SUPPLEMENTAL DIGITAL CONTENT 2

APPENDIX

Application of the proposed approach to the data of Fig. 3 typical subject.

The typical subject weighted 102 kg. His force-velocity and power-velocity relationships (Fig. 3) were obtained from the bilateral horizontal tests against different resistive forces. From these relationships, $\overline{F}_0$, $\overline{v}_0$ and $\overline{P}_{\max}$ were determined this subject: 2228 N (21.9 N.kg^{-1} when normalized to total moving mass), 3.23 m.s-1 and 1789 W (17.55W.kg^{-1} when normalized to total moving mass).

During the best trials of the different inclined push-off conditions, the mean forces he developed were: $\overline{F}_{ULright}$ = 961 N, $\overline{F}_{ULleft}$ = 1002 N, $\overline{F}_{BLright}$ = 704 N, $\overline{F}_{BLleft}$ = 797 N. His push-off distance (h_{PO}) was measured and set at 0.44 m.

From $\overline{F}_0$ (normalized to total moving mass), $\overline{v}_0$, h_{PO}, with g = 9.81 m.s^{-2} and α = 20 deg, equation [4] gives the take-off velocity of his center of mass ($v_{TO\max}$) during BL condition: $v_{TO\max}$ = 2.47 m.s^{-1}.

To compute $v_{TO\max}$ during the theoretical UL if each single limb acted independently of the other and presenting the same neuromuscular capabilities during UL and BL exertions (so if no neural capabilities alteration occured between UL and BL), the same input parameters were used in equation [4], except for the maximal isometric force which equals here to $\overline{F}_0/2$ (i.e. 8.34 N.kg^{-1} when normalized to total moving mass). This gives $v_{TO\max}$ = 1.60 m.s^{-1}.

From $v_{TO\max}$ values, and using either equation [1] or both equations [2] and [3], the mean force developed during these push-offs can be computed: $\overline{F}_{BL}$ = 1376 N, $\overline{F}_{ULth}$ = 838 N

From $\bar{F}_{ULright}$, $\bar{F}_{ULleft}$, $\bar{F}_{BL}$ and $\bar{F}_{ULth}$, actual BLD and theoretical BLD due only to F-v relationship (BLD_{Fv}) can be computed using equation [5] and [6]: BLD = 0.299 and BLD_{Fv} = 0.179.

The relative contribution of the F-v relationship to BLD ($\%BLD_{Fv}$) can be obtained using equation [7]: $\%BLD_{Fv}$ = 0.511