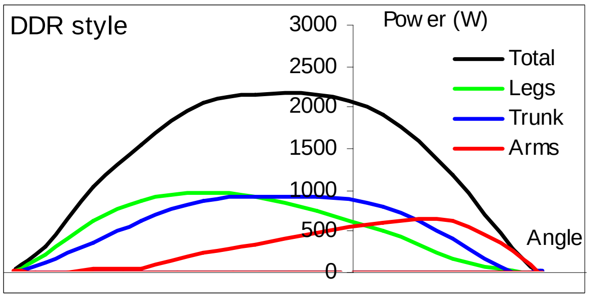
Q&A

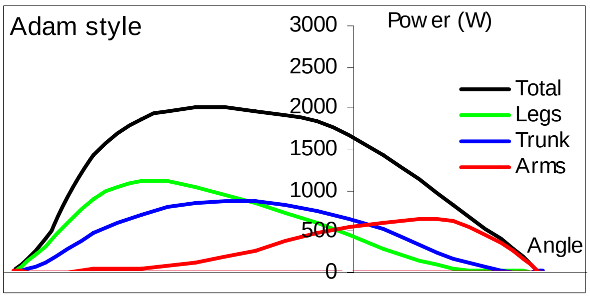
? Alex Field, 23, civil engineering student at Sydney University asks: "Regarding maximum and average handle forces you have listed in RBN 12/2001, what is "Average"? Is it an average force in a 2k race, a training session, or something different? Can you relate this force to a clean in weightlifting, i.e. how close is a 40kg clean to 392N of average force in the boat? Would doing 250 40kg cleans in 7 minutes be similar in any way to a rowing race?"

✉ The average force is calculated during the drive phase of the stroke cycle as an impulse divided by drive time. Impulse based on typical (average) pattern of the force curve over the sampling period (usually 500m). Yes, average force can be related to a weight training. If the start and end velocities of the weight are zero, then the average force applied to it will be equal to its gravity force ($F_{average}$= m g). Amount of work done will be similar the work per stroke, if the height of the clean is equal to the travel of the middle of the oar handle (on average 85±4% of the body height).

Ideas. What if…

✓ … we use simple modeling to try to find the effect of rowing styles on force/power curves. We have modeled total power (product of force and velocity) as a sum of segment powers. Its relative magnitude and timing characterize four rowing styles described in RBN 3/2006:



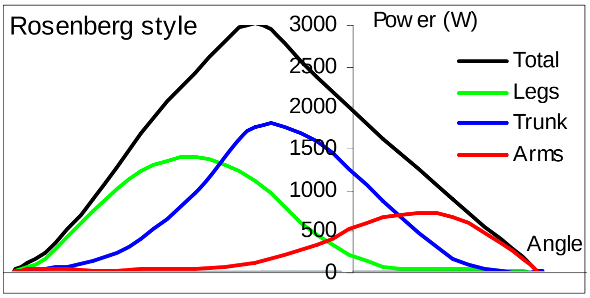


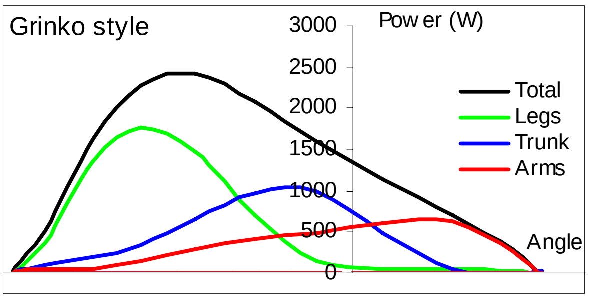
Simultaneous work of the legs and trunk (both German rowing styles) produce a more rectangular shape of the power curve, but the peak power is lower. More even pressure on the blade improves its propulsive efficiency. However, slower and more static movement of the legs and trunk does not allow the delivery of the optimal power.

A sequenced work of the legs and trunk (Rosenberg and Grinko rowing styles) produce a triangular shape of the power curves and higher peak power values. This leads to higher slippage of the blade through the water that causes energy losses. However, lower blade propulsive efficiency can be more than compensated by higher values of force and power produced per kg of body weight. Active usage of the trunk produce even more power, so the Rosenberg style can be considered as the most powerful rowing style.

Emphasis on the legs or trunk affects the position of the force and power peaks. Styles with leg emphasis (Adam and Grinko styles) allow a quicker increase of the force and earlier peak of the force curve. This improves the initial boat acceleration micro-phase D3 (RBN 1-2/2004) and makes the drive timing more effective.

Styles with trunk emphasis (Rosenberg and DDR styles) produce more power because of better utilisation of big muscles (gluteus and longissimus muscles). However, these muscles are slow by nature as they are intended to maintain body posture in humans. This fact does not allow quick increasing of the force and power when using trunk muscles. Shift of the peak of the power curve closer to the middle of the drive makes the temporal structure of the drive less effective.





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