



Speed

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Definition

- In sport, Speed is the ability to react to a stimulus or signal in the shortest possible time, and to perform cyclic and/or acyclic movements at the highest tempo at various levels of resistance.
- Speed becomes measurable by specifying velocity as the ratio of distance covered and unit of time: $V = s/t$

- **Bioenergetic Model**

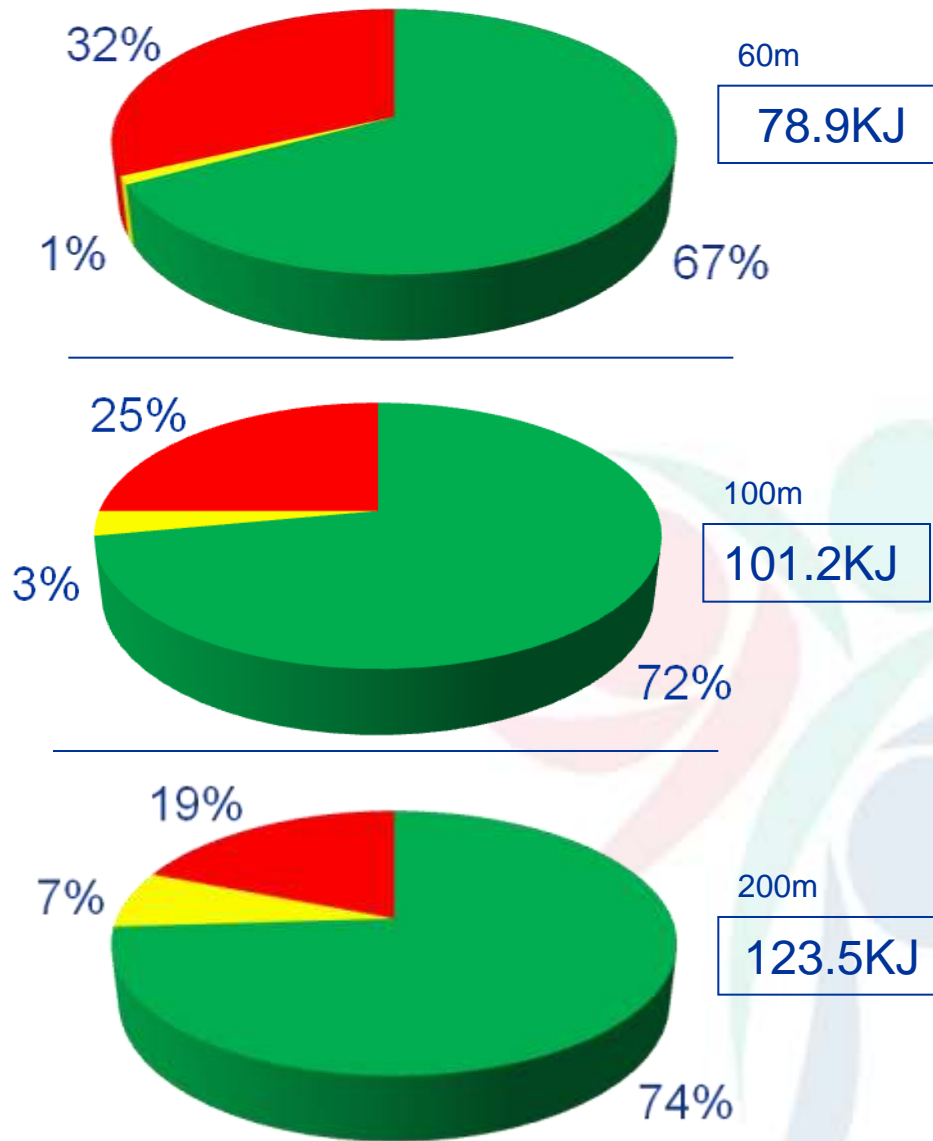
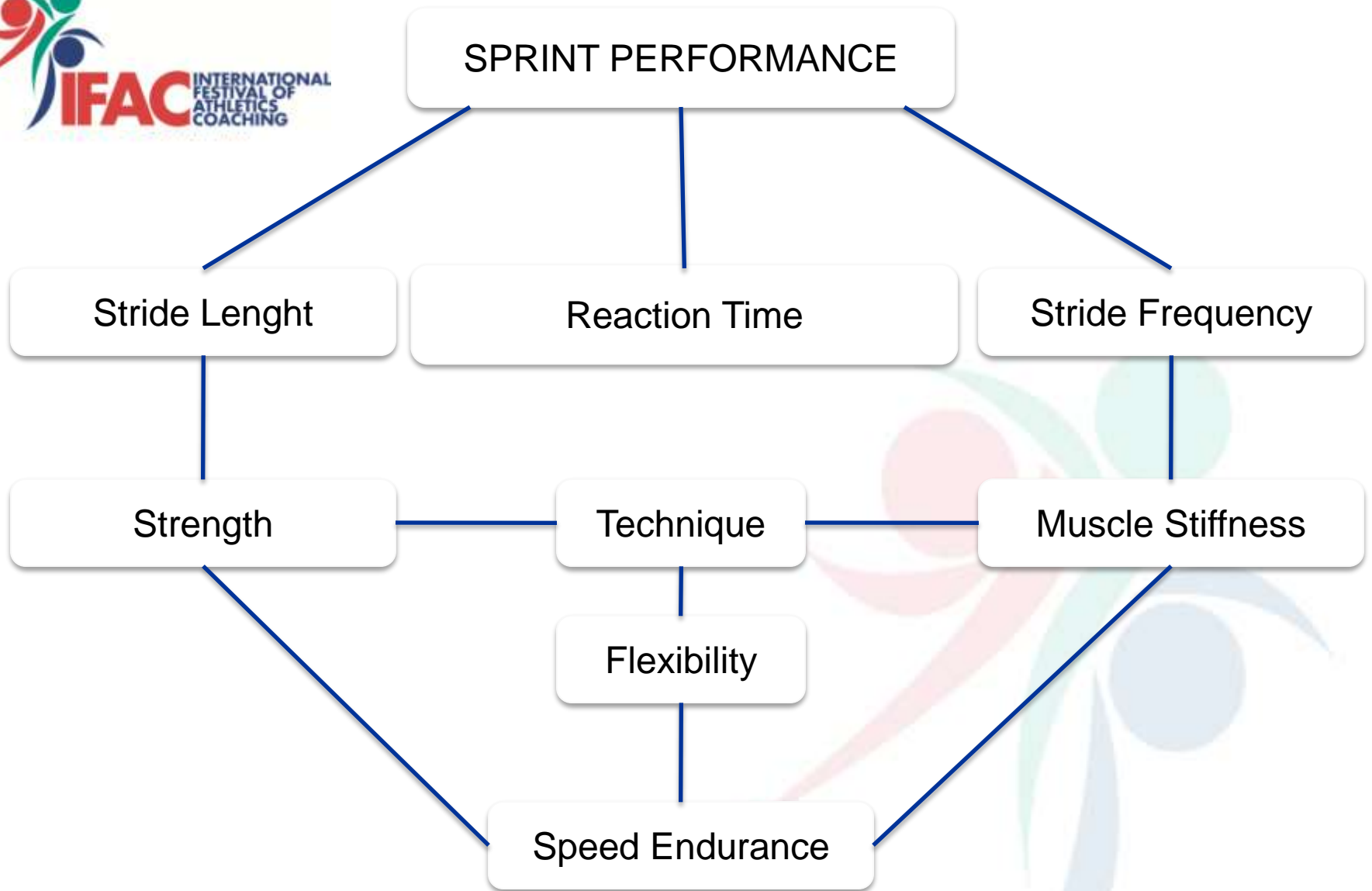


Figure 6: Contribution of glycolysis to sprint performance



Factors influencing sprint performance

- Reaction Time
- Explosive strength and Power
- Muscle Stiffness
- Technique
- Efficiency of the anaerobic system

Practically, these factors, (excluding reaction time) are those that influence the length and the frequency of the strides; the athlete shall try to optimize these two parameters to improve his/her performance.

Sprint Performance

- Sprint performance:
 - Is determined by the length and frequency of the strides. To increase the speed of a subject is necessary to increase one or both parameters.
 - Practically the coach should build an individual optimal model for each athlete, taking into consideration his/her neuromuscular capacities and his/her anthropometric data.
 - To modify one or both the above parameters the sprint training should include special exercises which can affect them (C. Vittori 1982).

Measuring Speed

- **Average Speed**= S/T ; Measured in m/s.
Example: 100m in 10" = 10m/s, that means 36 km/hour
(10s x 3600s divided 10mx100m)
- **Average Frequency** = number of strides done in a certain time; is measured in hertz.
Example: 100m in 9.58s with 41 strides; frequency = $41 : 9.58 = 4,28$ hertz.
- **Average Length**: to obtain it we should divide the race distance by the number of strides measured in cm
Example: 41strides in 100m. = 243,9cm

Fastest performances

- The faster race:
 - 4x100m (JAM) 37.04 = 38.9km/hour
- The top flying speed measured:
 - Usain Bolt in Berlin: in the 100m final, he covered the space between 60 and 80m in 1.61s that means 44.72km/hour

SPRINT MODELS

- Usain Bolt: 100m 9.58 41.0 strides
- Tim Montgomery: 100m 9.78 49.1 strides
- Frankie Frederiks: 100m 9.87 46.2 strides
- Asafa Powell: 100m 9.74 43.5 strides
- Ekaterini Thanou : 100m 10.82 53.0 strides
- Marlene Ottey: 100m 10.85 46.3 strides
- Florence Griffith: 100m 10.54 47.6 strides

N.B. -Marlene Ottey, after 1 year of specific exercises, did 10.74 with 46.9 strides (Milano: 1996).

Example: running 100m at different rhythm

Parameters	normal	run with shorter	run with longer
Time (s)	10.50	10.68	10.68
N. of strides	46	52,9	40,70
Average freq.	3,81hz	4,38hz	4,95hz
Average length	217,4cm	189,2cm	245,7cm

P.S. : Leg length of the subject = 92cm (% \approx 11,5%)

Thank you for your attention

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