

SPATIAL – TEMPORAL ANALYSIS OF BUTTERFLY STROKE PATTERN

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KEYWORDS: coordination, butterfly stroke, percent of cycle.

INTRODUCTION: The butterfly stroke is a unique swimming style and has been considered as the most difficult swimming style to perform because of the synchronizing characteristics of the arm and leg movements. The aim of this study was to examine the different phases of arm coordination patterns in the butterfly stroke between two levels of swimmers who were specialized in the butterfly stroke at three race paces (50M, 100M and 200M).

METHOD: Eight Taiwanese elite swimmers and eight division B college swimmers participated in the study. Two underwater high-speed cameras (200 Hz) were set in the transverse and sagittal plane under the water and synchronized to capture the swimming movement. The kinematics data were digitized and calculated with the Kwon 3D software. The catch phase is made from the fingers enter water to sweep outside of the widest point. The pull phase occurred at the end of catch phase to the minimum elbow joint angle under the chest. The push phase was from the end of pull phase to the fingers exist water.

RESULTS: The results show that there were significant differences between two levels, $F(1,14)=21.336$, $p<.05$ and three difference velocity in each group, $F(2,14)=5.056$, $F(2,14)=6.720$. In elite swimmers, the catch and pull phase had a significant difference by race paces, $F(2,14)=3.901$; $F(2,14)=4.386$, $p<.05$. The non-elite swimmers had a significant difference by race paces in pull phase and recovery, $F(2,14)=0.412$; $F(2,14)=9.705$, $p<.05$.

DISCUSSION: The elite butterfly swimmers demonstrated a decreasing percentage of duration for the catch phase over the increasing swimming velocity. In other word, by increasing the velocity, the elite butterfly swimmers had the trend potential of shorten the percentage of catch phase. The pull phase changed with velocity in two groups. Non-elite swimmers as the velocity increase up in recovery phase at the same time.

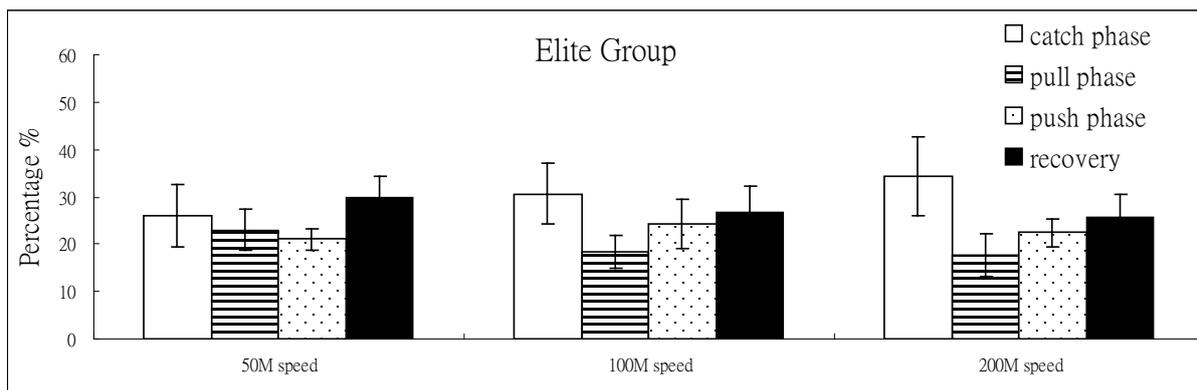


Figure 1. The percentage of each arm phases of butterfly stroke in elite group

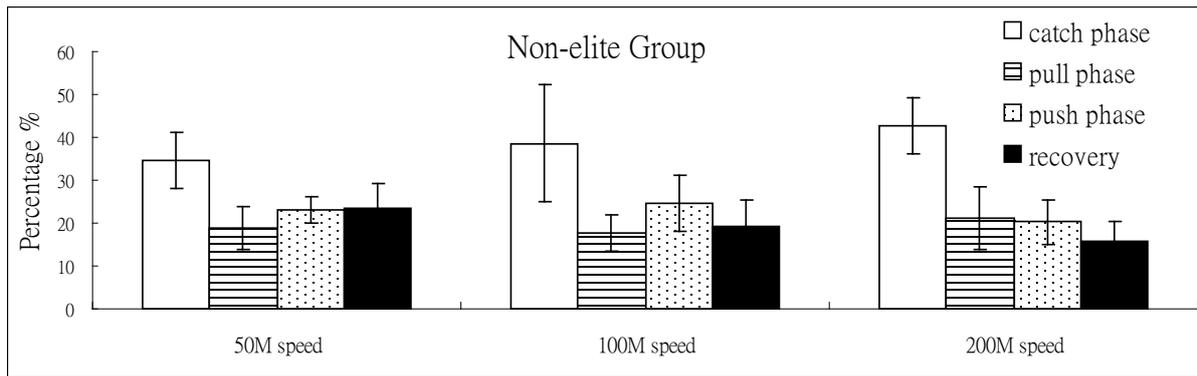


Figure 2. The percentage of each arm phases of butterfly stroke in non-elite group

CONCLUSION: In catch phase, there is an obvious descending trend with velocity in two groups. However, even in elite swimmers can hardly find an identical pattern in each race paces. The percentage of arm stroke imply the coordination of the butterfly stroke, the consistency should include in each race paces.

REFERENCES:

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