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Comparing the efficiency of different kayaking paddle leaves.

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INTRODUCTION:
Flatwater kayaking performance was revolutionized following the introduction of the “wing” paddle in 1986, which was significantly more efficient than the traditional “drag” one. Since then, many sports equipment manufacturers have proposed several new designs based on the “wing” paddle leaf concept, in an attempt to further improve performances. Yet, to our knowledge, no quantitative comparison of the efficiency of such new designs was carried out so far. Here we set out to experimentally compare two popular new paddle shapes and determine whether the different designs do have an effect on performance.
METHODS:
We used two Kayak Power Meters and a GPS smartwatch to record 8 college-level athletes each performing four 200m runs with each one of the two tested leaf models, at a predefined, sub-maximal stroke rate while focusing on the correct stroke technique and on maximizing the exerted power. The collected data were analyzed both in terms of individual strokes and as overall means, focusing on stroke power trace morphology, peak stroke power, and time-averaged stroke power. The two latter parameters were individually normalized on each participant’s performance and then compared through statistical analysis.
RESULTS:
The morphological analysis of the power exerted during individual strokes showed that the main characteristics of right and left strokes are independent of the paddle blade as they are preserved across each subject’s runs. On the other hand, more subtle parameters of the stroke morphology as its initial slope and the time of peak power relative to the stroke duration are influenced by the shape of the leaf and were higher and occurred sooner, respectively, with one model compared to the other.
Also the value of the normalized mean peak stroke power and that of the normalized mean time average power of each stroke were found to be higher with one paddle design compared to the other.
Finally, the comparison of completion times taking into account the direction of the trial with respect to the weak current flow was also in favor of a statistically significant difference related to the paddle leaf used.
CONCLUSION:
Here we set out to perform a comparison of the biomechanical efficiency of two different paddle blade designs, and we devised an experimental study on a group of college-level athletes to answer such question. Although the differences in power delivery and boat speed were subtle, an accurate data analysis and statistical comparison highlighted a consistently better performance obtained with one model over the other, in spite of the several confounding factors involved. Future developments will attempt to further reduce such factors and their influence to simplify and promote quantitative analyses of performances.

Topic: Sport Technology

Presentation Poster

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