METHOD OF MEASURING THE SPEED OF EXECUTION IN 8-12 YEARS KARATEKA

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Abstract: The method of measuring the speed of execution in 8-12 years karateka relies on image-processing software Kinovea with which it is highlighted the trajectory of movement, measured path length, maximum striking distance, execution time and speed at different points of the trajectory.
With Kinovea software it has been clearly revealed the starting and the end point of the trajectory of impact and in this way execution speed can be defined as the ratio of the distance between the two points and run time.
For a group of children aged 8-12 years we calculated the execution speed at the initial and final maegeri technique testing after applying for three months sports training programs specially designed for the development of the execution speed and we highlighted results in photos, a table and a graph.
Keywords: *speed reaction and execution, karateka, children.*

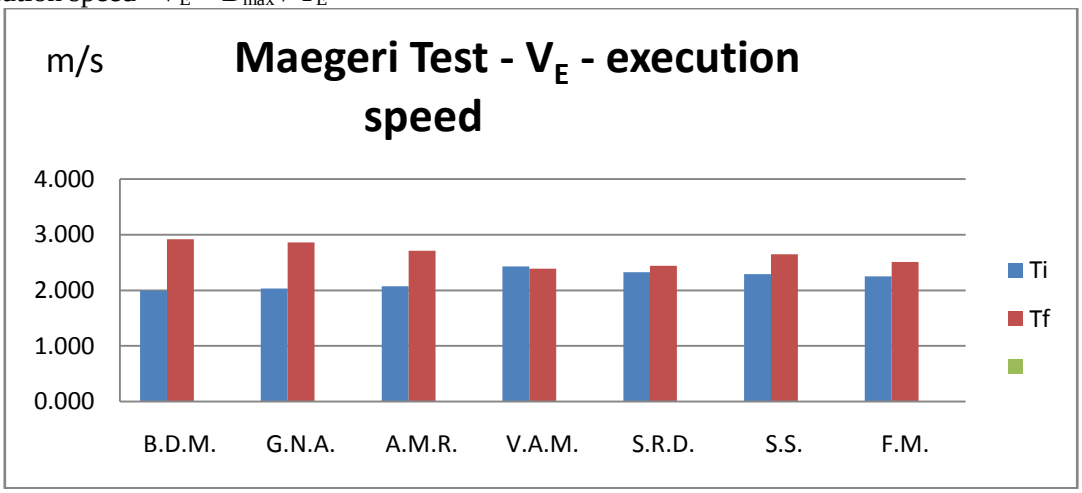
Introduction

The main motor quality of karate is speed of execution and therefore we believe that scientific measurement provides a valuable tool for tracking the evolution of karateka, comparing them and evaluating the effectiveness of applied sports training programs.
Execution speed is one of the main indices of motor skills specific to the disciplines of combat [1].
Execution speed express full time needed to perform a motor act [2] and depends on the level of the other basic motor qualities [3] as well as the accuracy with which is executed the karate technique [4].
In the literature there have been few measurements of this kind in karate because of a limited access to complex and expensive measuring equipment which uses sensors to the body athletes.
The measuring method we propose is simple, easy to implement, cheap and accessible to most coaches in karate do and can provide a tool for evaluating the work programs and in training.
To achieve the proposed approach we have chosen a group of seven children aged 8-12 years who were observed for motor behavior and on the development of motor skills, considering that by using conventional techniques of competitive activity, improvement of the speed of execution under the explosive force can be seen, coordination and mobility, noting that this must take account of age particularities of the subjects and the requirements of competition.
To correlate the results of the control samples we have carried out an initial testing in March 2015 and after that we developed a series of workouts that we implemented during April, May and June after we conducted a final test in which were applied the same tests as the initial test.
One of the samples used is maegeri kick which further exemplifies how to measure execution speed.
Maegeri kick consists of a foot kick forward with the positioned back foot.
From hidari hanmi gamae position (a fight position with the left foot in front) runs at signal (a clap executed behind the athlete) maegeri kick (a right foot forward kick) then returns to the original position.
I record the execution with a camcorder (I used a camera Nikon D 5300) and then, using the Kinovea program (100% free and open Source) for analysis of the motion I measured the execution time, response time, I highlighted the trajectory of movement of the foot, I measured the speed of the foot reached in seven points of the trajectory, maximum speed reached by this, path length and maximum striking distance.
Video recording resolution was FullHD (1920x1080 / 50pfs) which allowed a margin of error of less than 10 ms ie below 1%.
This margin of error is more than acceptable if we consider the total cost of the system (laptop and camera Nikon) for approx 700 euros.

Tabel No.1 Maegeri test

Name	T	T_{R+E}(ms)	T_E(ms)	T_R(ms)	L_t(cm)	D_{max}(cm)	V_{tmed}(m/s)	V_E(m/s)	Obs.
B.D.M.	T_i	1080	960	120	210,16	191,18	2,189	1,991	
	T_f	820	680	140	235,93	198,26	3,470	2,916	increase
G.N.A.	T_i	920	720	200	163,6	146,43	2,272	2,034	
	T_f	720	580	140	192,77	165,77	3,324	2,858	increase
A.M.R.	T_i	960	800	160	180,76	165,91	2,260	2,074	
	T_f	780	620	160	201,42	168,24	3,249	2,714	increase
V.A.M.	T_i	840	640	200	179,31	155,32	2,802	2,427	
	T_f	840	700	140	192,93	167,07	2,756	2,387	
S.R.D.	T_i	840	680	160	173,7	157,97	2,554	2,323	
	T_f	860	680	180	197,45	165,88	2,904	2,439	increase
S.S.	T_i	760	560	200	152,14	128,16	2,717	2,289	
	T_f	720	600	120	184,79	158,82	3,080	2,647	increase
F.M.	T_i	880	720	160	191,46	161,96	2,659	2,249	
	T_f	800	660	140	208,32	165,53	3,156	2,508	increase

Legend
T -testing
T_i - initial testing
T_f -final esting
T_{R+E} - reaction and execution time
T_E – execution time measured from the start until reaching the apex of the trajectory
T_R - reaction time
L_t -length of foot path measured from the point of origin to its peak trajectory
D_{max} -maximum distance of impact measured as the distance between the starting point and the maximum point of the trajectory
V_{tmed}- average speed on trajectory $V_{tmed} = L_t / T_E$
V_E- execution speed $V_E = D_{max} / T_E$



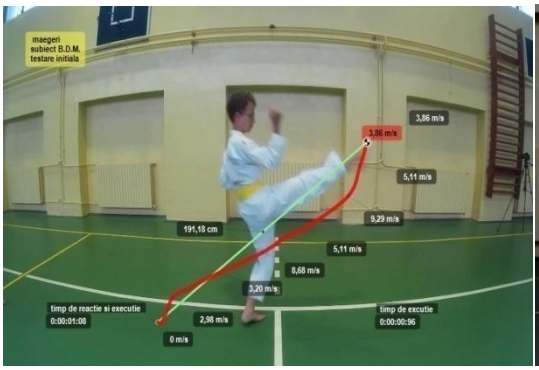


Foto maegeri 1.1.1, 1.2.1

Foto maegeri 1.1.2, 1.2.2

Foto maegeri 1.1.3, 1.2.3

Foto maegeri 1.1.4, 1.2.4

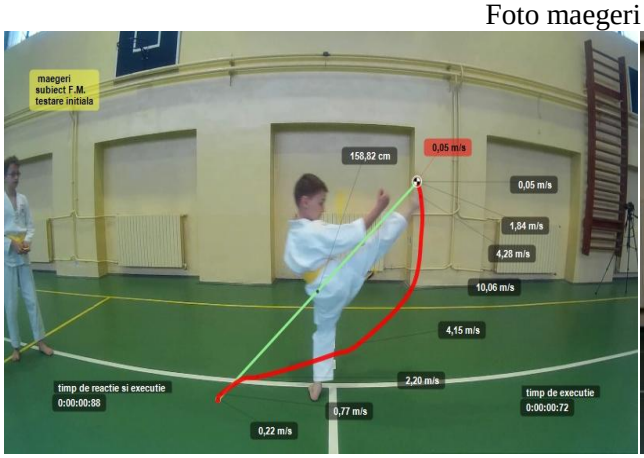


Foto maegeri 1.1.7, 1.2.7

Disscutions

In the maegeri test due to the proposed video analysis system manager I could accurately measure the execution speed $V_E = D_{max} / T_E$.

It follows that the possibilities of increasing execution speed V_E are given by the increasing distance of kicking D_{max} and decreasing execution time T_E.

The first variant, increasing the distance D_{max}, is based on the development of explosive strength and mobility of the lower limbs which leads to orientation training programs in this regard.

The second variant, T_E decrease execution time is done so by increasing the explosive force and especially by the correct execution of striking techniques maegeri, ie obtaining a motion trajectory as close to straight line D_{max}.

This follows clearly from the comparison of the motion length L_t with the D_{max} ($L_t > D_{max}$) and that the average speed on the trajectory V_{tmed} is always greater than the speed of execution V_E.

In conclusion this method allows measurements with an accuracy of ± 1% of the speed of execution, so important to guide programs to increase sporting performance in karate do.

The big advantage of the method of measurement by video image processing using Kinovea software is, compared to other methods, that introduce no disturbance during testing, it has reasonable cost and is easy to do even in competitive fight.

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