EQUILIBRIUM OF CHILDREN PRACTISING JUDO

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INTRODUCTION

In judo the attacks begin generally with the action of coming to grip and displaying push-pull forces on the rival, to bring him into an unstable equilibrium condition/kuzushi. (See Fig. 1. and 2.)

To move the opponent into a posture from which it is possible to throw or to down him, the attacking competitor/tori/ must shift the centre of mass of the opponent, so that the vertical projection is outside the supporting surface.

The lowering of the centre of mass may increase the stability state. If the opponent/uke/, attempts to retain his equilibrium and the former position by stiffening his body, he falls into a disadvantageous situation. It is difficult to describe every possible variant of the maintenance or loss of balance in a judo contest. Kazuzo Kudo (1968) gives a special summary of the process. If the competitor initiates a *kuzushi* by forcing the rival off balance to her right front, to perform the tai-otoshi, the possible reaction force must be anticipated. The probability level of this spontaneous estimation of the reaction forces is depending on the speed of action of the tori and the reaction time of the opponent.

The conception of the present work takes into consideration the above mentioned points of view, which were deterrnining for the selection of the tests and model situations, in our investigation. (M. Erdddy 1979, A.A. Makedon 1987, V.N. Boloban 1990, K. Bretz & R.J. Kaske 1994).

The purpose of this study was to collect equilibrium data and motor co-ordination measures as well as reaction ability in children practising judo.

SUBJECTS AND METHODS

Fifteen children (aged 8-13 years, 12 boys, 3 girls) practising judo, took part in the investigations. Six tests for equilibrium and motor co-ordination measurements were used on "Adam-type" force platform, Psycho 8 microcomputer and PC with software (specially developed for children).

Amplitudes and frequencies of movements of the centre of pressure in the Romberg position plus co-ordination performances with visual bio-feedback control were recorded. The test results was based on the radius of a circle containing 68% of the sampled data from the stabilogram (Ri). Time and displacement in x and y planes were presented as analysis graphs. Other tests were based on the computerised bio-feedback system including four different tasks to measure the motor co-ordination ability and the speed of the subjects, as well as their reaction capability to quickly perform voluntary movements.

The test battery includes the following situations:

a. Task No. 1: standing on the platform, looking ahead with arms straight out from the body, with opened eyes.

b. Task No. 2: as in "a" but with closed eyes.

c. The subjects were standing on the platform, both arms hung naturally to the sides of the body and the legs opened about as wide as the length of the foot/shizen-hontai/audio-visual feedback was applied from the computer and the monitor.

Task No. 3: moving of the centre of pressure to the "centre".
Task No. 4: moving of the centre of pressure to different, pre-determined positions.
Task No. 5: moving of the centre of pressure to an asymmetrically positioned point.
Task No. 6: moving of the centre of pressure within a pre-determined surface.

Fig. 1. The action of coming to grip.

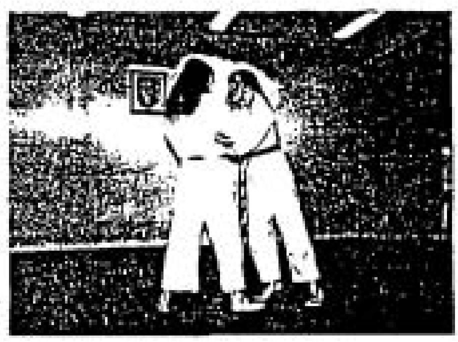


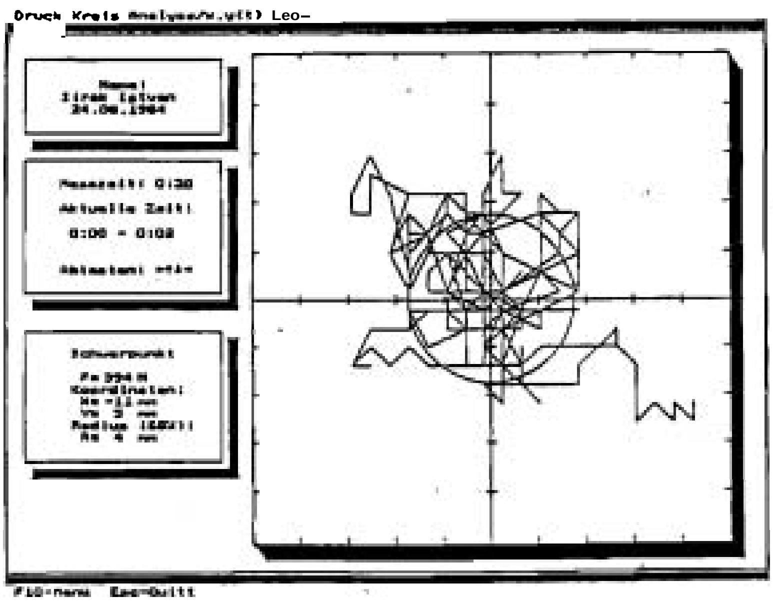
Fig. 2. Forcing the opponent off balance.

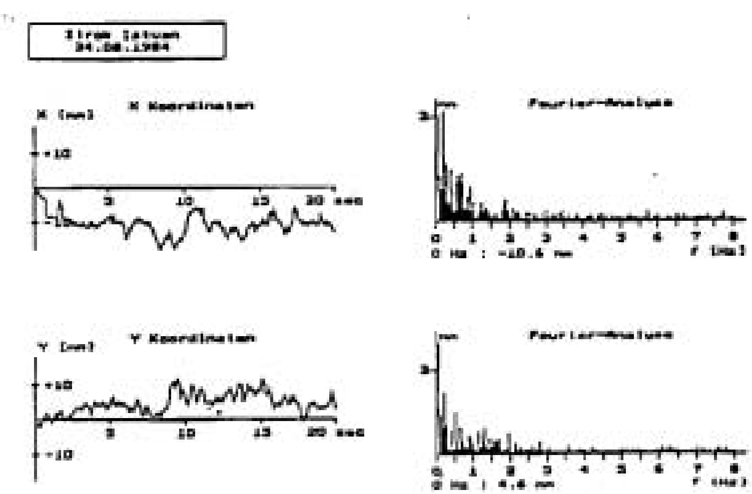
RESULTS

Table 1 demonstrates the summary of results. Fig. 1 shows the stabilometry dispersion diagram, the displacement-time functions and their Fourier analysis which were recorded and computed employing the results of the subject S.I.

Parameters	Mean	Std Dev	S.E.	Variance
Age /years/	9.53	1.92	0.49	3.69
Height /m/	1.35	0.08	0.02	0.69
Mass /kg/	28.06	5.80	1.49	33.63
Romberg test I. R1 /mm/	5.33	1.49	0.38	2.23
Romberg test II. R2 /mm/	7.20	2.36	0.61	5.60
R2/R1 (%)	138.3	42.5	10.9	1806
Task No.3.: "Centre" (%)	94.5	3.81	0.98	14.5
Task No.4.: "Sugar" /s/	9.40	1.76	0.46	3.11
Task No.5.: "Mouse" /s/	3.86	1.59	0.41	2.55
Task No.6.: "Field" (%)	52.6	7.65	1.97	58.5
Task No.7.: "Time" (%)	93.6	5.66	1.46	32.09

Table 1. The **summary** of the test results





DISCUSSION

We found that from the natural position/shizen-hontai/ it is easy to move the centre of mass into different positions controlled with bio-feedback by the computer and the monitor. It is the most effective position from which techniques can be applied. (Kazuzo Kudo 1968).

In accordance with the above cited authors we also found that the development of stance stability of children practising judo increases the sport performance reflecting the efficiency of training and improves the postural control as well as the fight capability in the standing position. We recommend specially constructed training methods to develop and improve the stance stability in the judo contest.

REFERENCES

Boloban, V.N., V.G. Siltshenko, E.V. Birsk (1990). Metodika stabilografii v isledovanie ustoitshivosti tela sportsmena i sistemi tela pri vipolnenii gimnastitsheskih, akrobatitsheskih uprashnenii. KGIFK. Kieve. 1-23.

Bretz, K., R.J. Kaske (1994). Some parameters of multi-loop biofeedback control of posture. International Congress of Sports Biomechanics. Budapest, Siofok.

Erdôdy, M. (1979). Analysis of physical and psychomotoric data for the selection of young judo competitors aged 10-13 years. Thesis submitted for a degree of "proficient coach". High School of P.E. Budapest.

Kazuzo, Kudo (1968). Dynamic Judo. Japan Publication Trading Company, Tokyo.

Makedon, A.A. (1987). Biomechanitsheskie osobennosti techniki priemov s vuevedeniem sopernika iz ravnovesia sportivnoi borbe. Tesisi dokladov Vsesojuznoi nautshno-praktitsheskoi konferentsii. "Problemi biomechaniki v sporte". Moscow, 14-16, 12.1987. p. 113-114.