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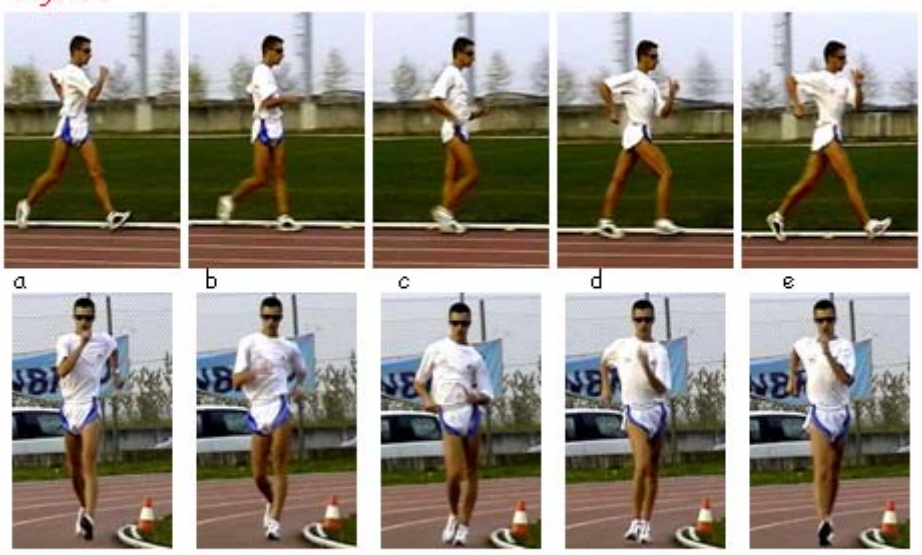
Developing Race Walking Technique: key drills to develop race walking technique and neuromuscular co-ordination

Race walking coaching is organised as part of the endurance group in UK Athletics. The aerobic demands of the events (20 km & 50 km) see athletes performing training of a similar nature to 10000 m/marathon runners. Coaches in this event look to develop both the endurance efficiency of the elite distance athlete but also the neuromuscular qualities of economical and correct technique (fig. 1). IAAF rule 230 governs the event and plays a decisive role in the outcome as incorrect technique may lead to disqualification (DQ) if the athlete fails to maintain unbroken contact with the ground and/or the supporting leg is not straight on contact (remaining straight until centre of gravity has passed over it). DQ's for "lifting" or "bent knees" generally occur early in competition for the athlete with incorrect technique and late for the athlete experiencing fatigue where prior correct technique breaks down.

Figure 1



- Race walking technique phases: a) double support; b-c) swing; d) attack; e) drive.

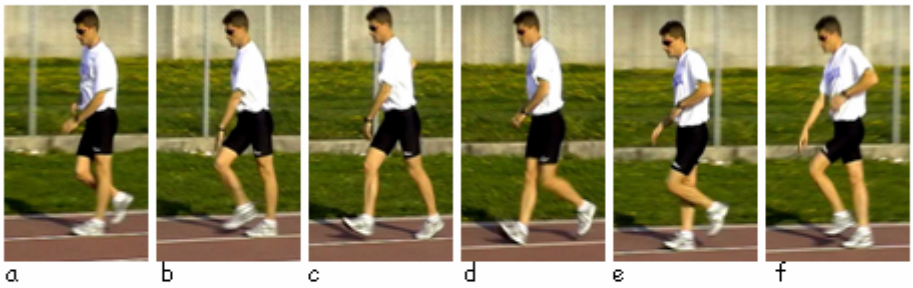
Technical Drills

Race walk drills are often called "Mexican Drills" as they are associated with the preparation of the great Mexican athletes who came to prominence in the 1970's such as 1976 Olympic 20 km Champion Daniel Baustista and the 1984 50 km Gold Medallist Raul Gonzales. Similar drills remain an important part of the training repertoire of current champions including Italians Ivano Brugnetti, 1999 World 50 km Champion, Lorenzo Civallero, 2001 World University 20 km Champion and Alessandro Gandellini, 9th Olympic 20 km 2000, who feature in the photo sequences. The drills outlined focus on the movements and control of the hips/pelvis that are the key to effective race walking technique. They break hip action down into constituent parts, whilst also including the torso and shoulder girdle (figures 2-6), and control of the walking action (figures 7-8). Coaches use drills like these to develop dynamic mobility and also to teach and correct the technical aspects of the events, e.g. the hip flexion drill (fig. 2) develops dynamic anterior mobility in the hip joint but also helps the athlete to learn the full knee extension on contact required by rule 230. Some suggestions for using drills to help athletes learn are given later.

Drill Terminology

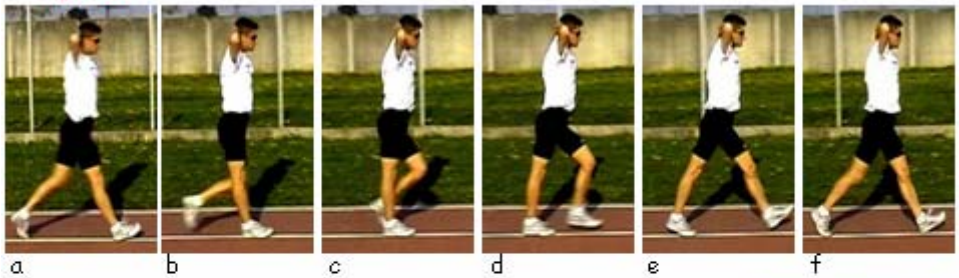
- Flexion: Decreasing angle at a joint
- Extension: Increasing angle at a joint
- Median plane: Midline dividing body into right and left halves
- Horizontal plane: Midline dividing body into upper and lower halves
- Frontal plane: Midline dividing body into front and back halves
- Plantar flexion: Ankle flexion (pointing toes)
- Dorsiflexion: Ankle extension (raising toes)
- Retracted: Contraction of trapezius and rhomboids to move shoulders back
- Medial rotation: Rotation moving (e.g.) Arm toward median plane
- Inferior: (e.g.) Hip moving closer to feet
- Lateral flexion: (e.g.) Torso moves away from median plane

Figure 2



- Hip flexion drill. a) normal swing phase body position with arms extended at elbow; b-c) increased right hip flexion, left foot plantar flexion and left arm medial rotation (not crossing median plane) result in shortened drive phase and elevation of hips through horizontal plane; d) right leg in initiation of single support with increased dorsiflexion; e-f) return to normal elbow flexion but reduced shoulder extension.
- Drill also teaches full knee extension on contact, e.g. d-f

Figure 3

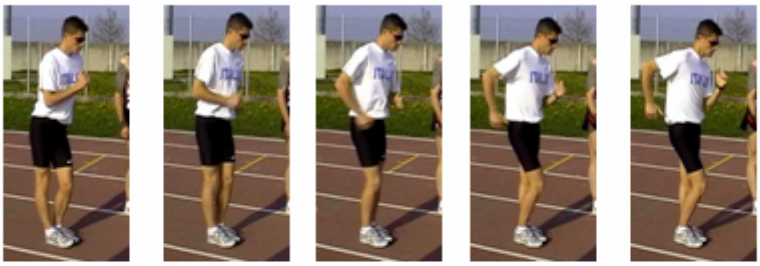


a b c d e f

- Hip extension drill. Hands held behind head, shoulders retracted. No torso movement. a-e) lower limbs move through double support, swing, attack and drive phases; f) return to double support; g) alternative arm position.

g

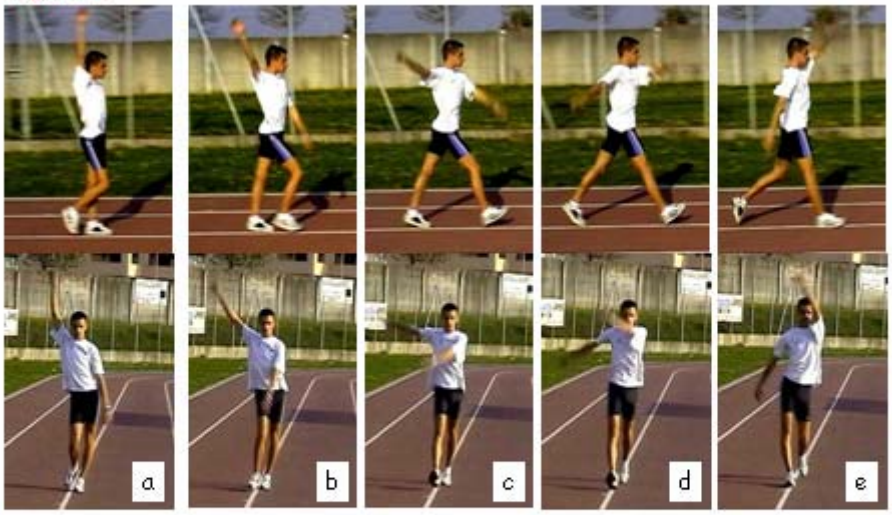
Figure 4



a b c d e

- Arm action drill. Feet together throughout. a) right elbow flexed at 90° and medially rotated towards but not across median plane; b) initiation of right shoulder extension; c-e) right shoulder continues movement to hyperextension at "e".
- Hip flexion/extension is limited by foot position but there is no lateral flexion of the pelvic or shoulder girdle in the frontal plane .
- Slight dorsiflexion at ankles gives body position of about 88° to horizontal (moving body into frontal plane).

Figure 5



- Hip rotation drill. Arms fully extended at elbow throughout. a) lower limbs in swing phase and right arm fully flexed at shoulder to initiate (b) rotation; b-d) right hip flexes and right knee extends into double support phase, while left arm is medially rotated; e) left shoulder flexion increases inferior movement of left hip in swing phase.

Figure 6

- Medial hip rotation drill. a) double support with cross over of lower limbs and increased elbow extension; b-d) right foot inverted through swing phase and torso flexes laterally to athletes' left through frontal plane; e-g) left thigh medially rotates during hip flexion in attack phase; g) torso begins extension back to vertical during drive phase.

Figure 7

- Co-ordination drill 1. Switch between different stride patterns: a) overstride (technique leading to bent knee warning); b-e) jump - initiating flight phase (technique leading to lifting warning); f-j) short/fast stride as correction (use f-j in competition as response to caution signal from judge).

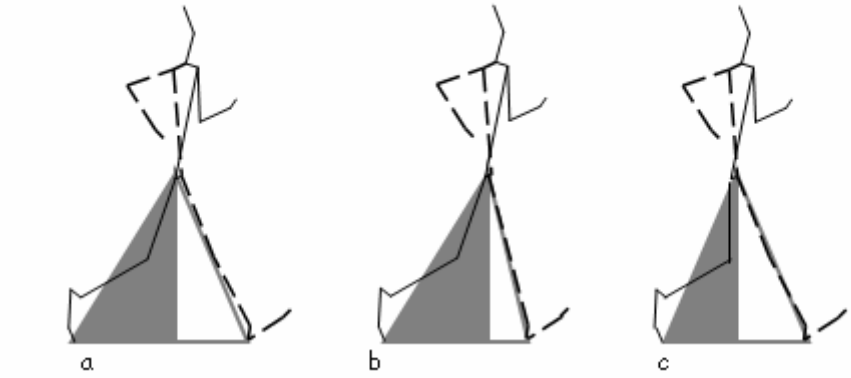
Figure 8

- Co-ordination drill 2. Switch between run (a-c) and race walk (d-f)

Key Technical Errors (leading to warning):
An identifiable flight phase during double support is called “lifting” and possible causes could be: incorrect stride length; high knees during the swing and attack phases; and high shoulders.
Knee flexion on contact is called “bent knee” (as in running) and possible causes could be: eversion (pronation) of the foot on contact and lack of strength in the quadriceps.
Poor posture (lack of core stability) results in sub-optimal hip flexion/extension and may be a factor in either technical error.

Coaching Points
In the double support phase, if a line is dropped from the centre of the hips to create two triangles, the rear is the largest (e.g. fig. 9a). An athlete with poor foot placement or lacking strength in the lower limbs may be unable to attack and/or drive effectively (e.g. fig. 9b). If the athlete lacks strength in the tibialis anterior (shins) the push phase may be too short (e.g. fig. 9c).

Figure 9



A good range of movement in the pelvic girdle is essential if technical development is to occur. It is required for development of optimal stride length and drive (horizontal impulse). In the race walk athlete the largest mean joint power is generated in the hip joint and this is related to pelvic/hip motion. Japanese researcher Koji Hoga's data collected from 33 elite male athletes competing in a 10,000 m race (finish times 40:52 - 45:50 min) demonstrated the relationship between the motion/control of the hips/pelvis and the ability to produce an effective/high power output seen in the faster finishing athletes (Hoga, *et al.* 2000).

While increasing the athletes' range of motion and muscular strength may be required to develop race walking technique, the drill exercises by their dynamic nature also develop neuromuscular co-ordination, which may be a more effective way for the athlete to "learn".
Coaches may consider the review of learning and performance effects of practice by Berg and Lundin (2002) for a discussion on the use of drills. Blocked drills (repetitive tasks in fixed sequence) may lead to better performance in training but randomised practice (different tasks in no particular order) may lead to better learning (Berg and Lundin, 2002). As well as the co-ordination drills in figures 7 and 8 coaches could ask their athletes to perform drills in a random order and in combination switching in and out of regular technique, e.g. drill fartlek.

Athletes may experience a temporary decrease in performance (loss of economy) while attempting to make technical changes. This is because small muscles that generally perform proproiceptive/synergistic roles (e.g. in the torso and pelvic girdle musculature) may well be more active while new movement patterns develop. As neuromuscular co-ordination improves so proproiceptive/synergistic activation may lessen and economy improve.

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- Hoga, K., Ae, M., Enomoto, Y., Fujii, N. Biomechanical factors of the walking speed in race walkers. *Abstracts for the joint meeting of the 8th annual meeting of Japanese Society of Exercise and Sport Physiology and the 16th annual meeting of the Japanese Society of Biomechanics*. p.402. 2000.

Acknowledgements

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Andrew Drake is a Lecturer in Coaching & Sport Science at Coventry University, a UKA Level 4 Performance Coach and a member of BASES. a.drake@coventry.ac.uk