

Propulsive actions classification of underwater dolphin kick in Swimming

Clasificación de las acciones propulsivas de la patada de delfín subacuática en Natación



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ABSTRACT: For classification the propulsive actions of underwater dolphin kick, a systematic review was carried out in the DOAJ, EBSCO and SPORTDiscus databases. The criteria developed allowed selection and ordering of technical content for the underwater dolphin phase, and classifying the propulsive actions by: actions type, skills system and performance conditions, in increasing order of complexity and difficulty.

Keywords: dolphin kick, butterfly stroke, undulatory kick, swimming training.

RESUMEN: Para clasificar las acciones propulsivas de la patada de delfín subacuática, se realizó una revisión sistemática en las bases de datos DOAJ, EBSCO y SPORTDiscus. Los criterios elaborados permitieron seleccionar y ordenar el contenido técnico para la fase de delfín subacuático, y clasificar las acciones propulsivas por: tipo de acciones, sistema de habilidades y condiciones de realización, en orden creciente de complejidad y dificultad.

Palabras Clave: patada de delfín, estilo mariposa, patada ondulatoria, entrenamiento de natación.

INTRODUCTION

The propulsive properties of underwater dolphin kick have made this one of the most used techniques today after sliding in start and turn at the freestyle, backstroke, breaststroke and butterfly events (Anderesen & Sanders, 2018; Wadzyk, Nosiadek, & Staszkiwicz, 2017). However, current training models include flow analysis and numerical modeling methodologies that low budget countries developing performance sports cannot yet afford (Shimojo, Gonjo, Sakakibara, Sengoku, & Sanders, 2019; Takagi, Nakashima, Sato, Matsuuchi, & Sanders, 2016).

The aim of this work is to classify the propulsive actions of underwater dolphin kick in systemic order of complexity and difficulty.

DEVELOPMENT

A systematic review was carried out in the DOAJ, EBSCO and SPORTDiscus databases in order to identify the main characteristics described of the underwater dolphin phase and its training process. For the search the keywords were used: dolphin kick, butterfly stroke, wave motion, undulatory kick, swimming training and their possible combinations (Figure 1). The propulsive actions of underwater dolphin kick were classified from the principle of content systematization (Bompa & Buzzichelli, 2019).

The electronic search resulted in 2408 potentially relevant documents. After reading the abstracts, a total of 135 met the search criteria and 92 (68.14%) could be downloaded, which were read and used to describe aspects that should be considered to guide the training of underwater dolphin kick.

In this study, only the technical component of the preparation was considered, and of this, the object of study technique: propulsive actions (Light, 2019). The criteria developed after considering the most recent studies were: 1) optimal form of actions performance (sport technique); 2) amplitude of kick (stature - amplitude relationship of kick); 3) functional structure of actions (kinematic pairs and predominant musculature); 4) body position (surface geometry); 5) departure angle (orientation: after turn and approach to surface); 6) recommended depth; and 7) corporeal regions involved in the undulation.

Using criteria 1) and 3), three types of actions were established: basic, preparatory and specific to underwater dolphin kick, and they described a set of skills that were listed in increasing order of integration (complexity) (Table 1). The rest of developed criteria were used to determine the conditions for performing the actions described above and were placed by actions type in increasing order of difficulty.

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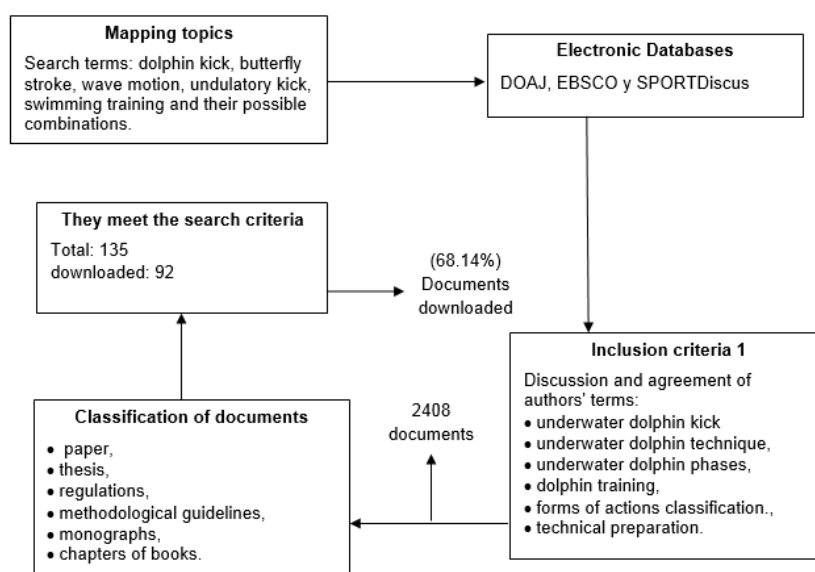


Figure 1. Flowchart of strategy search for identification of the studies.

Table 1. Systemic ordering of propulsive actions in the underwater dolphin kick.

Actions type	Skills system		Performance conditions			
Basic actions	Adopt posture	With arms outstretched up		With arms beside body	Arms back	
	Position the body		Awash	Submerged + 50 cm	Submerged + 1 m	Varying the depth
	Orient the body	Horizontal front	Horizontal back	Simulating standing	Diagonal to surface	Perpendicular to surface
		Scrolling		Horizontal	Perpendicular	With inclination angle to depth
Preparatory to the underwater dolphin	Interact with fluid	Alternate legs (amplitude)	Simultaneous legs	Small swim fins	Big swim fins	Monofins
	Enter to water or push wall		Awash	With immersion up to 50 cm	With immersion up to 1 m	
		Slide after the start and turn		Awash	Varying the inclination	Changing orientation
Own of underwater dolphin kick	Wave the body			Varying the posture	Varying the orientation	Varying the position
	Shake the legs	Varying the amplitude	With swim fins	With torso weights	With ballast	With elastic band

The basic actions of underwater dolphin kick describe those of less complexity to performance and are bearers of the essence of sports actions. While preparatory actions for the underwater dolphin kick are those that precede these movements during the entry into the water or after the turns. Preparatory actions precede the dolphin movements but condition their preparation and therefore they need to be introduced into the action system. The third group, the own actions of underwater dolphin kick, are where the distinctive movements of this swim form begin and the body resulting propulsion. The systemic integration of the three groups facilitates methodological work of Swimming coach when planning training.

On the other hand, it is not enough to know the actions types and their systemic integration to design training exercises, it is also necessary to determine the context in which they will be performed. In the columns where conditions for actions performance are described, the fundamental conditions to be taken into account to plan the exercises were described: to the subject or to the physical environment of performance. In this sense, any combination of action-performance conditions allows several exercises to be elaborated if the variations in the rest of the performance conditions are significant.

The introduction of auxiliary aids is an aspect of consideration since these are widely disseminated and used in dolphin training. Other means such as swim-

ming kickboard and snorkeling are also used but without the same importance and significance for the fundamental function that the underwater dolphin kick fulfills in swimming, propulsion.

CONCLUSIONS

The criteria developed (seven in total) made it possible to select and order the technical content for swimming underwater dolphin kick and classify the propulsive actions by: action types, skills system and performance conditions in increasing order of complexity and difficulty. The established order facilitates the identification of exercises types for planning underwater dolphin kick training.

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