OBJECTIFYING THE ROWING TECHNIQUE BY USING CINEMATIC AND DYNAMIC INFORMATION

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Abstract

The present article wishes to present aspects related to means of tracking down, diagnosis and treatment of the technique mistakes that appear in the sport activity of the rowers.

The relation between the form and objective becomes doable, easy to objectify, with major importance in individual performance boost and by association, the crew's performance.

Thus, the rowing technique, as a limited factor, important in obtaining the expected performance in rowing, becomes an element that benefits of real possibilities to objectify, on its way to develop strategies with rapid influence, from the above data obtaining technology itself.

Introduction

The academic rowing, viewed as a sport that mostly depends on the energetic qualities of the athletes composing the crew, is equally a sport where technique efficiency can make a difference.

After exploiting the qualities of the development resources almost to the limit, during the specific conditions of the aquatic environment, with a light vessel, using a high amplitude swing, within the rowing space or..., the tie breaker elements are related to efficiency. This implies that certain movement technique that releases the least amount of energy. In the course of this paper, we will try to present the possibilities of objectifying the technique deficiencies, within the rowing movement, under response conditions that stimulate the actions and reactions to act in the natural environment, in maximum effort conditions, within competitions.

The author's intention is to present some results that were obtained by utilizing hybrid investigation techniques. They reunite relatively recent acquisitions from the measurement technology, transferred from the military industry to the civil one, which can subordinate to a field that is generically called inertial navigation, together with facilitating the simulation method developed within NISR starting from 1975 and whose follow up we consider being far from running dry.

Witnessing the technique issues and the highlighting methods underline the fact that continuous development of the investigation methods and techniques is needed.

Hypothesis: we consider that the modern technology can essentially contribute to objectifying the rowing technique and to highlighting the cinematic and dynamic aspects related to certain types of errors.

The object of the present paper revolves around highlighting the technical errors that arise in the beat-phase in rowing, in the sense given by Rowing Australia [ROWING AUSTRALIA 2000, pg 8]

Following a survey realized in Snagov, the existence of some individualized aspects on the arrival and installation of fatigue within the competition effort was detected.

If we accept that technique can't be modified structurally, its completion is related to the individual particularities and objectively accentuating some exceptions from the "ideal way".

According to the statement: "Mistakes generated by the incongruity between the mental representation and the visual and kinesthetic analyzer's sensations are the hardest to prevent or dispose off, because of the low level of the rower's proficiency in the first and second stage, respectively the perception of time and space" [DEMETER, 1972, pg. 142], we consider that the difficulties related to their disposal also derive from the small pool of objectifying measures.

Morjenikov's assessment: "at elite athletes, 25% of the performance rests upon execution technique and approximately 75% depends on the level of functional physical skills" [Morjenikov, 1982, pg. 61], can be viewed today with relative suspicion. Our arguments, after almost 3 decades, are related to the fact that

aspects, respectively technique and functional skills, are essential during world competitions. Any breakage from these aspects carries out to important loss in the competitive scheme of the athletes and/or the crew.

In the time period with Morjenikov, Florescu was stating that: "Possibilities in investigating of the technical performance in the academic rowing are means that allow:

- The analysis of the visual aspects of the rowing stereotype;
- The deployment analysis during rowing and their effects" [FLORESCU, 1983, pg. 252]. From our point of view, the last three decades brought major modifications in investigation of the technical execution field in academic rowing.

We can mention two major directions: the migration, "accentuated in the past few years, from the cinematic studies of the movement towards the dynamic analysis methods (considering forces and moments of forces") and even simulating on mathematical movement dynamic models, which shows an evolution from the mostly observing stage to the operative one, generator of practice intervention" [Hillerin, 2002, pg. 307], and including the "real time" concept in the efficiency of the technical review [TRAIAN, 2005, pg 34, and HILLERIN, 2005, pg 22].

In 1977, the statement "a good technical rower is capable of quickly recording the exterior stimulus with the help of the receptors, and transforms it in actual motric actions" [HERBERGER, 1977, pag.87], but more important today is the ability of the team assisting and counseling the high performance rowers, to bring in the latest technology and fine knowledge of the rules that govern specific movement efficiency, closer to the act of correction.

Investigation methodology

For the data acquisition we have used the systems that record the forces and positions within conditions simulated by the environment [ONLINESOLUTIONS MEDIA, 2008] and the equipment for recording the cinematic movement with the help of the MOVEN inertial navigation technology [XSENS MOTION TECHNOLOGIES, 2008].

Rowing trials were realized in environment simulated conditions, with both types of equipments working simultaneously. The movements have been executed so that frequent technique errors made in practice were highlighted. We have stopped on three types of such technical errors: "stolen attack", "arms coupling" and "backward bottom".

From every series of recordings we have chosen a complete cycle for the cinematic recorded with MOVEN equipment and the conditions simulator. We have chosen the graphical description of the in-time evolution of the positions alongside the axis the traction was being executed and describing the evolution possibilities of the forces depending on time. For these types of graphics we have attached the presented figures on "freeze", by MOVEN STUDIO 2. program for each particular error as well as the reciprocal relation presentation of the evolution of the shoulders, fist and pelvis position in each of the three error cases.

Even if we use the Moven suit we can calculate:

- Position, space orientation directions for each of the 23 body segments delivered by the program,
- Speeds and linear accelerations on each of the space gauge directions attached to the recording while calibrating the system on each joint,
- Speeds and angular accelerations for the segments, in the economy of this presentations,

we stop only at the Ox movements, considering that finding obvious discrepancies between space relations for different cases of abnormality from the "ideal" technique a revealing aspect only for this type of analysis.

Results and discussions

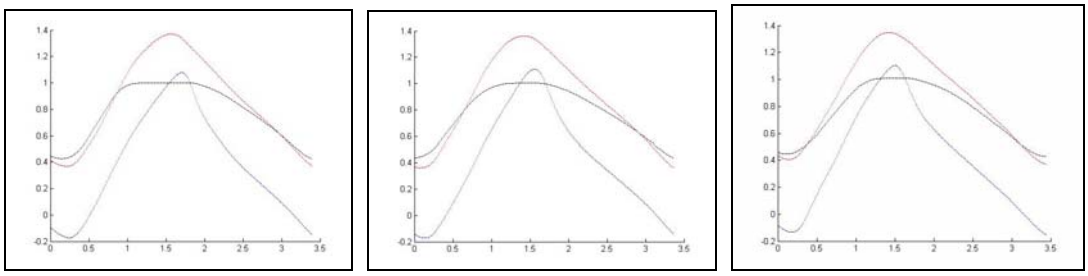
In image no.1 we present the three types of errors correspondent to the positions.

a) b) c)

Image no. 1

The positions correspondent to the three types of errors delivered by the MOVEN STUDIO program 2.1, a) "stolen attack", b) "arms coupling", c)"backward bottom".

Image no.2 presents, in the same succession, evolution graphics of the positions on the Ox axis of the pelvis, right shoulder and right fits during a complete cycle. The curves placed at the inferior levels represent the evolution of the fist position alongside Ox axis the middle ones represent the evolution of the pelvis and the upper ones the evolution of the shoulder.



a) b) c)

Image no. 2

The evolution of the pelvis, right shoulder and right fist on the Ox axis positions, during a complete cycle. a) "Stolen attack", b) "arms coupling", c) "backward bottom".

In image no. 3, we have presented the relations between simultaneous positions on the Ox axis, for the pelvis, fist and shoulder joints, simultaneous for each type of error.

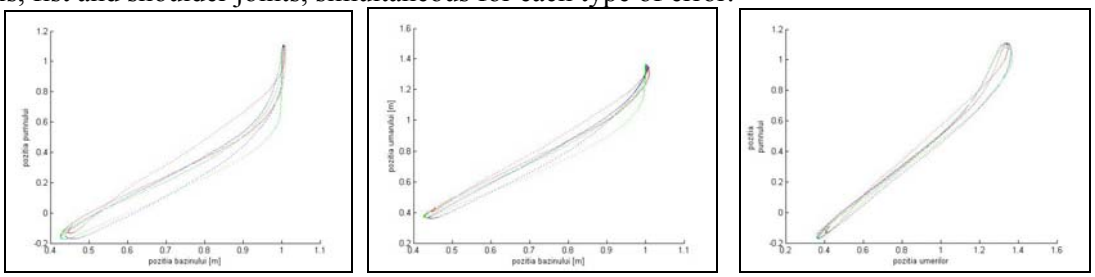


Image no. 3

The relation between simultaneous positions, on the Ox axis for the pelvis, fist and shoulder joints.

Finally, in image no. 4 we present the forces evolution based on the time throughout the three technique mistakes that we've discussed in this article.

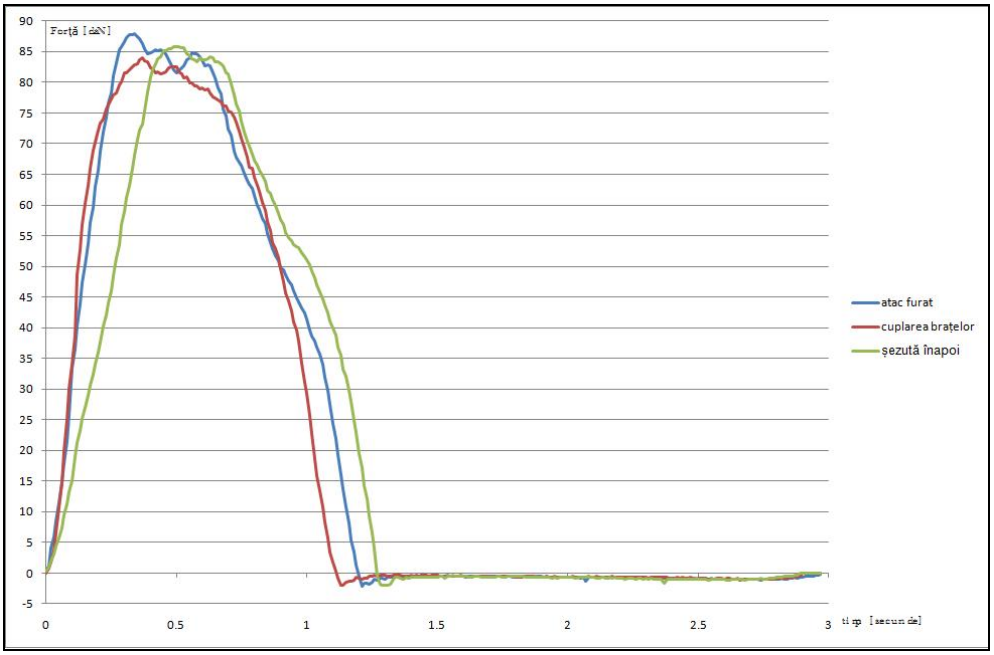


Image no. 4

The forces evolution based on the time throughout the three technique mistakes

We notice that in all the presented figures there are obvious differences between the three mistakes analyzed, with major impact on the evolution in time of these forces as we can see in the image above, highlighting the fact that the "backward bottom start" has a slower attack and a longer duration of "passing through" water, an important factor of competitive performance decline.

In the above presentation manner, a firm opposition can be made about the following affirmation that states: "the rower's motric act can't be described except in general terms, the priority being the objective not the form of movements" [FLORESCU, 1983, pg., 110].

Conclusion

1. The relation between the form and objective becomes doable, easy to objectify, with major importance in individual performance boost and by association, the crew's performance.

2. Thus, the rowing technique, as a limited factor, important in obtaining the expected performance in rowing, becomes an element that benefits of real possibilities to objectify, on its way to develop strategies with rapid influence, from the above data obtaining technology itself.

OBIECTIVIZAREA TEHNICII DE VĂSLIT PRIN UTILIZAREA INFORMAŢIILOR DE CINEMATICĂ ŞI DINAMICĂ

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Cuvinte cheie: canotaj, tehnică, obiectivizare, simulare, navigație inerțială.

Rezumat

Prin prezenta lucrare se doreşte a prezenta aspecte legate de mijloace de depistare, diagnosticare şi tratare a greşelilor de tehnică ce survin în activitatea sportivă a canotorilor.

Legătura între formă și scop devine realizabilă, relativ ușor de obiectivizat, cu o importanță majoră în creșterea performanțelor individuale, iar prin asociere, a performanțelor de echipaj.

Astfel tehnica vâslitului, ca un factor limitativ important în obținerea performanței scontate în canotaj, devine un element ce beneficiază de posibilități reale de obiectivizare, iar pe cale de conscință de strategii de influențare rapidă dezvoltate din chiar tehnologia de obținere a datelor prezentate mai jos.

Introducere

Canotajul academic, considerat ca un sport preponderent dependent de calitățile energetice ale sportivilor componenți ai echipajelor, este, în egală măsură, un sport în care eficiența tehnică poate să facă diferența.

După exploatarea aproape de limită a resurselor de dezvoltare a calităților ce asigură suportul energetic al deplasării, în condițiile atât de specifice ale mediului acvatic, cu o ambarcațiune ușoară, într-o mișcare de mare amplitudine, în interiorul locului de vâslit sau ramat, elementele care departajează performerii sunt legate de eficiență. Aceasta implică acel tip de tehnică de mișcare ce face o cât mai mică risipă de energie. În prezenta lucrare, vom încerca să prezentăm posibilitățile de obiectivizare a deficiențelor tehnice, în mişcarea de canotaj, în condiții de răspuns ce simulează comportarea acțiunilor și reacțiunilor din mediul natural, în situații de efort maximal de competiție.

Intenția autorilor este de a prezenta câteva rezultate obținute prin utilizarea unor tehnologii de investigare hibride. Acestea reunesc achiziții relativ recente ale tehnologiei de măsurare, transferate din industria militară către cea civilă, care se pot subsuma unui domeniu numit generic navigație inerțială