Power output and affective load change during time trial according to environmental conditions

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Procedure

8 amateurs cyclists performed 5 TT in different environmental conditions. Each course was designed to last 20 min.

- Flat Road
  - No Wind
  - Head wind
  - Tail wind

- Uphill (7km; slope 8%)

- HT

**Hollistic approach**

**Power Output** (PO), pedalling cadence, velocity, Torque, **Crank Inertial Load** (CIL)

=> Objective measures

**Affective Load**

Borg’s category ratio scale (CR10)

=> Subjective measures
Relationship between Sufferance, Pleasure and Performance

- **Pleasure**
  - Positive affective responses

- **Physical Exercise**
  - Sufferance / Pain

- **Affective Load**

Negative affective responses ≠ Positive affective responses
AFFECTIVE LOAD

EFFORT

10  Maximal
9  Very Strong
8  Strong
7  Moderate
6  Weak
5  Very weak
4  Extremely weak
3  Nothing at all
2  
1.5  
1  
0.7  
0.5  
0.3  
0  

 насadiator

PLEASURE

10  Maximal
9  Very Strong
8  Strong
7  Moderate
6  Weak
5  Very weak
4  Extremely weak
3  Nothing at all
2  
1.5  
1  
0.7  
0.5  
0.3  
0  

Performance +++
Performance +
Performance ---

F. Grappe, 2012
Similar pacing strategies between all conditions but different mean Power Output values.

The highest AL were recorded in conditions where riders develop the lower PO!!!
Central Governor

- **Environmental conditions (NW)**
  - Unconscious mechanisms => Physiological responses ++
  - Conscious mechanism => perception of exertion ++

- **Memorised experiences +++**

- **Estimation of the end point ++**

- **Motivation** => Level of acceptance of AL ++

- **Desire to select a high intensity**

- **PO Pedalling Efficiency**

- **Affective Load ++**

- **Memorised experiences +++**

**Specific Force-Length relationship**

**Specific cadence-CIL relationship**
Find pedalling strategy to be performant and to decrease muscular strains.
Flat road but CIL and speed - - ??

Environmental conditions (HW)

Memorised experiences - -

Estimation of the end point - -

Physiological responses ++
+ perception of exertion +++

Affective Load +++

Motivation

=> Level of acceptance of AL - - -

Difficulties to pace PO, gear ratio, cadence

Central Governor

Memorised experiences - -

Estimation of the end point - -
Peak Torque +/-
Inertia ++

Physiological responses +
perception of exertion +

Memorised experiences ++

Affective Load +

Motivation
=> Level of acceptance of AL +++

Environment conditions (TW)

Estimation of the end point +

Speed+++

Pleasure and desire to develop high PO

CIL
Conclusion

✓ Training sessions in different environmental conditions would improve quantity and quality of stored data.

✓ To decrease AL it seems necessary to adopt an optimal gear according to the field and learn to tame the environmental conditions.

✓ Pacing strategy is dependent on the pre-established template certainly programmed into the motor cortex from prior physical exercises during childhood.

⇒ This kind of training method could be designed during childhood to improve efficiency and stability of the pacing strategies.