Stroke Frequency and Arm Coordination in Front Crawl Swimming

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Abstract

This study aims to determine whether the arm coordination observed at different stroke rates (SR, number of arm stroke cycles per minute) differs according to the level of expertise. Thirteen non-expert (G\textsubscript{NE}) and 14 expert (G\textsubscript{E}) swimmers swam crawl five 25-m lengths at five stroke rate values: 35, 40, 45, 50, and 55 cycles \textcdot min\textsuperscript{-1}. Results show that the pattern of 45 \% of G\textsubscript{NE} switched from the catch-up (a lag time is performed between the propulsive phases of the two arms) to the superposition coordination mode (both arms pushing simultaneously during a short period of the cycle) between 45 and 50 cycles \textcdot min\textsuperscript{-1}. Patterns of 62.4 \% of G\textsubscript{E} switched in the same way between 50 and 55 cycles \textcdot min\textsuperscript{-1}. Significant differences in coordination patterns were found between G\textsubscript{NE} and G\textsubscript{E} only when SR was set at 45 cycles \textcdot min\textsuperscript{-1}. As non-expert swimmers seldom produce the superposition mode, but adopt this pattern when required to swim at high stroke rate values, it is suggested that this coordination mode is an emergent property of the movement.