Some controversy exists over the best energy expenditure strategy to use during a race (Klavora, 1977; Klavora, 1978). Physiologically and biomechanically speaking there is support for an even-paced or slightly negatively sloped strategy. (Townsend, 1982; Sanderson and Martin, 1986). Psychologically speaking it may be better to make an initial sprint and try to stay out in front. Clarifying the mechanisms which are at work during the course of the rowing event will help the athletes to select the most effective strategies.

The purpose of this study was to examine the time history of selected biomechanical variables during the performance of six minute maximal ergometer rowing to determine their effect on power production at different stages during the effort.

The average power output onto the oar handle was selected as the variable representing energy expenditure and can be found as the product of the average power per stroke and the stroke rate.

Peak force is one of the main factors determining the average power per stroke, (Schneider, Angst and Brandt, 1978), thus peak force and stroke rate were chosen as the other two variables for this study. The manipulation of stroke rate and peak oar force in the provision of what the rower considered was an appropriate energy expenditure strategy during six minutes of maximal ergometer rowing was, then, the focus of this study.

KINEMATIC ANALYSIS OF U.S. DECATHLETE SHOT PUT PERFORMANCE

SMITH, S.L.; SNOW, R.E.
USOC Sports Science Division
Colorado Springs
USA

The purpose of this study was to analyze selected kinematic parameters describing shot put performances of elite U.S. decathletes. The obtained information would provide baseline data of decathlete shot put performance in the initial year of the current quadrennium upon which subsequence performances of these same decathletes could be evaluated. A secondary purpose was to correlate the selected kinematic parameters with put distance.

During the 1989 PAC Championships, the trials of 13 decathletes in the shot put event were videotaped by an AG-150 Panasonic camcorder positioned perpendicular to the movement path of the athlete across the ring. Mean height and weight values for the group were 1.87 m and 83.92 kg, respectively. The best put for each decathlete (mean distance = 11.66 m) was analyzed on the Peak Performance Motion Measurement system at 60 Hz using a 15 segment model. The glide technique was used by 11 athletes with the spin move being preferred by the two other decathletes.

The digitized data were smoothed; selected temporal, linear displacement, and angle measurements were calculated. Mean values for shot velocity, angle of projection, and height at the time of release were 9.35 m/s, 42.5 degrees, and 1.97 m, respectively. None of these three variables describing projectile motion was significantly related to shot put distance.

Both shot horizontal displacement during the propulsion phase and the total movement sequence correlated negatively with distance (-.47 and -.52, respectively). Times for the drive phase and total movement of the put sequence also correlated negatively (-.50 and -.55, respectively) with put distance.

These findings suggest that (1) the lack of significant statistical relationships between put distance and projectile motion variables are not surprising considering the small, homogenous sample, and (2) the observed negative correlations between temporal measures with put distance reflect the importance of the force component in the impulse-momentum relationship in this event.