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Identifying Determinant Movement Sequences in Monofin Swimming Technique

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INTRODUCTION: The aim of this study is to identify errors in leg and monofin movement structure, lowering the effectiveness of swimming. With this information on errors, the crucial sequences in monofin swimming were identified. METHODS: Six high level monofin swimmers conducted a progressive trial (900m at increasing speeds). One cycle of each swimmer was filmed and analyzed (SIMI). Results were obtained in the form of time dependent series for: angle of foot bending in relation to the shank and proximal part of the fin in relation to the foot and for angle of attack: the distal part and entire fin surface. The choice of parameters was based on a devised monofin swimming model (Rejman, 2009). The errors were quantified by calculating the difference of the fields estimated by registered and model series. The range of errors were illustrated by the movement sequence registered, which were compared with sequences that accomplished the model or were slightly different. RESULTS: Based on information related to the scale and structure of errors committed by swimmers the following suggestions were formulated: the errors in angular displacement studied mostly exceeded the pattern of model, with the exception of the dorsal flexion of feet in the upbeat, performed by the slowest swimmer; the most difficult element of monofin swimming is the proper range of motion in the ankle joints; the parameter most differentiating the swimmers, is the angle of bend of the feet: the errors estimated were high correlated to swimming velocity. The information related to errors creates a basis for isolating crucial sequences of leg movements and monofin, which allows the description of key elements in the swimming technique. DISCUSSION: Controlling foot movement allows use of the torque of transfer to initiate propulsion through the bending of the tail and changing of the structure of waterflow over the of the fin. Correct crucial sequences allow for use of the monofin to achieve maximum swimming speed. That is why the identification and of key elements in the movement structure, and the quantification of their quality, is justified within the aim of anticipating and eliminating errors. REFERENCES: Rejman M. (2009). Modeling of monofin swimming technique: optimization of feet displacement and fin strain. J. App. Biomech, 25:340-350

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Patterns of Behavior in the Crawl Technique of the Elite Portuguese Swimmers

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INTRODUCTION: The purpose of this study was to find the applicability of the monitoring system based on the crawl technique. Louro et al. (2009) found that the existence of motor patterns contributes for the implementation of this technique, from an appropriate observed methodology. When used in swimmers training, analysis can reduce the variability of behavioral tuning swimming technique (CampaniÃ§o, et al. 2006). The behavior was studied through the analysis of temporal patterns (T-pattern) of five elite swimmers and a sequence of five cycles (swimming at submaximal (75%) and maximum speed). METHODS: Five elite Portuguese swimmers (Mean Â± SD; age 20,87 Â±1,55; FINA Points at 100m crawl: 815,62 Â±65,09), performed the distance of 25 meters, at submaximal (75%) and maximum speed. A digital video camera Sony Mini DV (25 Hz) was placed about 30 centimeters deep, near the edge of the pool. The instrument of observation was prepared Ad-Hoc qualitative analysis, enables the study of stability of technical implementation. This study was ensured through the index of intra-observed reliability (95%) and inter-observed accuracy (96%). The Theme 5.0 software was used to detect patterns of 5 cycles in each swimmer. This allowed the identification of stable structures in technical performance, within a critical interval of time ($P<0.05$) - T - patterns. RESULTS: The mean index values of stability in the sub-maximum speed were 0.45 Â± 0.16, and the relative to the values of stability at maximum speed was 0.43 Â± 0.12. DISCUSSION: The swimmers with best times have an improved stability of swimming in the two executions, although this is higher in sub-maximum speed, we deduce that itÂ´s because the sub-maximal speeds are closer to the training speed. REFERENCES: CampaniÃ§o, J., Santos, J. & Silva, A. (2006). Breaststroke Swimming Patterns From VÃdeo Sequences Analyzes, produced by specific field formats. Book Of Abstracts Biomechanics and Medicine in Swimming. Revista Portuguesa de CiÃªncias do Desporto, vol. 6. supl.1,76. Louro H., ConceiÃ§Ã£o,A., Matos T., Nilton J., Franco R., Camerino O., CampaniÃ§o J. (2009) Characterization of Temporal Patterns of Behavior of the Crawl Technique Journal of Sport Science & Medicine (8) Suppl. 11 2009, 95.

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Evaluation of the Gliding Capacity of a Swimmer

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INTRODUCTION: The capacity to move its own body through the water with the lowest resistance should be included among the most important qualities of a swimmer. In his advance through a liquid, evacuates water and occupies its place, causing the hydrodynamic resistance that acts in the same swimming direction but in the opposite sense. Diminishing resistance is probably the fastest way to improve performance and the most efficient to reduce energetic cost. It is for this reason that a double goal is pursued: To give advise to coaches to re-orient their training sessions towards reduction of resistance forces by suggesting exercises for its improvement and to develop and apply a new test for the evaluation of gliding. METHODS: The proposed gliding test is an adaptation of the one developed by Klauck et al. (1976) and evaluates the maximum speed reached by the swimmer after push-off from the wall and the passive hydrodynamic resistance when gliding through the water. Video image and values from velocity meter are simultaneously recorded. This device, attached to the swimmer's hip, displays the instantaneous speed during the exercise. The gliding resistance coefficient Gc includes frontal area (A) and friction and shape coefficient (Cd) in a single parameter. The formula to be used for its calculation is $Gc = 20 / dT * (1 / VFinal – 1 / VInitial)$, where dT=selected gliding time, Vinitial=max. speed at push-off and Vfinal=instant velocity after dT. RESULTS: ObsF (154,64) is higher than CritF (4,05), meaning that both coefficients, Klauck's Resistance Factor Rf and Gc evaluate lost of speed and are linearly related by equation $Rf = 0,0403 * Gc + 0,089$ with $n=48$, $R2=0,771$, $SEE=0,0213$ and $CritT=2,3172$. Best gliders obtained the lowest values of Gc, because of either a higher initial velocity or a small lost of speed. Lower initial velocities and/or higher decelerations lead to higher values of Gc of worst gliders. DISCUSSION: This methodology eases the complex process of technique learning by letting the swimmer to establish a direct relation between "what he feels" (sensations from recent execution) with "what he does" (visual feedback from video images) and "the result of what he does" (speed curve and Gc as a gliding performance). REFERENCES: 1. Klauck J and Daniel K (1976). Determination of man's drag coefficients and effective propelling forces in swimming by means of chronocyclography.In: P V Komi (ed.) Biomechanics V B. Human Kinetics Pubishers. pp 250-257