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Effects of Incompatible Prior Knowledge in Butterfly Style on Understanding Finswimming Style

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Introduction

The basic purpose of the present study was to examine the effect of prior knowledge in butterfly swimming style, on finswimming undulatory movement. The basic theoretical framework is based on work in cognitive science (Chi, Feltovich, & Glaser, 1981; Carey, 1994) and cognitive developmental psychology (Vosniadou & Brewer, 1992), which shows that prior knowledge can stand in the way of acquiring new information, which is incompatible with it. In such cases there is considerable conceptual reorganization of prior knowledge required in the process of development or the acquisition of expertise in a domain. In sport settings, Hanin, Korjus, Joste, & Baxter (2002) noticed performance difficulties and technique errors when athletes change a sport field.

For that purpose, we designed a computerized experiment comprised 18 closed-questions. The present experiment was designed to examine the performance and the reaction time that finswimmers took to answer on questions about the finswimming technique. Half of the sample had previous experience in butterfly swimming which is inconsistent with finswimming in some respect and the other half did not. Two types of forced-choice questions were used; “Body-propulsion” questions, the answers to which were expected to be influenced by conflicting prior knowledge in butterfly swimming and “body-position” questions which were not. We hypothesized significantly more errors and higher reaction time in the “body-propulsion” questions versus the body position questions for the swimmers with prior knowledge in butterfly compared to those without such prior experience.

Method

Participants. Fifty-two finswimmers (mean age; 15 years and 9 months) participated, twenty of them with a mean of 4 years of finswimming competition and thirty-two with a mean of 2,5 years of finswimming competition and with prior knowledge in the butterfly swimming style (5,5 years of competition).

Material. A forced-choice questionnaire consisting of 18 questions was used. Half of the questions were about body propulsion and the remaining half about body position.

Procedure. The experiment was conducted on a laptop PC with a 15inch LCD screen (at 1024 x 768 pixel screen resolution). A custom made program written in Java, was used to present the stimuli and to record the participants’ responses. The questionnaire was administered on individual basis.

Results

Two mixed ANOVAs were performed [2 (swimming style) x 2 (type of question)], for mean score and for reaction times.

Mean scores. The analysis showed both main effects for swimming style, in favor of the finswimmers [$F(1,50)=41,032, p<.01$] and for the type of question, in favor of the “body-position” questions, [$F(1,50)=68,967, p<.01$]. The mean score in “body-propulsion” condition was lower for both groups. The analysis produced interaction of swimming style and type of question [$F(1,50)=50,963, p<.01$].

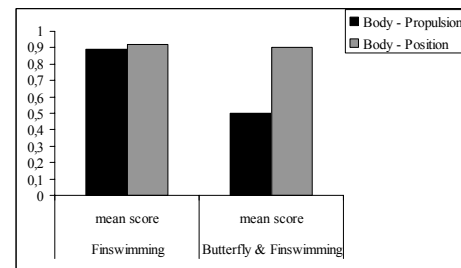


Figure 1: Mean scores of both groups for experiment 1

Reaction Times. The analysis showed a main effect only for the type of question, in favor of the “body-position” questions, [$F(1, 50)=66,499, p<.01$].

Discussion

The results support our hypothesis that in the “body-propulsion” condition, the athletes are going to give answers that are compatible with their prior knowledge. According to the results, incompatible prior knowledge can inhibit the acquisition and performance of the finswimming style.

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