



Using time intervals in sports training

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Abstract

Objective of the study was to justify the feasibility of using a time interval of 12.36 seconds and its multiples in sports training.

Methods and structure of the study. The experiment was carried out in several stages. In the period from 2016 to 2018, the first stage, the dynamics of the level of development of special endurance of runners was studied using a time interval of 12.5 seconds and its multiples in the training process of marathon athletes. At the second stage in 2021, the dynamics of the accuracy of perception of the duration of a time interval of 12.5 seconds in amateur athletes was revealed, depending on age. At the third stage in 2023, the stability and variability of the perception of two time intervals was studied: an individual minute - 60 s and a time interval lasting 12.36 seconds and its multiples: 24.7; 37.1; 49.4 seconds. In addition, the objectives of the study included assessing the feasibility of using the time interval under consideration in training children aged 7-11 years old doing taekwondo.

Results and conclusions. The rhythmic ordering of loads set in time ensures the passage of the most important processes in the body of athletes with the least energy costs, and therefore increases the effectiveness of the training process. This conclusion is confirmed by the relationship of the time interval of 12.36 with the golden ratio.

Keywords: *time interval 12.36 s, golden ratio, feasibility and effectiveness of use in sports training.*

Introduction. The current level of sports achievements is a consequence of a significant increase in the volume and intensity of training loads, which today have reached their maximum values. We believe that further growth in sports results can be achieved through the use of achievements in related areas of knowledge that have not previously found wide application in sports practice.

Our attention was drawn to the time interval, which in psychology is called "present time" or "internal measure of the present." William James, in his work "Principles of Psychology," published in 1890, called this time interval "the visible present" [6, p. 180]. Then, in the laboratory of Wilhelm Wundt, the duration of the "visible present" was experimentally established, which did not exceed 12 seconds.

In 1991 N.I. Moiseeva, considering time as an internal category of perception, gave a definition of "present time". She called the present tense "the period of

time during which the surrounding world is perceived without involving memory mechanisms, is perceived as a holistic image" [7, p. 4]. Scientists examined the duration of the "internal measure of present time" and determined its duration, which was 12.5 seconds.

Objective of the study was to justify the feasibility of using a time interval of 12.36 seconds and its multiples in sports training.

Methods and structure of the study. The scientific work was carried out in several stages. In the period from 2016 to 2018, the first stage, the dynamics of the level of development of special endurance of runners was studied using a time interval of 12.5 seconds and its multiples in the training process of marathon athletes [1]. As the results of the study showed, the dynamics were positive.

At the second stage, which was conducted in 2021, the study was aimed at identifying the dynamics of the accuracy of perception of the duration of a time inter-



val of 12.5 seconds in amateur athletes depending on age. 47 people aged from 18 to 62 years took part in the experiment. When determining the accuracy of perception of the studied time interval, its duration was clarified, which amounted to 12.36 ± 0.12 s. It was also found that the accuracy of perception of a given time interval does not depend on age and gender [2].

At the third stage - 2023, the stability and variability of the perception of two time intervals was studied: an individual minute (60 s) and a time interval lasting 12.36 seconds and its multiples: 24.7; 37.1; 49.4 seconds. It was found that the error in perceiving the duration of an individual minute is 2.5% higher than the error in perceiving the time interval of 12.36 seconds and its multiples [3].

In addition, the objectives of the study included assessing the feasibility of using the time interval under consideration in training children aged 7-11 years old doing taekwondo. As is known, the ability of an athlete to maximally maintain the duration of muscle activity, where the dominant source of energy is the alactic anaerobic process, is also 10-12 seconds [5, 10].

Results of the study and discussion. The results of the study showed the effectiveness of using time intervals: 12.36; 24.7; 37.1; 49.4 when develop-

ing speed-strength abilities and special endurance in young taekwondo athletes [8, 9].

In addition, world records in cross-country athletics were analyzed and revealed that at distances of 800 m, 2000 m, 5,000 m, 10,000 m, 21 km 97 m and 42 km 195 m, the record time is a multiple of 12.36 seconds. Moreover, the time difference between women's and men's records is also a multiple of this time interval. The results of the analysis of world records are presented in table 1.

The multiple of world records with a time interval of 12.36 seconds and the multiple of this difference between women's and men's records allows us to conclude about the stability and functionality of this time interval. In addition, its rhythmic repetition indicates the rhythmicity of a number of processes in the body of athletes, on which the sports result depends.

The stability and functionality of the manifestation of this time interval in the athlete's body can be confirmed by its relationship with the golden ratio (with the Fibonacci constant): $0.618 \cdot 20.0 = 12.36$; $12.36 \times 1.618 = 19.99...$

The Fibonacci constant is 1.618. Because of its unique mathematical properties, it was called the

Table 1. World records in cross-country athletics and their multiple times over a time interval of 12.36 seconds

Distances (m/km)	Result (s)	Multiplicity (number of times)	Difference (s)
Men 800 m	1.40,91	$100,91 \div 12,36 = 8,16$	12,36
Women 800m	1.53,28	$113,28 \div 12,36 = 9,16$	
Men 2000 m	4.44,79	$284,79 \div 12,36 = 23,04$	3×12,36
Women 2000 m	5.21,56	$321,56 \div 12,36 = 26,02$	
Men 5000 m	12.35,36	$755,36 \div 12,36 = 61,1$	7×12,36
Women 5000 m	14.00,21	$840,21 \div 12,36 = 67,98$	
Men 10,000 m	26.11	$1571 \div 12,36 = 127,1$	13×12,36
Women 10,000 m	29.13,3	$1741,3 \div 12,36 = 140,9$	
Men 21 km	57.31	$3451 \div 12,36 = 279,2$	26×12,36
Women 21 km	62.52	$3772 \div 12,36 = 305,2$	
Men 42 km	2:00.35	$7235 \div 12,36 = 585,4$	54,8×12,36
Women 42 km	2:11.53	$7913 \div 12,36 = 640,2$	

Table 2. World records in swimming and their multiple times for a time interval of 12.36 seconds (50 m pool)

Distances (m/km)	Result (s)	Multiplicity (number of times)	Difference (s)
Men's 200 m freestyle	1.42,00	$102,00 \div 12,36 = 8,3$	10,85
Women's 200 m freestyle	1.52,85	$112,85 \div 12,36 = 9,1$	
Men's 200 m backstroke	1.51,92	$111,92 \div 12,36 = 9,06$	11,43
Women's 200 m backstroke	2.03,35	$123,35 \div 12,36 = 10,98$	
Men's 200 m breaststroke	2.05,48	$125,48 \div 12,36 = 10,15$	12,07
Women's 200 m breaststroke	2.17,55	$137,55 \div 12,36 = 11,13$	
Men's 200 m butterfly	1.50,34	$110,34 \div 12,36 = 8,9$	11,47
Women's 200 m butterfly	2.01,81	$121,81 \div 12,36 = 9,9$	



golden ratio, and the reciprocal value of the constant, 0.618, was called the Phidias number [4].

We have analyzed world records in other cyclic sports where endurance is demonstrated. However, such almost one hundred percent accuracy in multiples as in running was not found, which is due to the naturalness of running and the environment in which it is carried out. However, the identified pattern is found with less accuracy in multiples in swimming at a distance of 200 m.

If we take into account that swimming methods were developed by people and they are not as natural as running movements, including the specificity of turning, then we can also talk about the orhythmic nature of the manifestation in the body of swimmers of a given time interval.

Conclusions. Based on the conducted research, we can conclude that it is advisable to use the time interval of 12.36 and its multiples in sports training.

The rhythmic ordering of loads set in time ensures the passage of the most important processes in the body of athletes with the least energy costs, and therefore increases the effectiveness of the training process. This conclusion is confirmed by the relationship of the time interval of 12.36 with the golden ratio.

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