Biomeccanica II

Lez. BM11

Mercoledì 16 Gennaio 2008 14÷15:30

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Salti

c. m. Osaka 2007
m 8.47
Andrew Howe
n. r. n.
Irving Saladino
m 8.57
n. r. sa.

Salti

- Il termine salto indica il movimento con cui ci si stacca dal terreno con un balzo per superare un ostacolo o per percorrere una distanza;
- quella di saltare è un'abilità che la maggior parte degli uomini e molti animali possiedono a vario livello;
- saltare consiste nell'azione di rimuovere il corpo dal contatto con il terreno per un breve periodo utilizzando solo la propria potenza meccanica, di solito spingendosi in alto per mezzo di prima contrazione & poi estensione forzata degli arti inferiori;

Salti/2

- l'altezza del salto può essere aumentata utilizzando anche gli arti superiori ('salto della cavallina') o utilizzando un trampolino;
- si può saltare per raggiungere qualcosa in alto, scavalcare un recinto od un fosso, saltare in basso o saltare durante la danza o lo sport;

Salti/3

- Nello sport esistono varie discipline di salto:
  * salto in alto (atletica leggera);
  * salto con l'asta (atletica leggera);
  * salto in lungo (atletica leggera);
  * salto triplo (atletica leggera);
  * salto con gli sci (sci nordico);
  * salto a ostacoli (equitazione);

Salti/3b

* corsa ad ostacoli bassi-medi-alti (atletica leggera);
* Fierljeppen (tipo salto in lungo ma utilizzando un'asta);
* football americano;
* pallacanestro;
* danza;
* pattinaggio di figura (rotelle & ghiaccio);
* ginnastica;

Salti/4b

* salto della corda;
* arti marziali;
* rugby;
* skateboard;
* sci;
* nuoto;
* pallamano;
* trampolino;
* ultimate (tipo frisbee); e
* pallavolo.

Halteres

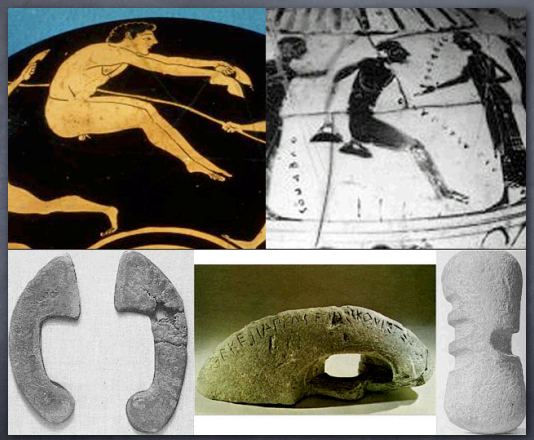

Figure 2.1 Upper panel – the use of halteres during the mid-flight phase of the standing long jump, as painted on a vase (Beazley Collection, 2002). Lower panel – halteres (British Museum etc., 2002) of different material (lead, stone), shape and size (from 1.1 to 4.5 kg).

Halteres/2

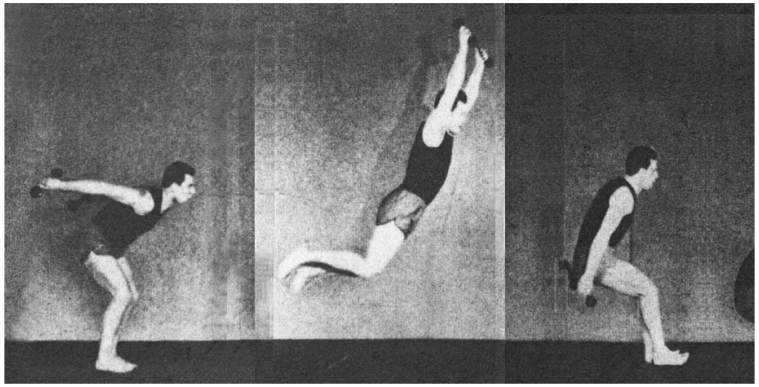

Figure 2.2 Sequence of three photographs (start, mid-phase and landing) of a standing long jump with hand-held weights provided in the paper by Ebert (1963).

Halteres/3

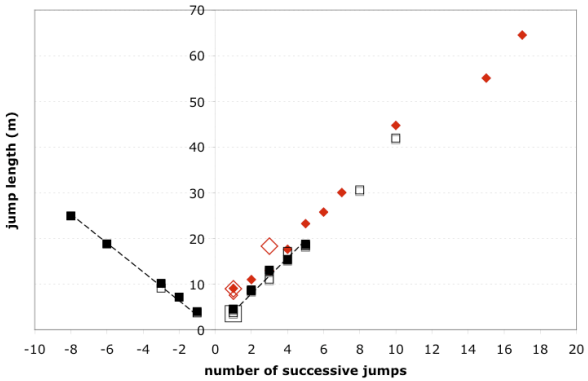

Figure 2.3 Record jump distance as a function of the number of jumps (negative number of successive jumps refer to successive backwards jumps): empty symbols 'without weights', filled ones 'with weights'; squares 'standing jump', diamonds 'leap one'; bigger symbols 'official records' (bigger empty square 'historic official standing long jump record', bigger empty diamonds 'current [leap] long jump world records [single and triple]'). Standing jump with weights series (backward & forward) have been fitted by linear regressions:

backward: jump length (m) = - 3.16 jumps #, R^2 = 0.99 n = 5;
forward: jump length (m) = 3.92 jumps #, R^2 = 0.97 n = 5

for a ratio between the two regression coefficients of:

= 1.24 (124%)

suggesting a reasonable 'functional asymmetry' of the exercise of the standing long jumps in the humans.

Halteres/4

Halteres/5

Figure 2.7 Original halteres' (British Museum, 2002) reproduced for testing purposes by the Department of Design and Technology of the Manchester Metropolitan University, UK.

Halteres/6

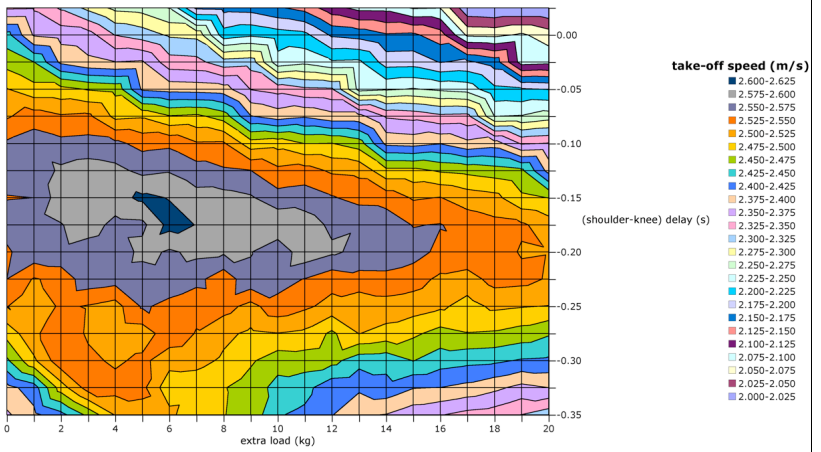

Figure 2.9 Take-off speed as a function of halteres mass and activation delay. Contours represent iso-take-off speed (spaced 0.025 ms^{-1}) for each combination of extra-load (0 means unloaded hands) and delay in the activation of knee actuator with respect to the shoulder; the maximal take-off speed (2.61 m s^{-1}) was obtained at (6 kg, -0.17 s).

Halteres/6b

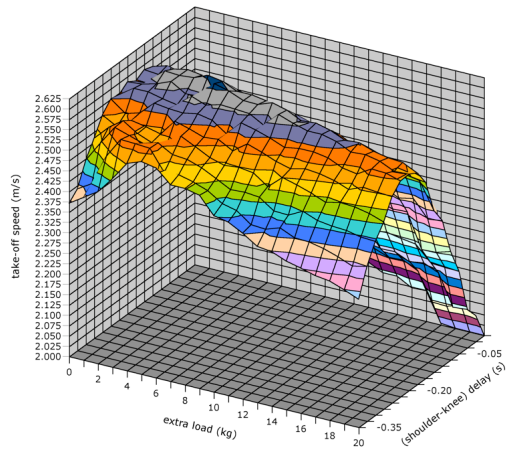

Figure 2.10 Take-off speed as a function of halteres mass and activation delay ('3-D surface' graph). 3-D contours represent iso- take-off speed for each combination of extra-load and delay in the activation of knee actuator with respect to the shoulder, like in figure 2.9 .

Halteres/7

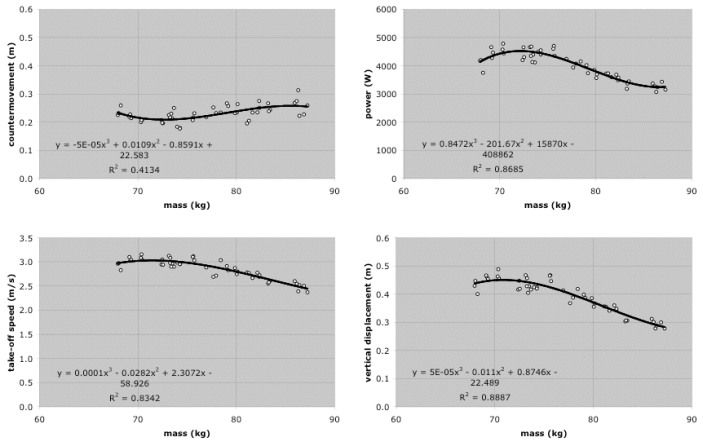

Figure 2.12 From left to right, from top to bottom: counter-movement, peak power, take-off speed and displacement of the centre of mass, vs. total mass (subject + hand-held weights), for the same typical subject of figure 2.10, all jumps. Fitting 3rd degree polynomial curves are used, together with raw data, for graphical purposes (in figure 2.13, too).

Halteres/7b

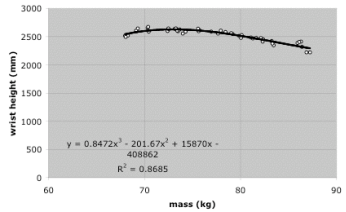

Figure 2.13 Maximal wrist height vs. total mass (subject + hand-held weights), for the same typical subject of figure 2.10, all jumps.

Halteres/8

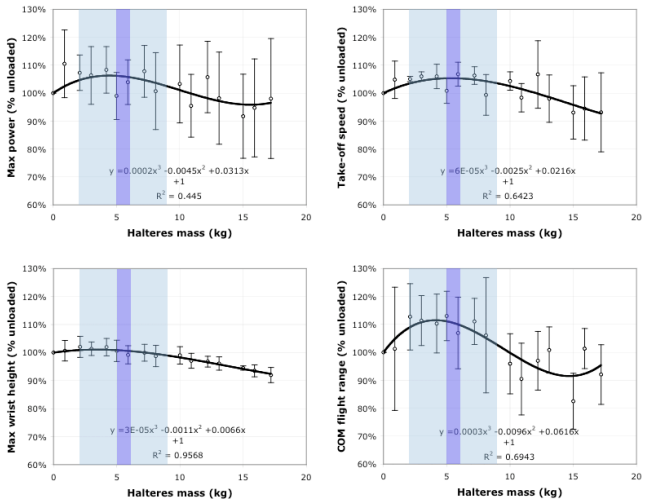

Figure 2.14 From left to right, from top to bottom: maximal vertical power, take-off speed, maximal wrist height and BCOM flight range over halteres mass. Average values (± SD, vertical bars) of the best results (among 3 trials for each halteres mass) are shown as a percentage of the unloaded jump condition (mass equal to 0 kg). The curves represent 3rd degree polynomial regressions – fitting chosen for graphical purposes – with imposed intercept at (0, 100%). The outer colored vertical band represents the size range of archaeological halteres (British Museum etc., 2002), the inner one the optimal performance amount (based on take-off speed).

2.6 Conclusions

The use of halteres in the standing long jump was likely to increase the distance range due to the following reasons:

1) the geometry of the loaded flight was featured by a more anterior position of the body centre of mass at take-off and its more posterior position at landing. For the same parabolic trajectory, feet could land more anterior and thus jumping performance was improved (a different geometry improves jump length);

2) it is very likely that the swinging of the arms+halteres caused an increase in the (net) vertical ground reaction force; and

3) it is also very likely that the shoulder rotator muscles operated at a more efficient (slower) contraction speed (a slower muscles' contraction speed might improve take-off speed).

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TI INTERESSA UN'ANALISI DELLA TUA POSTURA IN PROVE DI LOCOMOZIONE?

SE SI'? MASCHIO E/O FEMMINA, DI OGNI ETA', CONTATTAMI

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MI RACCOMANDO: SPARGI LA VOCE!!!!