BIOMECHANICAL VARIABILITY IN THE SPRINT START

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INTRODUCTION: Research into the acceleration phase of sprint running has encompassed a spectrum of biomechanical variables (e.g. Mero *et al*., 1983), but little has been reported on intra-subject variability. This study reports preliminary data from ongoing research into variability in sprinting performance.

METHOD: Kinematic measurements of the start and acceleration phase for an elite male athlete (100m record: 10.22 s) were carried out using CODA CX1 motion analysis system (Charnwood Dynamics Ltd., Leicestershire, UK) operating at 400Hz. Markers were located laterally on the fifth metatarsophalangeal, ankle, knee, hip, shoulder and elbow joints on the right side of the body and medially on the first metatarsophalangeal, ankle and knee joints on the left side of the body. The athlete performed eight maximal effort sprint starts and ran to beyond a 30 m line. Means, standard deviations and coefficients of variation were calculated over the first six steps. Time to 10 m, determined from the hip marker, was 2.08 (±0.03 s). Variability was evenly distributed indicating that there were no obvious 'warming up' or 'fatiguing' effects within the trial series.

RESULTS & DISCUSSION: Table 1 presents values for step length (SL), step frequency (SF), step height (SH) and contact time (CT). Step height was defined as the vertical range for the respective metatarsophalangeal markers.

Table 1 Coefficient of variation (%)

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6
SL (m)	6.6	8.3	4.8	4.1	2.3	2.1
SF (Hz)	12.1	12.6	12.6	4.4	6.2	6.1
SH (m)	13.0	11.1	14.3	9.0	8.8	6.8
CT (s)	12.1	20.4	15.7	7.0	8.2	6.2

Key: SL= Step length, SF = Step frequency, SH = Step height and CT = Contact time.

A higher level of intra-subject variability during the initial three steps of the acceleration phase was seen with the greatest variability occurring around steps two and three.

CONCLUSION: Decreasing intra-subject variability was observed as the athlete progressed from the start. In order to gain further insight into the factors contributing to this variability and hence to sprint performance, these measures are currently being extended to include further trials for this athlete and for additional athletes to facilitate the examination of inter-subject variability.

REFERENCES:

Mero, A., Luhtanen, P. & Komi P. (1983). A biomechanical study of the sprint start. *Scandinavian Journal of Sports Science*, **5** (1), 20 -28.

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