

All for One and One for All! Disparity Between Overall Crew's and Individual Rowers' Pacing Strategies During Rowing

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Purpose: This study examined individual contributions to overall pacing strategy during 2- and 5-km rowing trials in a coxless-4 boat. **Methods:** A crew of 4 male rowers performed maximal-effort on-water trials over 2 and 5 km, and power output during every individual stroke was measured for each crew member. Mean overall boat and individual rower stroke power were calculated for each 25% epoch (25% of total strokes taken), and power for each individual epoch was calculated as a percentage of mean power maintained over the entire distance. The coefficient of variation was used to determine stroke-to-stroke and epoch-to-epoch variability for individual rowers and the overall boat. **Results:** In both trials, the overall pacing strategy consisted of a high power output in the initial 25% that decreased in the middle 50% and increased again in the final 25%. However, individual rower data indicate wide variation in individual power profiles that did not always mimic the overall boat profile. **Conclusions:** This study demonstrates that overall boat power profiles during 2- and 5-km rowing trials are similar to velocity profiles previously reported for individual ergometry and on-water racing events. However, this overall profile is achieved despite considerable variation in individual rower profiles. Further research is warranted to determine the mechanisms through which individual contributions to overall pacing strategy are regulated and the effectiveness or otherwise of seemingly disparate individual strategies on overall performance.

Keywords[AUQ1]:

The distribution of workload throughout an event is termed pacing, and the appropriate distribution of energetic resources is essential to successful performance.¹ During 2000-m rowing, a common parabolic race profile has been reported in both on-water² and ergometer^{3,4} events. Race profiles have been determined through calculation of mean boat speed every 500 m using split times. These data indicate that boat speed is fastest over the opening 500 m, decreases throughout the middle 1000 m, and increases again over the final 500 m.

Almost all previous studies have reported total boat speed when analyzing pacing strategies during rowing. One study investigated the coordination and consistency of rowers in a racing-8 and demonstrated that individual force-time profiles when the oar is in the water remain preserved throughout a 22-minute training run.⁵ However, that work used a submaximal exercise bout rather than a maximal-effort trial and did not report individual or overall boat power profiles, which relate to the distribution of muscle work rate over the duration of a competitive effort. No published study has reported individual rower or overall boat power profiles during on-water rowing. The aim of this case study was therefore to describe overall and individual rower power profiles of a coxless-4 boat during 2- and 5-km time trials.

Method

A crew of 4 male rowers (20.8 ± 1.5 y, 79.5 ± 11.1 kg) who were actively competing at British Rowing Intermediate standard and had at least 3 years experience at varsity level participated in this study, which had institutional ethics committee approval.

After familiarization trials, the crew performed maximal-effort on-water trials over 2 and 5 km in a Janousek 4 boat (Janousek Racing, Surrey, UK). The oarlocks were removed and replaced with PowerLine gates (Peach PowerLine systems, Peach Innovations Ltd, Cambridge, UK). The PowerLine system was interfaced to a PC equipped with PowerLine V3-3 software, which calculated power output (W) generated during each stroke. Power was calculated based on the integral of force on the handle multiplied by handle speed, both of which were reduced to their components in the x direction. Handle speed was taken as the difference between angle measurements recorded at 50 Hz. The validity and reliability of both force and angle measurements generated have been determined, and the system appears appropriate for measuring biomechanical variables in an elite sculling program.⁶ The system was calibrated before each trial using the PowerLine logger.

For both trials, mean overall boat and individual rower stroke power were calculated for each 25% epoch (25% of total strokes taken), and power for each individual epoch was calculated as a percentage of mean power maintained over the entire distance. The coefficient of variation (CV) was calculated to determine epoch-to-

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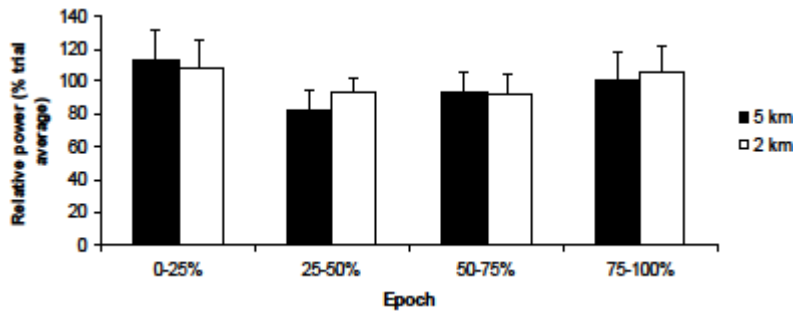


Figure 1 — Overall boat relative power output during the 2- and 5-km trials.

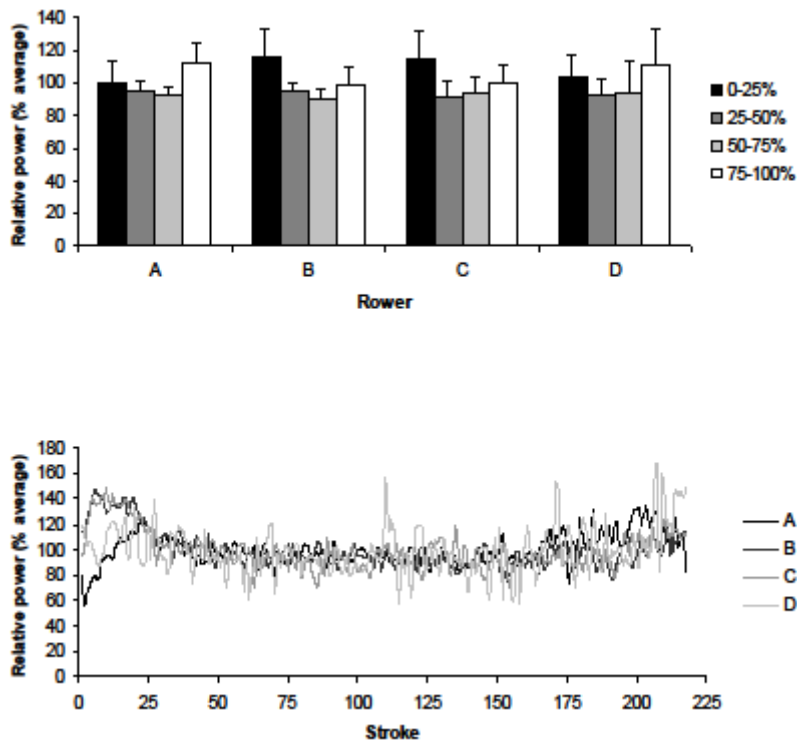


Figure 2 — Relative epoch-to-epoch and stroke-to-stroke power output for individual rowers during the 2-km trial.

Author Queries

[AUQ1] Please provide 3 or 4 key-words/phrases for indexing purposes that are not included in the title.

[AUQ2] Who published this, and where? And what is the page number or range for the abstract?