

## Determining the force the takeoff leg exerts in the Long and High Jumps

By Robert J. Mackenzie

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The takeoff is the moment where the outcome of a long jump or high jump is determined. Once the jumper has left the ground, the ballistic characteristics of the jump are set in place and the only thing he/she can do is to wriggle around in the air like a cat, which will not increase the length or height achieved.

Each athlete has a set of personal characteristics that influence how he/she will perform in the takeoff. These characteristics include speed, leg strength, quickness,

height, weight, etc. However, figuring out either what an athlete is capable of or how to make him/her perform better is largely a subjective matter. How fast to approach the takeoff board or the bar, how to plant and how to take off, have always been somewhat "artsy" questions.

In this article, the author provides a method for the coach to determine the level of takeoff force generated by a jumper. He gives a formula that will allow the coach to calculate this force from film analysis. This information can be compared to measurable physical characteristics, such as maximum leg press, to determine if the athlete is jumping to his/her potential. It will also indicate how to modify the athlete's takeoff to best use the physical characteristics he/she possesses.

## Transitional control in the Combined Events

By Rick McGuire, Cliff Rovelto

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While the decathlon and heptathlon offer stiff tests of the physical skill, strength and stamina of an athlete, the mental challenge of combined event competition may be the most difficult of all. The wide range of disciplines and their numerous technical and tactical demands are just the most obvious aspects of the psycho-emotional trial facing the combined event athlete. There is no doubt that the mental aspect of these events has determined success or failure in many competitions.

Arguing that more attention should be paid to managing a combined event com-

petitor's mental and physical equilibrium between events (and between days), the authors ask if it is inevitable that an athlete must allow his/her thoughts and emotions to become negative and self-defeating. They conclude that athletes can learn to take control of critical aspects of their mental processes and thus increase the probability that they will deliver optimal performances and gain the greatest enjoyment, pride and satisfaction from their competitive efforts.

The four specific controls that are most important for the combined-event athlete are explained. These are: 1. Emotional control, 2. Attentional control, 3. Arousal control and 4. Transitional control. Specific examples of Transitional Control routines for each of the individual events in the heptathlon are provided as an appendix to the article.

## Velocity course over 400m at world-class level

By Stefan Letzelter, Ralf Eggers

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Because it was possible to divide the measured intervals in half, thus doubling their number and increasing the detail of the picture gained, this study of the 400 metres races at the 1997 and 1999 IAAF World Championships in Athletics provides results that contrast with earlier research.

After analysing the fastest races of eleven male and twelve female finalists in the two championships, the authors conclude that elite 400m runners reach their peak velocity not on the back straight as is

commonly held, but in the middle of the first curve. By 100m after that point the runner's velocity has decreased slightly and by 200m it has clearly dropped. The greatest loss of velocity takes place in the last 50m of the race. It was also found that the best elite 400m runners are not faster in the start and first acceleration but in the second curve.

The authors also conclude that male 400m runners are faster than their female counterparts not because of better speed endurance but because they have a higher level of speed strength and can reach a higher maximum velocity. A greater speed gain between the first and second halves of the first curve proves that right from the start of the race men accelerate to a higher velocity.

