temporal patterns of each swimmer, using the Theme 5.0 software, which allows to identify the structures of the technical standard within a range of critical time (p <0.05) - T-patterns
RESULTS In the results the patterns found settings are different and different levels of complexity depending on the adjustments made by the swimmers in gestual cycles. Variations of codes in each time producing different settings, to determine the differences between cycles of the swimmer.
DISCUSSION & CONCLUSION Comparing patterns found distinct differences between swimmers, the records demonstrated a clear behavioral similarity when compared the result with the biomechanical model of the general butterfly technique. Technique is objective for the purpose it was created and is a valuable instrument for qualitative analysis.
KEY WORDS Technical Analysis, Stability, T-Patterns, Butterfly, Temporal

Training control in young female swimmers: a case study

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OBJECTIVE The need to improve competition times encourages coaches to use different methods to control the training process. However, not always, the available processes are easy to be applied in a large group of female competitive swimmers. Furthermore, the use of some tests in young swimmers is questionable. Hence, the aim of this study was to apply a simple protocol to assess the process of training in a group of female swimmers.
METHODS Eleven female swimmers participated in this study (11.45 (0.52) years old, 1.50 (0.08) m, and 39.81 (7.84) kg). All the swimmers belonged to the same swimming club. After 3 weeks of general training tasks, the swimmers were engaged in a 9 week training period in order to prepare the participation in the Regional Championship. During this period the swimmers performed 6 units of training per week (week 1: 19.0 km, week 2: 22.0 km, week 3: 22.0 km, week 4: 24.0 km, week 5: 26.0 km, week 6: 23.0 km, week 7: 25.0 km, week 8: 26.0 km, week 9: 21.6 km). Every Thursdays, after a 30 min warm up each swimmer performed two trials of a 50 m front crawl all out test, with a 15 min rest. Only the best performance was used to control the training process. A repeated-measures analysis of variance with Bonferroni adjustment was used to analyze the differences between the mean values of each week performance. The significance level was set at $p<0.05$.
RESULTS 50 m performance did not change during the first three weeks of training ($p>0.05$). In the week four the performance significantly decreased (week 1: 39.09 (4.51) s, week 4: 39.86 (5.12) s; $p<0.05$). The present study also showed no significant differences in performance between week 1 and weeks: 5, 6, 7 and 8. Nevertheless, at the last week of preparation there was a performance enhancement (week 9: 38.72 (4.38) s, $p<0.05$).
DISCUSSION & CONCLUSION With a simples and easy test it was possible to monitor swimming training. We believe that these data could be used by coaches to control training in young competitive swimmers and simultaneously promote some adjustments during the preparation. Here, we were able to notice a performance improvement in the 50 m front crawl trial during the last week of training, before the competition, which corresponded to a decrease in the overall training volume. It seems that in short distances events the reduction of training volume could enhance young competitive swimmers performance.
KEYWORDS Performance, training volume, monitoring, short distance events.

Training evaluation in male age-group swimmers

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OBJECTIVE Monitoring the training process represents an important task during sports preparation. However, not always the applied protocols help to address the coaches´ concerns, namely regarding its complexity and difficulty to be used in large samples. Therefore, the aim of this study was to apply a simple protocol to control the training process in a group of male age-group swimmers.
METHODS Thirteen age-group male swimmers were involved in this study (12.46 (0.52) years old, 1.53 (0.10) m, and

42.81 (5.93) kg). All the swimmers belonged to the same swimming club. After 3 weeks of general training tasks, the swimmers were engaged in a 9 week training period in order to prepare the participation in the Regional Championship. This period comprised the months of October, November and December and corresponded to the first training macro cycle. During this period the swimmers performed 54 units of training (6 units per week) (week 1: 3.17 km/unit, week 2: 3.67 km/unit, week 3: 3.67 km/unit, week 4: 4.0 km/unit, week 5: 4.33 km/unit, week 6: 3.83 km/unit, week 7: 4.17 km/unit, week 8: 4.33 km/unit, week 9: 3.6 km/unit). Every week, each swimmer performed two trials of a 50 m front crawl all out test, with 15 min of rest between them. Only the best performance was used to monitor the training process. A repeated-measures analysis of variance with Bonferroni adjustment was used to analyze the differences between the mean values of each week performance. The significance level was set at $p<0.05$.
RESULTS 50 m performance did not change during the first eight weeks of training ($p>0.05$) (week 1: 33.58 (2.44) s). Nevertheless, at the last week of preparation there was a significant performance enhancement (week 9: 33.12 (1.89) s, $p<0.05$).
DISCUSSION & CONCLUSION In the last week of training it was possible to verify a performance increasing in the 50 m front crawl test. This week corresponded to a decrease in training volume attempting to achieve a better competitive performance. The 50 m test trials seemed to be a very simple test that can be used by swimmers´ coaches to control and monitor the training process in swimming, especially in age-group swimmers.

The energetics of surface events in finswimming, analysis by the concept of critical velocity method

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OBJECTIVE This study aimed to investigate the energetics of surface events (SF) by the analysis of the concepts of critical velocity (CV) and anaerobic swimming capacity (ASC), in finswimming.
METHODS The subjects were 9 finswimmers (5 males and 4 females, 24±5 years) who were members of the Japanese national team. Subjects performed five different swimming distances (100m, 200m, 400m, 800m and 1500m SF) at maximal effort in a 50m long course swimming pool. On the basis of the previous study (Oshita et al. Int J Sports Med, 2009), CV was calculated using 400m and 800m swim times. Velocity (V) multiplied by swimming time (T) implies that swimming distance (D); D=V*T. The equation of regression line can be expressed as follows: D= a*T+b, thus V= a+ b/T. Theoretically, if we could set the swimming velocity at a level where one can perform indefinitely, b/T will approach zero and V will approach a. Therefore, CV can be expressed as the slope of the regression line; CV=a. Further, ASC was employed as the linear coefficient (y-intercept) of each individual regression.
RESULTS The findings of this study were: (1) V of all distance SF (100m to1500m) showed significant positive correlation with the CV (r=0.73 to 0.94); (2) V-100m, V-200m and V-400m revealed significant positive correlation with the ASC (r= 0.69 to 0.81); (3) V-800m and V-1500m did not show significant correlation with the ASC (r= 0.59 to 0.64); and (4) ASC was significantly correlated with the residual error, calculated from the regression analysis for the relationship between CV and the V-800 (r= 0.94) and V-1500 (r= 0.95).
DISCUSSION & CONCLUSION These results suggest that: (1) the anaerobic performance (expressed as ASC) contributes to SF performance below 400m; (2) the aerobic performance (expressed as CV) contributes to SF performance from 100m to 1500m; and (3) the performance of 800m or 1500m SF could be considerably explained by the aerobic performance; however, unexplained residual error could be explained by the anaerobic performance.
KEY WORDS Finswimming, surface event, critical velocity, anaerobic swimming capacity

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Study of the drag coefficient during the first and second gliding positions of the breaststroke underwater stroke using computational fluid dynamics

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