P-037

Modelling Arm Coordination in Front Crawl

Seifert, L; Chollet, D
Faculty of Sport Sciences, University of Rouen, FRANCE

Regularly, arm coordination of front crawl swimmers switched from catch-up to superposition mode when speed was found to increase. The aim of this study was to model the relationships between the index of coordination (IdC) and speed (V). Twenty male swimmers of various skill level and specialty (sprint vs. distance) realised an incremental speed test of 8 × 25-m steps. After checking the change of arm coordination with speed, 5 models of regression were tested: power, logarithmic, exponential, linear and quadratic. The model was done by averaging the individual coefficient; then percent of error with the model was determined for each swimmer. The quadratic modelling (IdC =aV^2+bV+c) showed the highest coefficient of determination (0.81<R^2<0.99) and the lower inter-individual mean error with the model (21%). Arm coordination modelling enabled to relate motor control with the performance (V), the stroking parameters (stroke rate and stroke length) and the stroke efficiency (stroke index)

P-038

Creating the Best Physical Resources for Performing the Underwater Undulatory Swimming, a Case Study

Setterberg, J
Norwegian Swimming Federation / Olympiatoppen Norway, NORWAY

INTRODUCTION: Underwater undulatory swimming (UUS) has progressed in speed over an Olympic cycle faster than surface swimming times (1). In 2008 we (NSF and OLT) started a project in order to catch up with this development. We planned to create the best physical resources in our swimmers for performing the UUS. Kinematic analysis of world class swimmers (WCS) showed they are able to maintain a high frequency and a small difference between the down and upsweep. METHODS: We conducted a case study on a norwegian top-level female swimmer (IS). We compared the video analysis of a WCS and IS using the same kinematic measurements as Loebbecke et. al 2009 (2) Based on these data we designed and implemented in training on land and water a set of exercises for improving stability, strength and flexibility especially for core and ankle. This training was performed 3 days a week. The progress of USS speed was tested: a. 15m start speed during competition, b. kicktest during training of 15m max speed test from a push-off . RESULTS: 15 m time during competition showed the most significant improvement, pre 2,01 m/s and posttraining 2,35 m/s. The push-off test has increased with 0,05 m/s. The kinematic measurements showed improvement in the ability to kick with higher frequency over time, 2,14 kicks/s pre and 2,38 kicks/s post. The frequency is 2,78 kicks/s for WCS. The difference between the down and upsweep is reduced from -0,07s to -0,05s. Plantar flexion on land improved, but during kicking is still less than observed in WCS, 86 and 72 degrees. DISCUSSION: The observed differences between the fastest male UUS and IS in kickspeed, upsweep kick and dynamic ankle flexibility were the reasons why we intensified the effort to improve the physical basis for the swimperformance. The results improved on those elements we considered important for UUS likewise did the swimperformance. Obviously there could be other explanations for this improvement like the new swimsuits. Nevertheless it seems the specific exercises for strength and flexibility designed on the basis of the observed difference in crucial techniqual elements contributed to improve these elements. Perhaps the greatest advantage seems to be the swimmers ability to use a big plantar flexion of the ankle. REFERENCES: 1. Haljand R. www.swim .ee. 2. von Loebbecke A, Mittal R, Fish F, Russell M. (2009) A comparison of the kinematics of the dolphin kick in humans and cetaceans. Human Movement Science, 28, 99–112.

P-039

Observation of Standard Breaststroke Technique Stability

Silva, A[1]; Freitas, J[2]; R, J.[2]; Conceição, A.[2]; Campaniço, J.[1]; Matos, T.[2]; Leitão, L.[1]; Louro, H.[2]
[1]Utad, PORTUGAL; [2]Esdrm, PORTUGAL

INTRODUCTION: The aim of this study was to create an instrument to collect data for analysis of the technical stability in swimming. This instrument will serve as a base for the observed behavior during the cyclic execution in the breaststroke technique. In this context, using qualitative analysis through the observational methodology, the study focused on the characterization of the motor patterns of behavior in the breaststroke technique on elite athletes. METHODS: The instrument consisted of a system of field formats, based on references of observational methodology and biomechanical models of swimming, giving special emphasis to six taxonomic criteria that aggregate in the form of alpha-numeric codes the crucial information to describe behaviors that define the breaststroke technique. The quality of the instrument was analyzed using the kappa Cohen the software-GSEQ_SDIS (Bakeman & Quera, 1996), based on the records of seven trained observers, and, for accuracy effects, another expert. RESULTS: The kappa Cohen results ranged between 0.94 and 0.98, guaranteeing the accuracy and objectivity when describing technical approaches with this instrument. The behavioral stability changes accordingly to the swimmer and also between the stages and observed moments, however each swimmer fits the technical model. DISCUSSION: We can consider that, given the high values of agreement between the expert and the seven observers, the instrument is appropriate to observe the conduct of technical Breaststroke swimmers in context situations. REFERENCES: Louro, H., Silva, A., Anguera, T., Camerino, O., Oliveira, C., Conceição, A., Campaniço, J. Stability of Patterns of Behavior In the Butterfly Swimmers Journal of Sport Science & Medicine (8) Suppl. 11 2009, 195

P-040

Effects of a Blueseventy™ Bodysuit on Spatial-Temporal and Coordinative Parameters During an All-Out 50-M Front Crawl Stroke

Silveira, RP; Kanefuku, JY; Moré, FC; Castro, FAS
UFRGS, BRAZIL

INTRODUCTION: Considering that there is not enough research on the effects of using bodysuits on swimming performance, the purpose of this study was to verify the effects of using a shoulder to ankle bodysuit (Blueseventy™) on spatial-temporal and coordinative parameters during an all-out 50m front crawl. METHODS: Six subjects (16.6 ± 2.0 yrs) performed two all-out 50m trials (with and without bodysuit), starting in the pool. Two sub-aquatic video cameras (30 Hz) were used to acquire images from both laterals sides of the pool. The cameras were carried manually using a chariot and trails. The arm stroke phases (entry-catch, pull, push and recovery) and index of coordination were determined frame-by-frame by two experienced researchers. To measure the kinematic variables, a video camera (25 Hz) positioned in the middle of the pool was used. A repeated measures ANOVA was performed (mixed model 2 x 2 – two suits and two 25 m splits), with main effects verified using LSD post-hoc for an $\alpha < 5$ %. Using the software SPSS v. 15.0. RESULTS: Using the bodysuit swimming speed was higher ($p = 0.004$) and stroke length was also higher ($p = 0.023$). In the first split there was no difference in the duration of the stroke phases. However, on the second 25 m split, the duration of the entry and catch phase ($p = 0.041$) and non-propulsive phase ($p = 0.033$) were shorter. No statistical differences in index of coordination were found. DISCUSSION: Using the bodysuit enabled the subjects to swim in average 4.7 ± 2.2