



TEST FOR THE EVALUATION OF THE SPECIAL FORCE IN THE BOXING

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Introduction:

The objective evaluation of the punches' force in boxing is a very debated subject by many authors and sport researchers. In particular there are excellent studies recently published that created and valued some analysis instruments based on the use of force's transducers that measured the power of a punch.

Through this system it has been really possible evaluate objectively the force of the boxing's punches, but the sophisticated equipment necessary and the high realization's costs doesn't permit to the most of the athletes to accede to these evaluation methods.

Methods :

That's why, resuming and modifying a study of Atha et al (1995) we started an economic and approachable experimentation of a ballistic pendulum device, to measure the force of the boxing's punches.

This device (see picture 1 and photos) is mainly made by a pendulum punching bag, an iron frame and an integrated system of photocells and microcomputer. The punching bag is built with a leatherette cushion padded with pressed rubber, screwed to a metal disk, soldered at a rigid iron bar. The frame is of tubular metal and its height is adjustable telescopically and it supports the punching bag through a pin that permits the sole front-rear movement. The two couples of photocells (ergotimer Globus) are connected to the microcomputer (ergotester Globus) and are fixed at the frame by 4 rigid bars in way to record the oscillation pendulum time in the considered angle (30°).

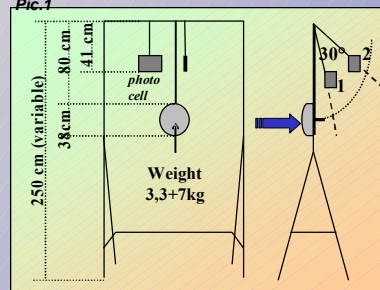
Having used the formula $[F = (10,3 \cdot 9,81) \cdot 99/t^2 \cdot \text{tg } 30^\circ + \text{friction} \cdot F]$, it was possible to transform the time in N.

We hanged an oscillating small hammer, chargeable with weights, in front of the punching bag. It permitted us to calculate the frictions evaluating the punching bag oscillation degree in relation to the little hammer weight (friction=8%).

To value the reliability and the validity of the machinery, we tested it on a group of 18 boxers, 9 amateurs (age 22±5; height 175±7; weight 71±8) and 9 unprofessional competitive athletes 2nd series (age 20±2; height 175±6; weight 70±4).

The subjects had to execute on the punching bag 4 jabs and 4 cross punches of which we calculated the respective means. The trial was repeated in two succeeding days.

Pic.1



Tab.1	Correlation test-retest
Mean sx	r=0,91; p<0,01
Mean dx	r=0,89; p<0,01
Mean sx - amateurs	r=0,81; p<0,01
Mean dx - amateurs	r=0,87; p<0,01
Mean sx - athletes	r=0,82; p<0,01
Mean dx - athletes	r=0,84; p<0,01

Results:

The results of the reliability study related to the correlation between test and retest put in evidence values of r between 0,91 and 0,81 for the both punches valued in the two groups (Tab. 1) with p<0.01.

The evaluation of the ability to discriminate (study of validity) was conducted with Anova one-way and put in evidence a superiority of the athletes boxers that had significantly better results related to those of the amateurs (Tab. 2). For the cross punch the percentage difference was of 39% (p<0,01) with passing time 30° of 0,11±0,01vs.0,15±0,03 sec. for the jab, instead, the difference was of 19% (p<0,001) with passing time 30° of 0,17±0,03vs.0,20±0,02 sec.

The force expressed by the boxers with the cross punch was always higher than the force expressed with jab (Tab. 3), both in the amateurs (23%; p<0,003) and in the agonists (34%; p<0,001).

Tab. 2	Difference between athletes and amateurs
Tot punch	27% ; P< 0,01
jab	19% ; P<0,001
cross	39% ; P<0,01

Tab. 3	Difference between "cross" e "jab"
Tot boxers	35% ; P< 0,001
amateurs	23% ; P<0,003
competitive athletes	34% ; P<0,001



Conclusions:

The high correlation test-retest seems to show that the pendulum punching bag that we crated can give reliable data.

In agreement with the international literature the results obtained confirm the different force capacity of boxers of different level and the difference of force of jab and cross punches.

But the N values we recorded (max.6532N; min.1091N) are not exactly superimposable to those obtained with the use of other machinaries of other international studies. Perhaps the cause is to be searched in the frictions, in the not enough level of sensibility of the photocells we used, and more in general in the error max ΔF (we not calculated). The research of these error causes and of their solution will be the aim of our next studies.

References:

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