

Conference Abstract

Heart Rate Response Times Measured in The Field as Indicators for Endurance Performance in Cycling

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Received: 4 March 2024

Accepted: 21 March 2024

Published: 10 August 2024

Abstract:

Purpose: To couple power and heart rate data of professional road cyclists collected in the field and study its relationship with performance obtained in controlled settings.

Methods: Heart rate and power data during all cycling activities was collected of 23 elite road cyclists for 2 years. Weekly athlete-specific heart rate response times (recuperation, delay and maximal response times) were extracted from models connecting heart rate and power output. Cyclists visited the lab several times to determine performance, defined by a 1- and 10-minute time trial. Linear regression was performed between performance and weekly heart rate response times.

Results: No significant relations between heart rate response times and 1 min TT power were found. Averaged per rider, significant (negative) correlations were obtained between the heart rate response times and 10 min TT power. Accuracies (R^2) of linear relationships were 0.54 ($p < 0.01$), 0.49 ($p < 0.01$) and 0.24 ($p = 0.03$) for recuperation, heart rate maximal response and delay times, respectively. Moreover, significant (negative) correlations were found between 10 min TT power and heart rate delay and maximal response times within 14 days of the performed lab test. Linear relationships were fit with accuracies (R^2) of 0.46 ($p = 0.02$) and 0.37 ($p < 0.01$) for delay and heart rate maximal response times, respectively.

Conclusion: Heart rate response times seem important physiological indicators concerning endurance performance in cyclists. This suggests a rider's endurance performance can be assessed periodically by coupling power and heart rate data collected in the field.

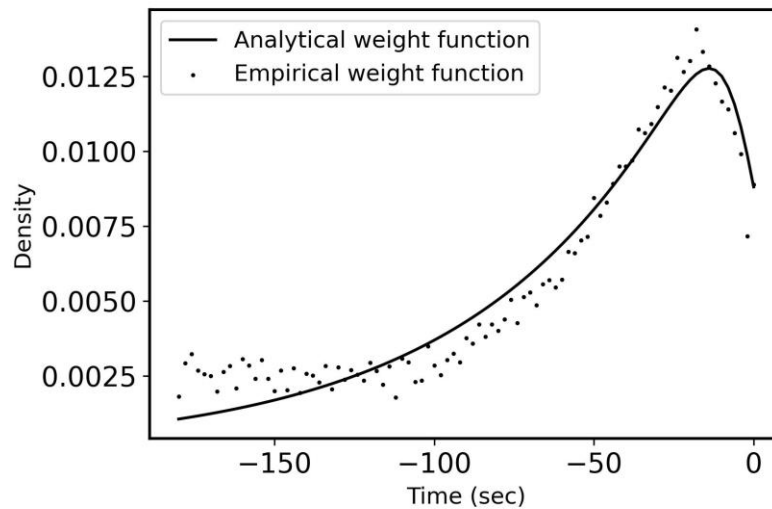


Figure 1. Typical example of empirical weight function and analytical weight function for a day and rider selected at random. An increment of the weight functions for small negative times is followed by a decrease for large negative times after reaching a maximum around -10 seconds. The analytical expression clearly fits the empirical solution ($R^2 = 0.94$).

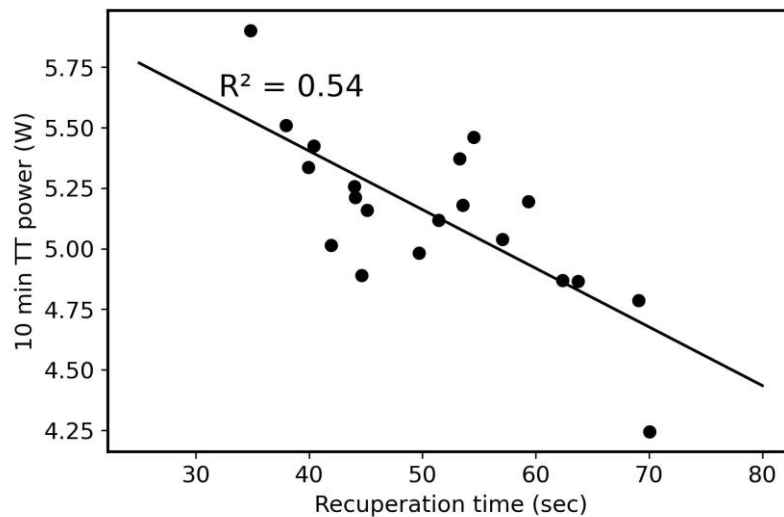


Figure 2. Recuperation time (as derived from heart rate/power data in the field) negatively correlates with 10-minute TT power (exercise test).

Keywords: Heart Rate Data, Power Data, Endurance Training, Cycling

References

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