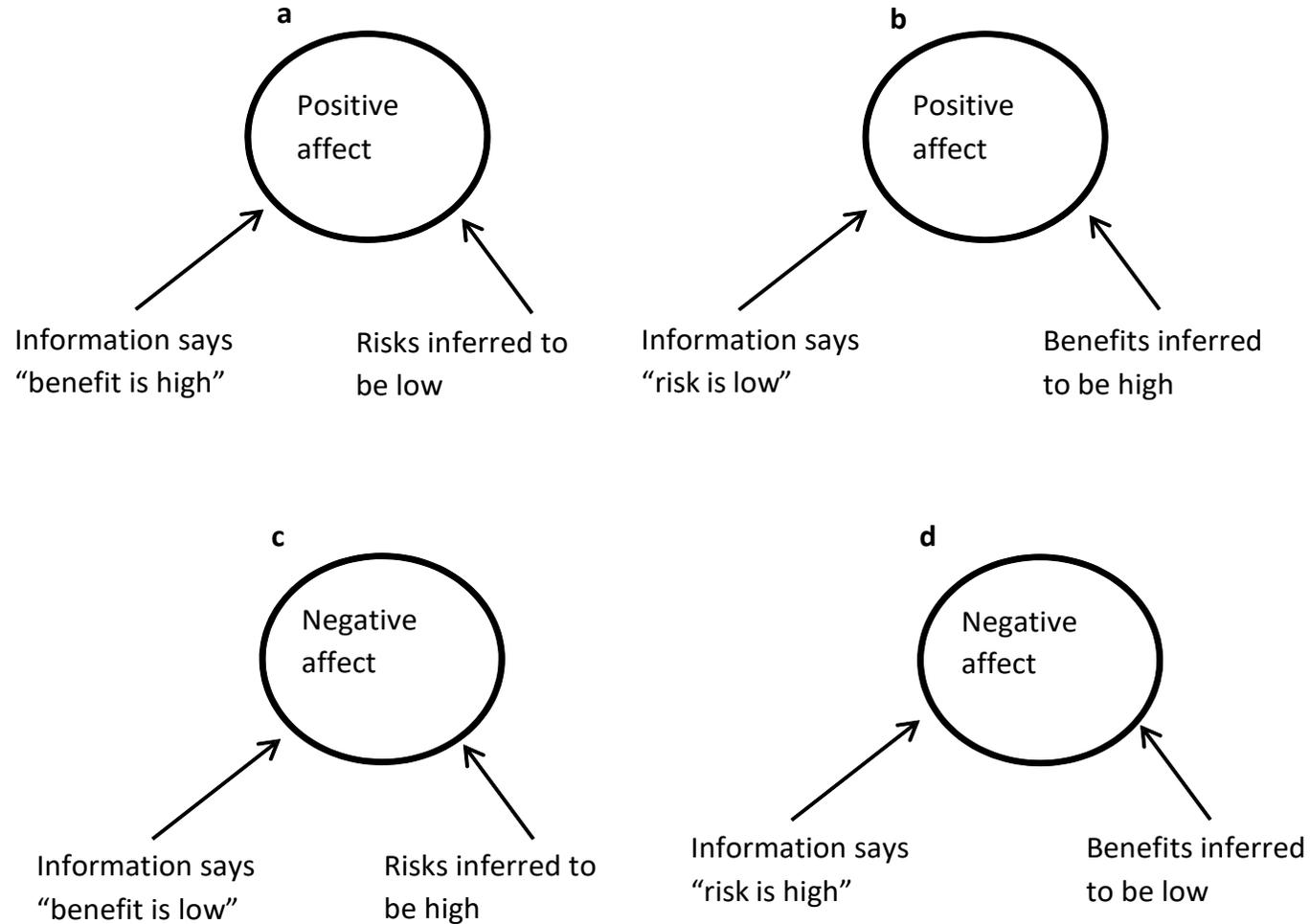
In such environments, rational decision-making is not possible.

Table 1

Rational decision-making	<p>The process of making decisions based upon complete knowledge of the available behaviour options and the statistical probability of specific outcomes occurring.</p> <p>Places high demands on the cognitive processing capacity of an individual.</p>
Heuristic decision-making	<p>A strategy that ignores some available information to make decisions more quickly and or accurately than can be achieved through more complex methods. Heuristics may be considered 'rules of thumb' or 'gut instincts'.</p> <p>Places low demands on the cognitive processing capacity of an individual.</p>
Small world environments	<p>Environments in which the decision maker has perfect knowledge of all behaviour alternatives, consequences, and probabilities</p>
Large world environments	<p>Environments where some relevant information is unknown or estimated</p>

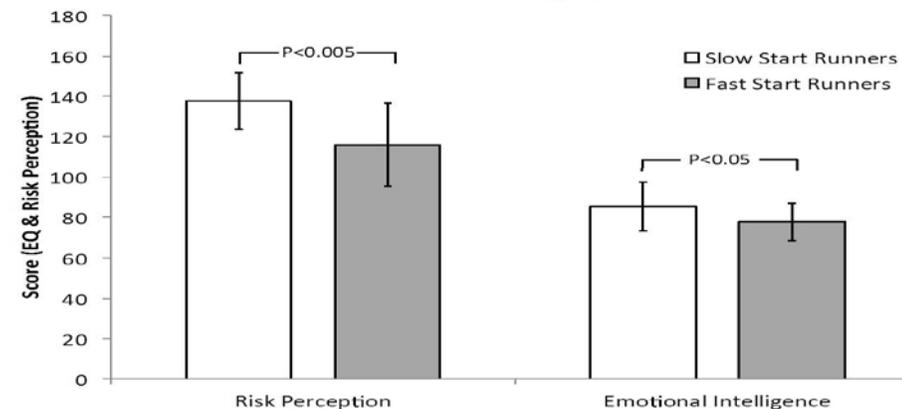
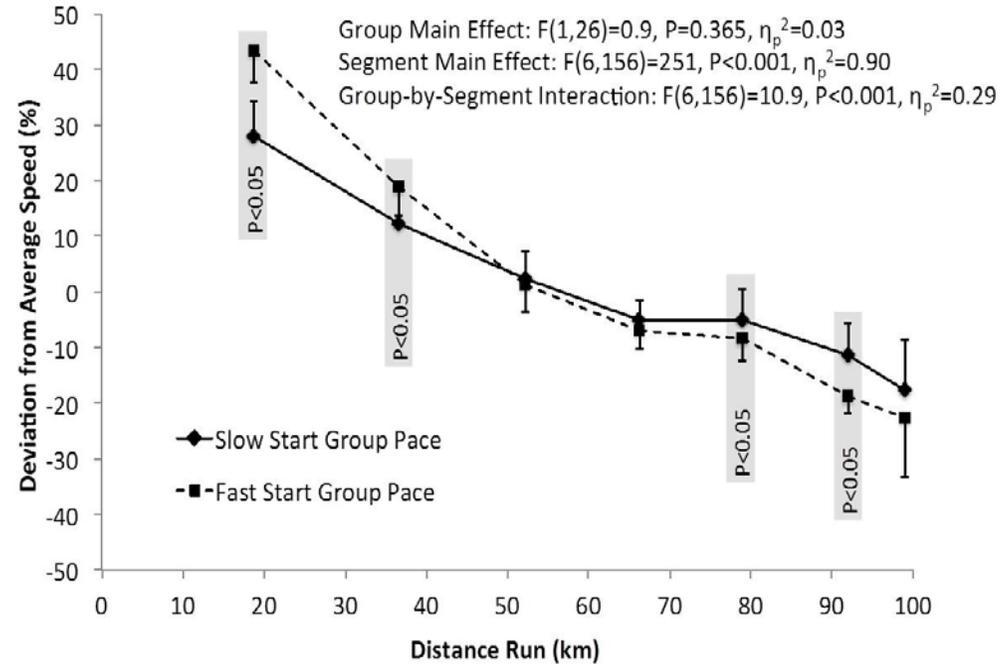
(Renfree *et al* 2014)

Use of an overall affective impression is more efficient than rational analysis, especially when the decision to be made is complex or mental resources are limited (Slovic et al 2003)

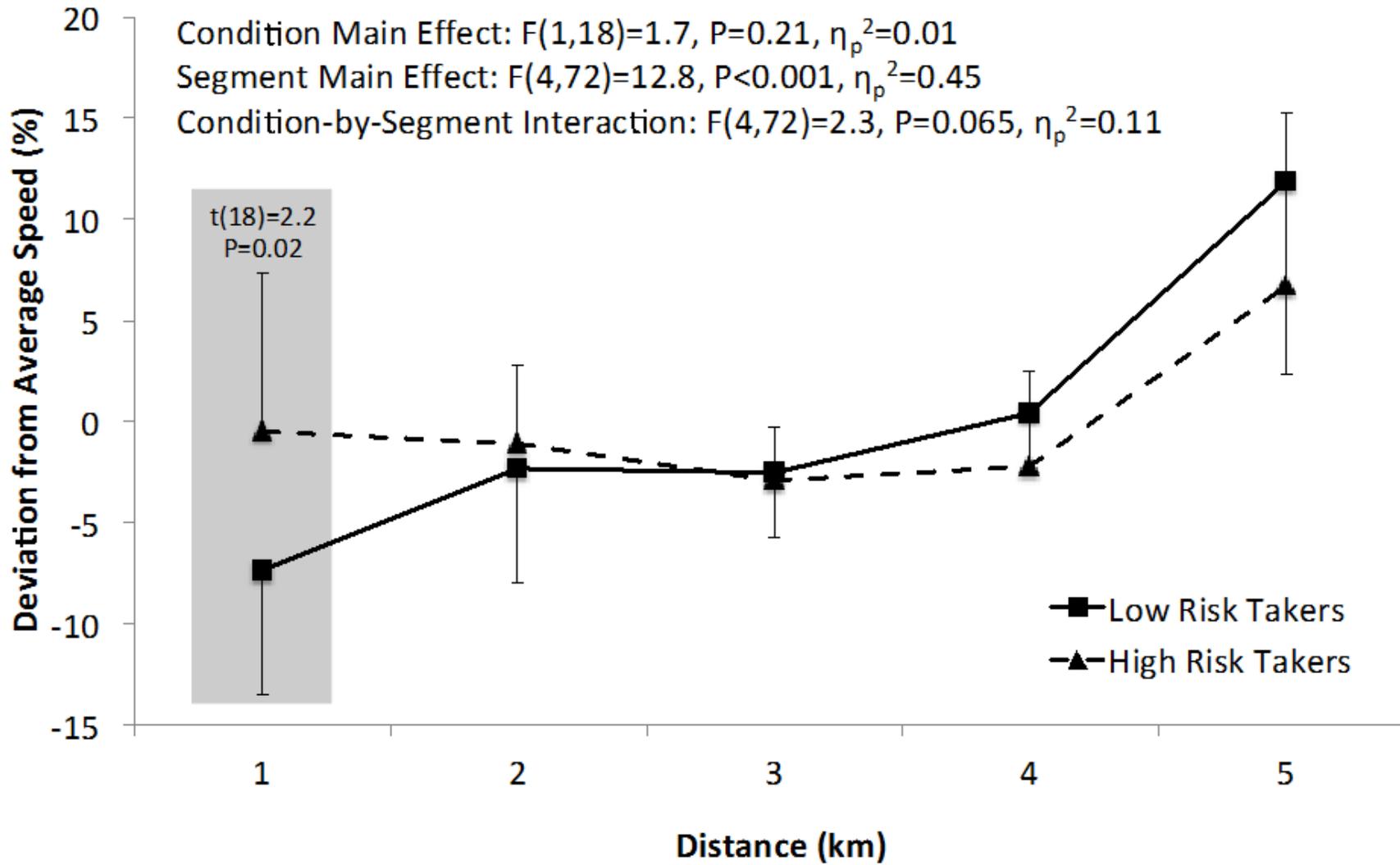


(Renfree *et al* 2014)

Assessment of risk may be important

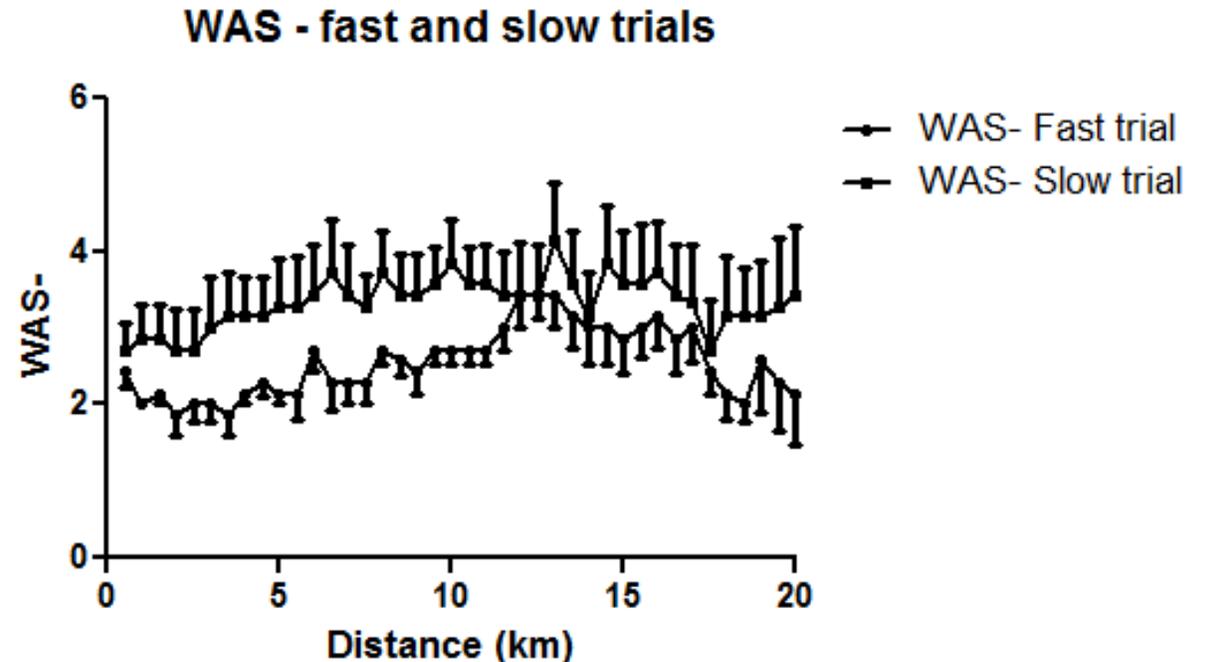
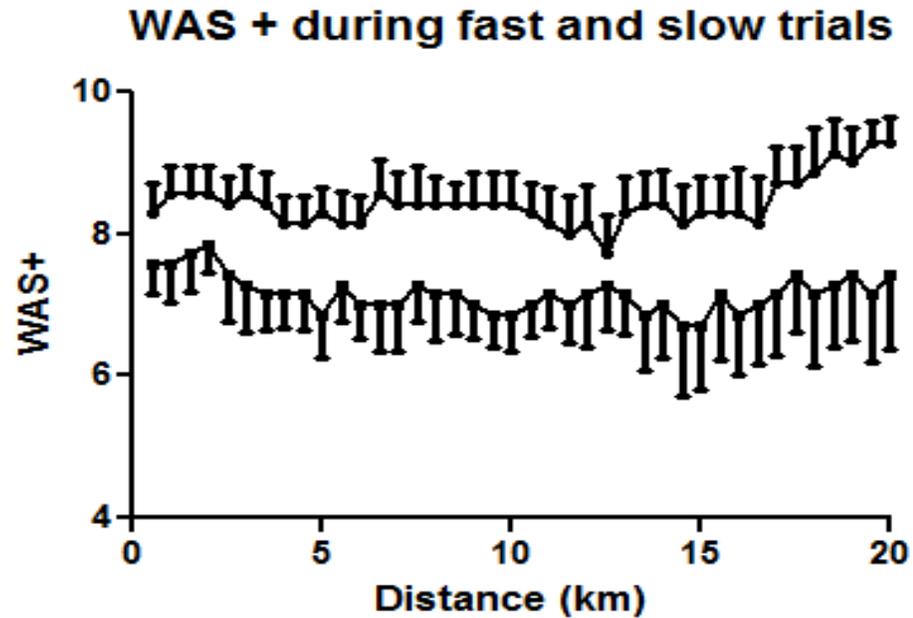


Micklewright et al (2014)

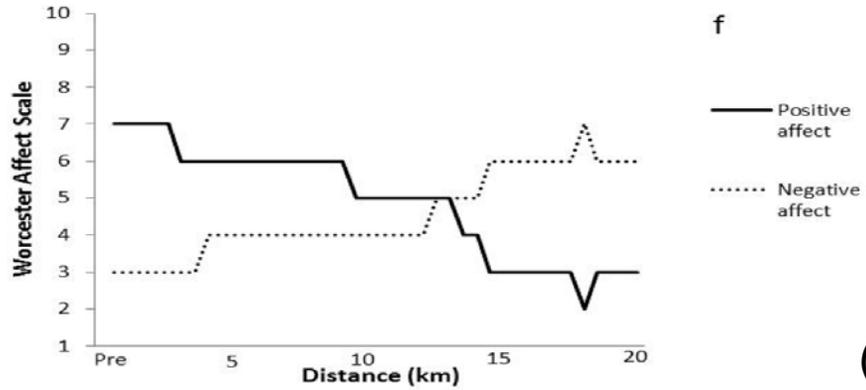
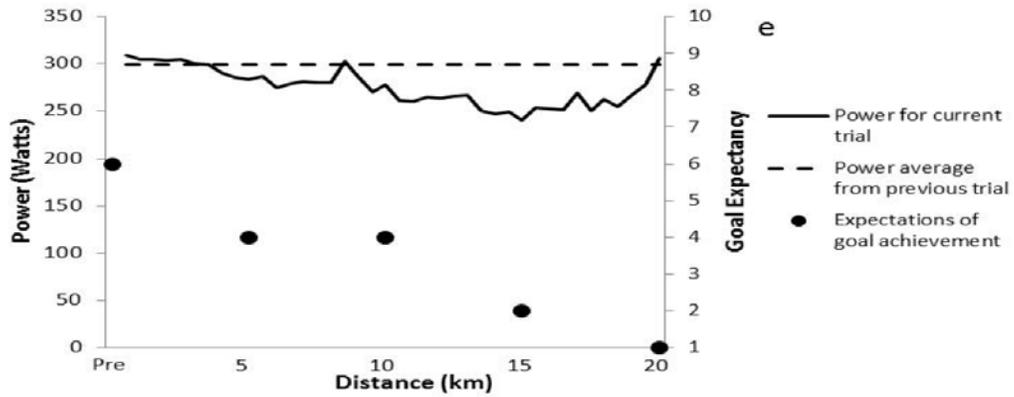
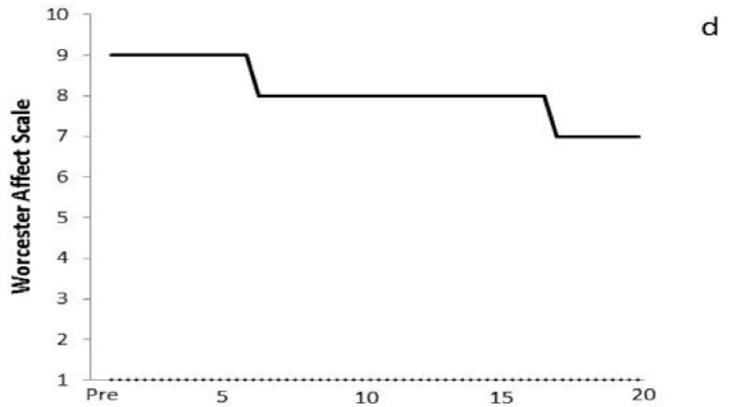
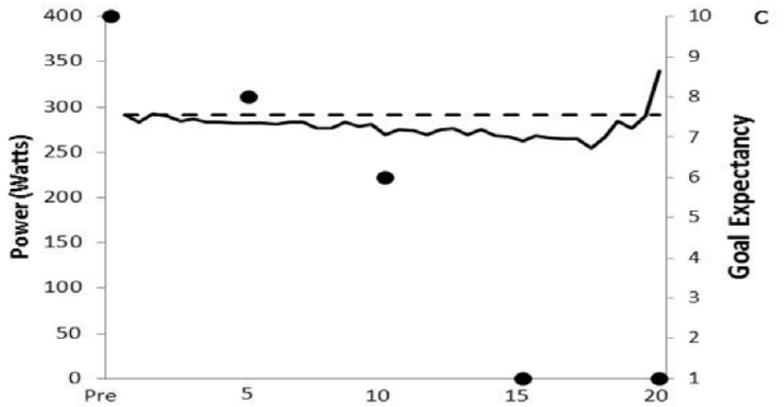
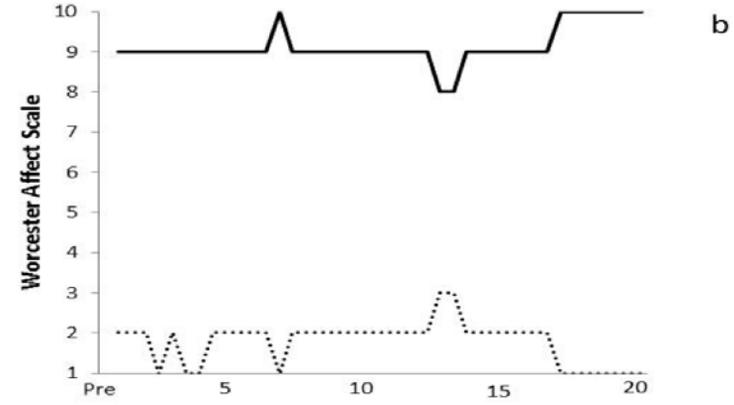
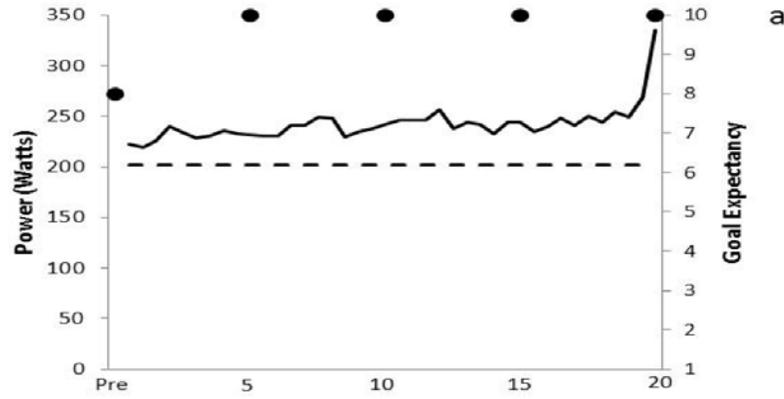


Micklewright et al (2014)

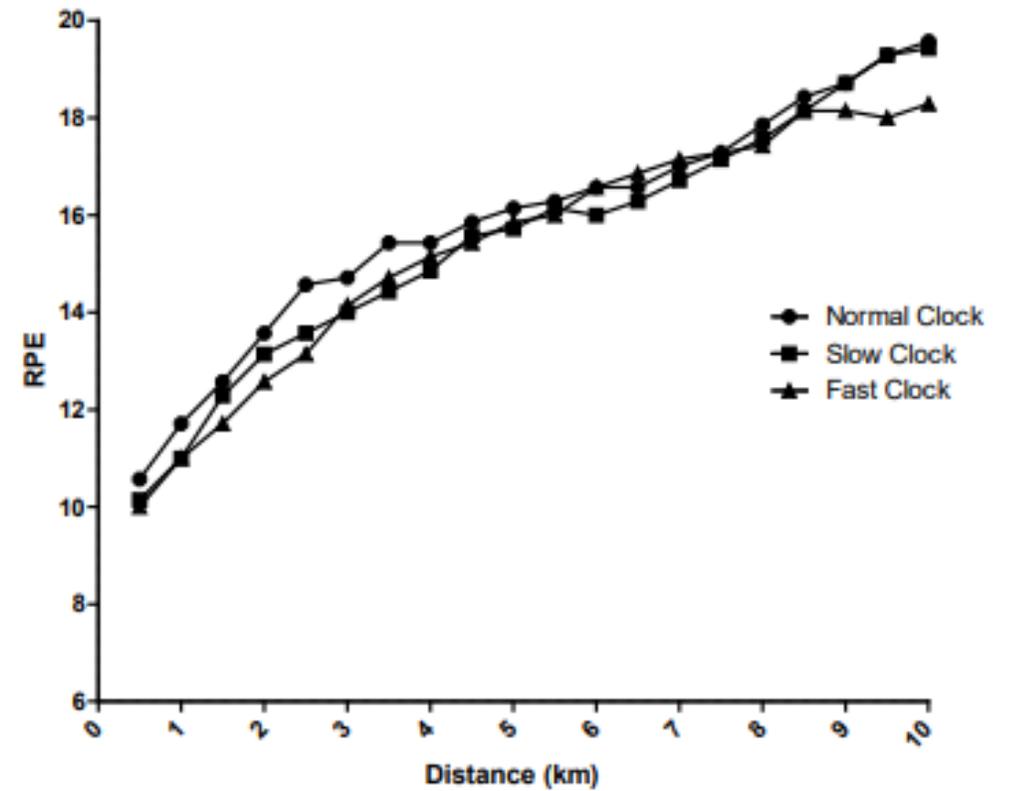
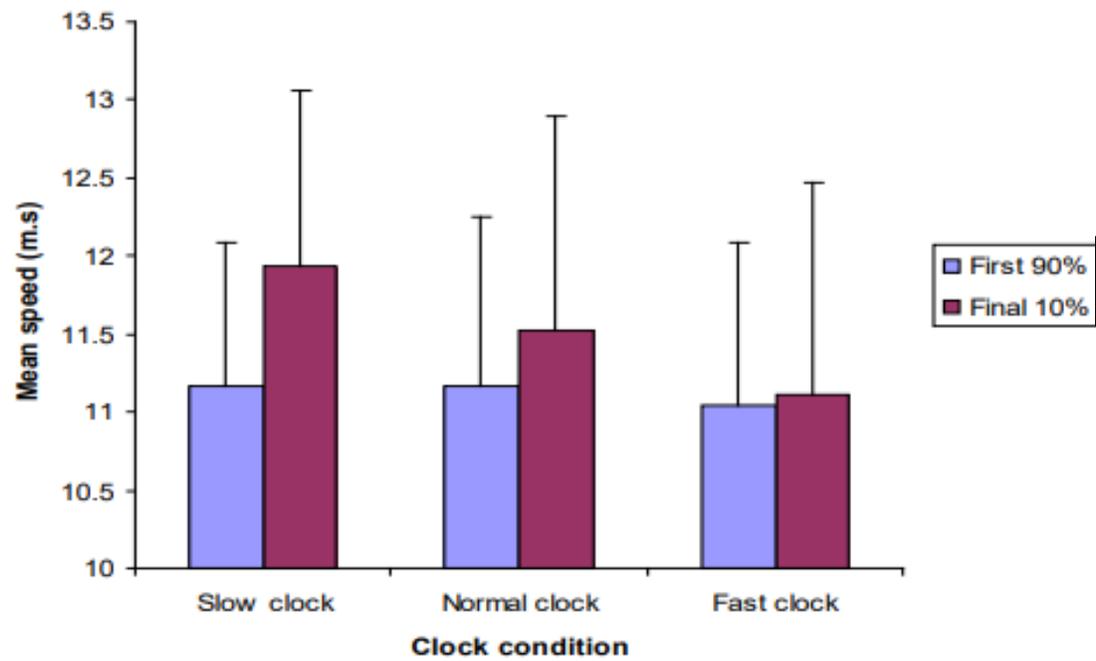
Emotion may be important



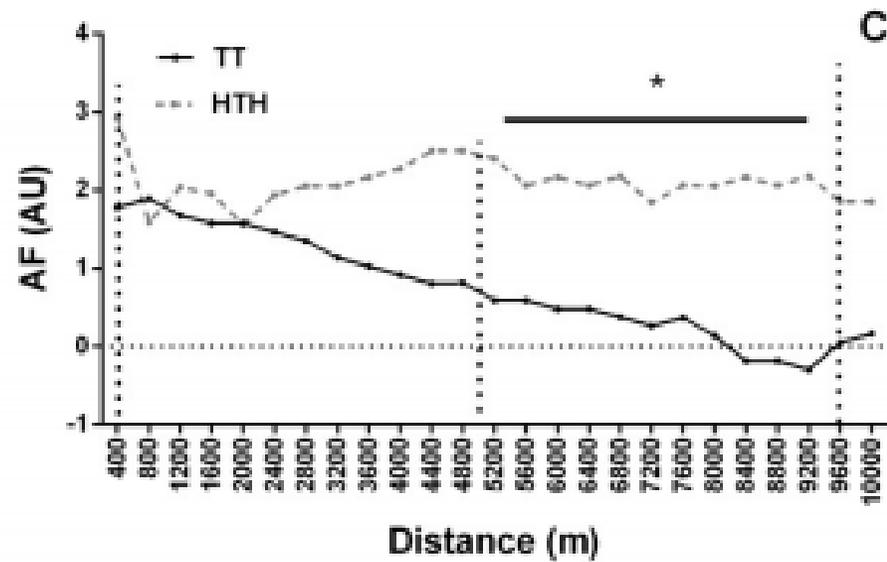
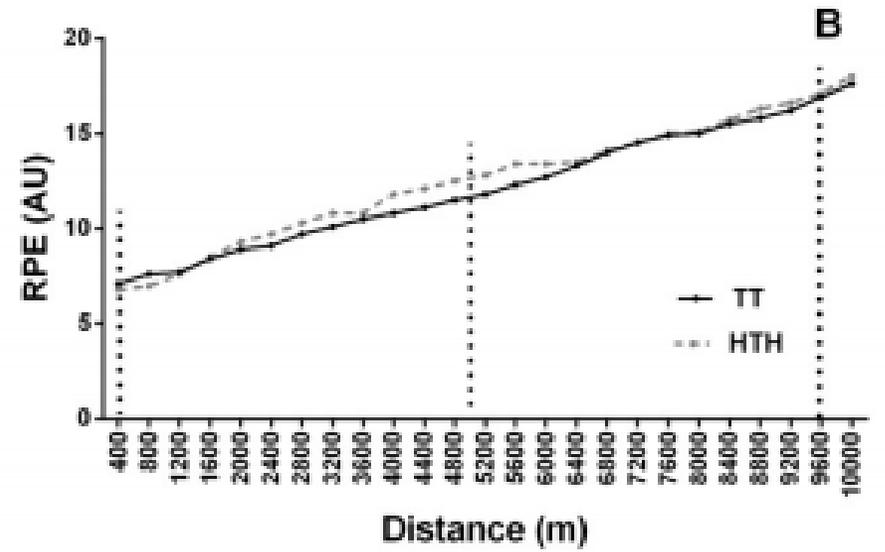
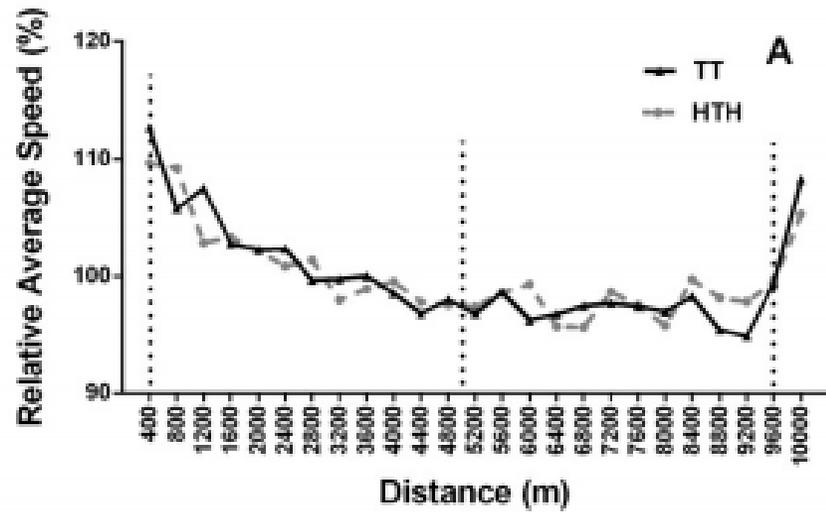
(Renfree *et al* 2012)



(Rhoden *et al* 2015)



(Thomas, G. & Renfree, A. 2012)



(Crivoi *et al* 2019)

In summary

- Management of exercise intensity is regulated by the brain.
- Exactly how pacing decisions are made is uncertain, although both RPE and affect are implicated.
- Goal setting is of crucial importance.
- Goal achievement requires strategic planning.
- (Perceived) progress towards a goal is important and may result in modifications to strategy.

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