seconds. It appears that DS may elicit performance enhancing benefits in association football through improved sprint performance. However, the use of SS within a warm-up routine may have a negative impact upon the sprint performance, and thus association football performance. It is hypothesised that the performance improvements obtained following the DS intervention trials are as a result of post-activation potentiation elicitation or an increase in core and/or peripheral temperature. Whereas performance decrements incurred from the SS intervention maybe associated with increased musculotendinous unit compliance or decreases in core and/or peripheral temperature. Yet, such mechanism warrant further investigation.

**ANALYSIS OF UNUSUAL ALTERNATIVE PATTERNS OF BREASTSTROKES TECHNIQUE**

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Introduction.

Breaststroke is a continuously evolving technique. Several studies have been carried out about its biomechanics and its complex coordinate structure, in particular analyzing continuity and frequency of propulsive actions ([1, 2]).

The aim of this study was to analyze the efficiency of some unusual alternative patterns of breaststroke's technique generally set by trainers during the training sessions, useful in elderly swimmers, people with disabilities, rehabilitation, leisure swimming.

Material and methods.

Nine swimmers (mean±SD, age 15.1±2 years, height 172.4±3.5 cm, body mass 61.5±3.4 kg) participated in the study. Firstly subjects experienced two alternative patterns of breaststroke's coordination: DA stroke, with a double arm stroke per stroke cycle (without breathing between the two arm strokes); DK stroke, with a double kick per stroke cycle. Then swimmers performed 25, 100 and 400 meters flat breaststroke (FB) and in the alternatives DA and DK patterns. Performances were collected and an index of efficiency (IE = velocity swim cycle length) was calculated from video recordings. We compared: the performances, the IE means for each swim distance and the IE in the three distances for each swim pattern.

Results.

No differences were found between FB and DA performances, whereas swimmers achieved better results in FB compared to DK pattern in all distances: 426.7±28.3 to 442.9±32.5 s in the 400m (p=.011); 94.4±8.9 to 100.9±8.7 s in the 100m (p=.00); 20.4±1.8 to 23.2±1.9 in the 25m (p=.011).

Flat breaststroke showed also a higher IE in every distance both in FB-DA comparisons (25m p=.005; 100m p=.00; 400m p=.00) and in FB-DK comparisons (25m p=.00; 100m p=.008; 400m p=.00).

With regard to the IE within each distance of swim, significant differences were found between: i) 400m and 25m both in FB (1.67±0.3 vs. 2.09±0.3, p=0.025) and in the DK pattern (3.04±0.6 vs. 4.09±1.0, p=.014); ii) 400m and 100m in the DA pattern (3.61±0.6 vs. 3.92±0.5, p=.011).

Conclusion.

DA pattern is nearly as efficient as FB, whereas worse results were found in the DK pattern, perhaps due to a longer non propulsive phase per stroke (the two gliding after the two kicks).

Therefore it seems that the DA pattern is more suitable when an alternative breaststroke is required, such as in elderly swimmers or people with leg disabilities.

However, it should be noticed that as distance increases the lack of rhythm occurs more frequently and the maintenance of the DA pattern becomes more difficult.

References.


**STRUCTURE AND EVOLUTION TRENDS OF THE EXTERNAL LOAD IN UNEVEN BARS. ANALYSIS OF THE FLIGHT ELEMENTS IN COMPETITION ROUTINES**

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Introduction

Specific literature in Artistic Gymnastics is rich in considerations about evolution trends of flight elements in uneven bars routines. Based on the analyses of total participants in world championships and Olympic Games we can observe that gymnasts performed more flight elements in last Olympic cycle compared with preceding cycles. In this way, the purpose of the present study was to analyse the trends in number, difficulty and direct combinations of flight elements in uneven bars routines in elite gymnasts.

Methods

Through the observational methodology, we constructed and validated an observation category comprising seven variables considered as indicators of the external load concerning flight elements in uneven bars. We observed 83 uneven bars routines from world championships and Olympic Games finals between 1989 and 2004. 12 competitions were framed in 4 Olympic cycles with 2 world championships and 1 Olympic Games each one. It was observed the total number of flight elements, direct combination of 2 and 3 flight elements, difficulty, number of preparation elements and body position in this kind of elements.

Data was analysed with descriptive statistics (mean and standard deviation). Kruskal Wallis test was used to compare general significant differences in all cycles and Mann-Whitney tests with Bonferroni correction to analyse differences between each cycle. The level of significance was established in 5% or 1.25% depending of the tests used.

Results

As main results we observed significant decrease in number of preparation elements from 0.15 in first cycle to 0.00 in last one. Concerning all other variables observed, we find no statistical significant differences. Elite gymnasts always perform between 1 and 2 flight elements, is rare the combination of 2 and null the direct execution of 3 of this kind of elements. Difficulty of flight elements ranged from 0.68 and 0.76 between all cycles meaning the constant execution of 1 or 2 elements of D value. Results showed also a regular execution of flight elements in closed body position with values from 1.19 to 1.55 beside the execution in straight body position ranged from 0.20 to 0.37.
Conclusion
Through the observation of obtained results of elite gymnasts we may conclude that the number, direct combinations, difficulty and body position in flight elements execution contradicted the trends for a evolution on this indicators of external load in uneven bars routines.

EFFECT OF THE TEMPO OF ATTACK IN ATTACK PERFORMANCE IN COMPLEX II OF THE 2004 OLYMPIC GAMES

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In a volleyball game, the action of every attacker is performed in cooperation with the setter and depending on the ball’s flight time, the attack can be performed in 3 tempos. It is generally believed that the shorter the ball’s flight time is the faster and the more efficient its performance will be. Previous studies have assessed the performance of attack actions in Complex i or ii (Barzouka et al., 2005), however performance of the attackers as a function of the tempo of the attack has not yet been examined. The purpose of this study was to investigate performance of Olympic-level male athletes in attack in Complex II as a function of the attack’s tempo.

Volleyball games of male teams competing in the preliminary phase of the 2004 OG were videotaped. Assessment of players’ performance in attack in relation to 3 different tempos (1st-2nd-3rd) in Complex II (N = 2122) was based on the 5-point numerical rating scale (scores 0-4 with 0 indicating an error and 4 an excellent performance) as proposed by Eom & Schutz (1992). Average performance was defined as the performance calculated from mean values of the range of performance scores 0 to 4. Intra-rater reliability coefficients for the assessment of performance and the attack tempo were found to be r = 0.93 and r = 0.98, respectively. The calculation of percentages and frequencies among the 3 attack tempos in each performance rating score was made with the crosstabulation method with levels of 3x3. Possible differences in average attack performance among different attack tempos was examined with univariate anova (p < 0.05).

From the total number of assessed attack actions in Complex II, results showed that 797 (37.6%) actions were assessed with excellent performance, 384 (18.1%) actions as good, and 184 (8.1%) actions as errors, respectively. The remaining of the attack actions were assessed with performance scores from 1 to 3. The average attack performance of 3rd tempo attack actions (2.3±1.5) was significantly (p<0.001) lower than the average performances of 1st (2.5±1.5) and 2nd (2.6±1.6) attack actions, respectively.

The results of this study indicate that in olympic-level male volleyball games for every 3 attack actions in the counter-attack process only one is efficient, whereas in every 6 attack actions an action resulting in a point won by the opponent takes place. Furthermore, it was found that the average attack performance during the counter-attack process is more efficient when attack actions are being performed with a fast (1st) or medium (2nd) tempo, while on the contrary, most erroneous actions occur when attack actions are performed with a slow (3rd) tempo. In conclusion, it can be speculated that when attack is performed in a fast tempo, it is efficient, in contrast with the higher incidence of erroneous actions that seem to result from an attack with a slower tempo.

References

HYDRODYNAMIC SKILLS IN YOUNG SWIMMERS: REPEATABILITY OF SOME GLIDING TESTS

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INTRODUCTION
Analysis conducted in swimming competitions of distances up to 400m pointed out that the first 15m play an important role for the result of the entire performance (1). Hence the hydrodynamic ability to glide underwater in a streamline position (2) should not be neglected during training, especially in young competitors.

AIM
The purpose of this study was to identify some tests to evaluate gliding skills in young swimmers, which might be repeatable and correlated to their performances in 15m crawl and breaststroke.

MATERIAL AND METHODS
Fifteen males (M, mean±SD, age 16.5±1.9 years, height 180±8 cm, body mass 69.3±11.3 kg) and sixteen females (F, mean±SD, age 15.6±1.5 years, height 170±6 cm, body mass 57.4±6.3 kg) at national level were tested. After familiarisation, participants were positioned on a starting block and asked to dive and swim for 15m crawl (CR) and 15m breaststroke (IBR) in two different trials. Later subjects underwent a series of hydrodynamic tests such as: diving and gliding underwater in a streamline position for 8m (DG), pushing off from the wall and gliding underwater in a streamline position for 12.5m (PG), sculling while floating on the back for 10m (SC). Time was recorded and all tests were repeated five times on the same day and again on a different day to assess their repeatability.

RESULTS
Repeatability was assessed through Intraclass Correlation Coefficient ICC: DG=0.90 vs 0.84, PG=0.89 vs 0.88, PGB=0.85 vs 0.81, PGB=0.68 vs 0.76, SC=0.84 vs 0.63, M and F respectively. M performed significantly better than F in all trials (mean±SD, CR=6.16±0.4 vs 6.88±0.2 s, BR=7.74±0.4 vs 8.38±0.5 s, DG=2.16±0.3 vs 2.61±0.2 s, PG=4.10±0.6 vs 4.62±0.6 s, PGB=5.27±0.2 vs 6.06±0.2 s, PGB=7.07±0.4 vs 8.08±0.5 s, SC=9.52±0.7 vs 10.60±0.6 s, p<0.02, M and F respectively).

Tests significantly correlated with both CR (CR vs DG r=0.83, CR vs PG r=0.68, CR vs PGB r=0.93, CR vs PGB r=0.76, p<0.01) and BR (BR vs DG r=0.77, BR vs PG r=0.67, BR vs PGB r=0.84, BR vs PGB r=0.83, p<0.01) performances.

Conclusions
The tests carried out on the groups were repeatable and the male group performed better than the female group. According to the literature, these gliding tests correlated well with the performance in 15m crawl and breaststroke, factors which highly influence the results in sprint competitions.

References