RELIEVING SYSTEM DATA BALANCE **SWINGING** PLATFORM

MAURO Franco - MAURO Luciano

Istituto Superiore Di Educazione Fisica Della Lombardia

INTRODUCTION

The ability of balance is defined by many authors as a dominant factor of sporting performance.

Literature quotes numerous methods of research and evaluation of balance, which generally use tests based on the definition of static or dynamic balance in standard "situations" on reduced support bases with and without a visual reference, estimating the subject's ability on the base of his achieved error and/or of the times of permanence or maintenance of the position or request situation. Facing the problem to design an instrument of measurement of the balance capacity, we set out the condition to build one of modest encumbrance and with low prices.

Beside, the instrument has to be of easy utilisation and offer the possibility to test the subjects in different situations and positions.

In addition to h e objective, inspired by the selectivity principle, the most important imperative was to respond to the need to measure in an objective way this quality according to a method for a data analysis as objective as possible.

Starling from the oscillating board generally utilized in re-education and proprioceptive works we idcatcd a small instrument which can be easily transported so that it is possible to test the subjects in heir habitual residence of activity or training.

THE INSTRUMENT

The instrument is made with an inferior part, represented with a semi-cylindric shape for the measurement of the balance capacity of the monoaxial movements and a semispherical cap, named "board", on which is placed the system of measurement. The support surface is metallic which assures it cannot he deformed, while the board is made whit wood. (Figure 1)

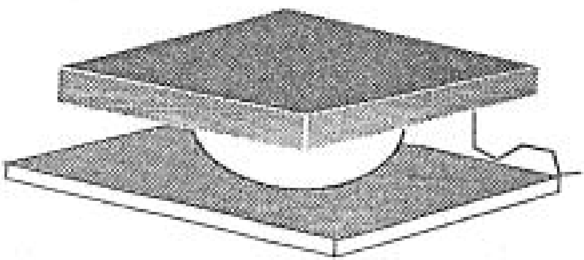

Fig.1.

Keeping in mind that the instability of the support has a direct relationship to the radius of the rotating surface, the size that we chose for the semicylinder and the semi-cap are respectively 22 and 5 0 cm in diameter.

Using these dimensions it is possible to bring about the conditions to measure the ability of balancing in numcmus positions.

The attempts of the subject to keep the equilibrium in a lixed position causes the base to oscilate; the oscillation of the base and the relative displacerncnt of it from the ideal horizontal plane, puts the recording system into action. The recording of this is done by means of a mercury cell which works with communicating containers.

The level mercury reached by the mercury in the 2 branches of the cell is recorded by 8 batteries of infrared photostatic machines that insure the registering of the listing of 4 positive + 4 negative levels.

The instrument can be built with various recording times depending on the type of experiment one wants to carry on; with the possibility of 5 to over 45 samples per second, for all the period wonted. (With this method we obtain the graphic results of various types).

METHODS

In order to describe the operations of the instrument we decided to report an experience rnade by us. We selected a pattern of 32 male subjects aged between 16 and 18 years, belonging to the secondary high school. Between those subjects 12 are sporting subjects practising various disciplines at good levels.

Between the various positions that we could test, for this experience we chose the two most suitable:

a - legs apart - arms free - eyes open

b - legs together - arms free - eyes open

Subjects were also tested in the same positions but with eyes closed.

The instruments used is the one-axis board (which is the one placed on the semi-cylindric).

MONOAXIS TILTING PLATFORM
TEST 2.1 - 20 SEC /CONFIG.40 (5 8 REGISTR /SECOND)

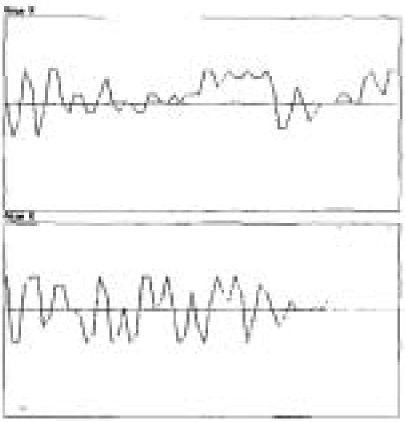

Fig.2.

The time we set out for the test is of 2 0 seconds and the record is done both with the measuring instrument oscillating on the sagittal board and on the transversal board.
After having tested for about 10 minutes, the various positions assumed on the training equipment, the subjects is placed on the record board.
Three records are detected for every position with a break time of 1 minute between the tests. Figure 2 shows the graphics that can obtain by the mono-axis instrument.

The balance capacity of the subject is shown by the graphic, while the numeric value that goes with it defines his capacity.

RESULTS

Data analysis shows, as expected, that with both the positions with legs apart and legs together, the equilibrium improves with eyes open.

Comparing the 2 axis, sagittal and transversal axis, of the 4 tested positions not real differences of values are shown (Figure **3).**

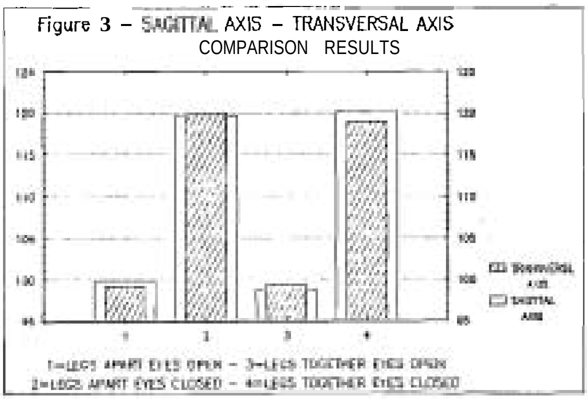

Figure 3 – SAGITTAL AXIS – TRANSVERSAL AXIS COMPARISON RESULTS

Fig.3.

Comparing the sporting subjects and the non-sporting subjects, we obtain various differences of the results (in favour of the sporting subjects) for the eyes open tests, both with reference to the sagittal-axis tests and in the transversal axis. (Figure 4) (Figure 5).

The results obtained by the eyes closed tests don't show real differences between the 2 groups (sporting subjects and non-sporting one) for both the axis considered.

The recording board on the 2 axis is placed on a semispherical cap, provided with a manual brake system which enables the tested subjects to get on easily and into the right position.

For this instrument the possible positions that can be tested are of various types: from the standing position on the 2 legs, to the balancing on one leg; to the sitting position on both upper and lower limbs.

The working principles of this instrument come from the monoaxial one. The 2 mercury cells are placed in an orthogonal position, so that the registration of the inclination on the 2 axes (x and y) of the base in relation to the ideal horizontal plane, are recorded at the same time.

For this instrument too is possible to set the time and sampling rate of the records.

At the end of the trials the program indicates the total number of achievements obtained, the average of the values in comparison with the x axis and y axis, including the difference and correlation between the 2 axes.

All data can obviously be memorised and dealt with statistically.

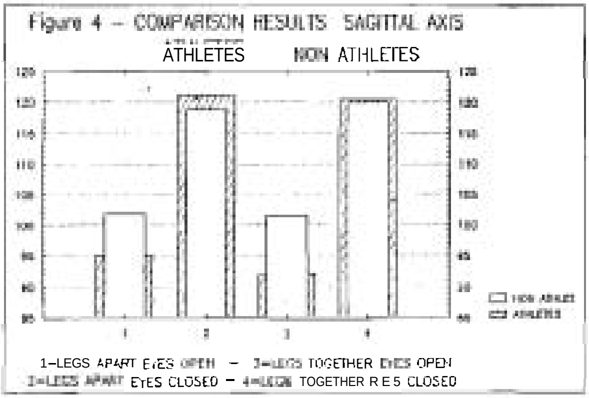

Fig.4.

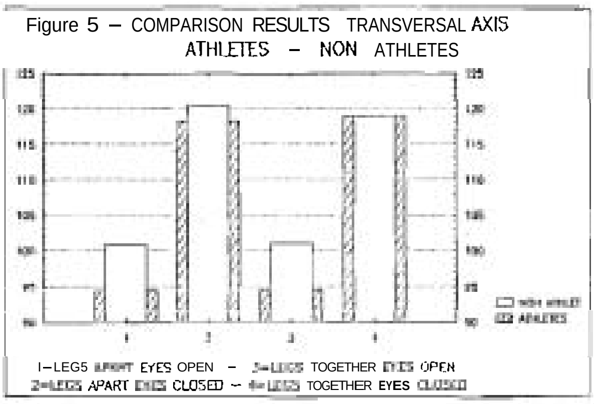

Fig.5.

CONCLUSIONS

After all the studies we have made, we think that the use of the instrument can be very interesting, in particular in the following fields:

- verification of the minimum aged testable
- predictive function, that is the possibility to identify the balance capacity as soon as possible
- correlation between sport activity and balance capacity, with particular reference and applications in the following sports: Gymnastics, ski, snow-board, skating, dancing, sailing, windsurf.