BIOMECHANICAL ANALYSIS OF THE LONG JUMP
AT THE WAC ATHENS 1997

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INTRODUCTION: In this study the performance of world class long jumpers was analyzed to determine whether jumpers can be divided into groups which have the same starting conditions and different jumping styles but nevertheless attain the same jump distance. It was also determined whether there are ideal jump strategies for various starting conditions given for both men and women at the world-class level of competition.

METHODS: The data for this study was recorded at the 1997 World Athletics Championships. Three stationary video cameras (50 Hz) filmed the jumps of 24 athletes, 62 jumps of which were analyzed from the women’s and men’s finals.

RESULTS AND CONCLUSIONS: The analysis revealed that independent of gender athletes demonstrating different combinations of vertical and horizontal velocities attain comparable jump distances. The total energy at touch down determines the maximum jumping distance, but most athletes fail to use this energy optimally (Fig.1). The take-off phase characteristics as given by the loss of center of mass (CM) energy during take-off and the transformation of the approach energy into jump energy (transformation index) are important determinants of jump distance. The transformation index shows a high correlation between energy at touch down and energy decrease during take-off. The optimum energy loss at take-off for the athletes analyzed was determined to be 5.5-6.0 J/kg for the women and 7.5-8.4 J/kg for the men. For a few athletes the measured values and the theoretical values varied considerably. These instances may indicate that the transformation index is dependent on individual physical differences.

Fig.1: Jump distance as a function of the energy at TD and energy decrease

REFERENCES: