

Why Did Coe's 800m Record Last So Long?

By Frank Horwill

Sebastian Coe's 800 metres world record is now 14 years old, as is his 1000m record. Numerous attempts have been made by promising two-lap performers to smash it - all have ended in failure. Why is this so?

(Editor's note: it has now been broken, after this article was written).

Broadly speaking, 800m runners must either possess blinding speed at 400m (sub-45 secs) or reasonable speed (sub-47 secs). The latter, because of their lack of comparative speed, must possess good endurance. A measure of such endurance is the ability to run sub-3:50 for the mile or sub-3:30 for the 1,500m.

It is clear that the sub-45 sec 400m runner can get away with less endurance than his slower counterpart. Juantorena and Fiasconaro do not appear in the World All-Time lists for 1,500m, but Coe does. Steve Cram appears in both the 800 and 1,500m All-Time lists. However, Joaquin Cruz, Coe's nearest rival in the 800m with 1:41.77, also does not appear in the 1,500m rankings. What does this tell us about 800m racing? It shows that the world record for 800m for the past 50 years has been in the hands of the 800 or 1,500m type of runner for two-thirds of the time, and a third by the predominantly 400m/800m type.

A simple test to discover whether an 800m runner has a weakness is to compare the flat 400m time to the average lap times in the 800m. If we take Coe's best 400m time of 47 secs and compare it to his average 400m time set in his world record of 1:41.73, we see that he ran two laps just under four seconds a lap slower than his best for 400m. If we do the same with Juantorena, we discover that the differential is just under 7.5 secs. If he had possessed Coe's endurance, the world 800m record would now be 1:36.52! And the same if Coe had possessed Juantorena's speed.

Gaining the four-second endurance

We can now safely adopt the four-second rule as a measure of adequate endurance in any 400m runner. Thus if we have a female runner with a best time of 52 secs/400, she is capable of 1:52 for 800 metres. But Jarmila Kratochvilova, with a best of 47:99 for 400m, could only manage 1:53.28 for 800m, more than 8.5 secs per 400m slower in her 800m time than for her best 400m performance. Again, had she managed a four-second conversion, the world record for the women's 800m would be 1:43.98!

How does one gain this four-second endurance? We have seen that one type of 800m runner with a fair 400m time can perform well at 1,500m. They could not do this if they did not

regularly train at 1,500m speed. This rate of running is relevant to two-lap running because it is 50 per cent anaerobic, well on the way to the 67 per cent anaerobic running required in the 800m. It is also 110% VO₂ max compared to 130 per cent needed in the two-lap event. That must be part of the answer to solving the equation. Yet there are two-lappers who constantly exclaim, 'I need speed for the 800m!' That, too, is a prerequisite, another part of the equation. But we have seen that pure speed can only go so far.

What is a meaningful 1,500m session? There are hundreds of combinations, but one used by women under the old Soviet system has much to recommend it because it mimics the 1,500m race. It is: 1 x 400, 30secs rest, 1 x 800, 60secs rest, 1 x 300. There is a lap walk when completed, then the session is repeated.

In my research I have discovered that the average times done on both sessions will forecast the potential 1,500m time. For example, if the 400 is done in 60 secs, the 800 in 2:04 and the 300 in 42 secs, this adds up to 3:46. If the second set is completed in 3:56, the average is 3:51 - the potential 1,500m time.

The secret of Coe's endurance

But where did Coe get his amazing endurance from? The answer came to me in 1986 when I went to Battersea Park Track one Saturday morning with a 13:11 5km performer to do a session of 7 x 800m at 5km speed with 45 secs rest. The rep times were fixed at 2:08 because the 5km runner was returning to fitness after injury. Coe was on the track and came across and asked what we were doing and could he join in? I felt a little apprehensive that an acknowledged 800m/1,500m runner would not survive a 5km pace session with a short recovery. The 800ms went like this: 2:08, 2:06, 2:04, 2:02, 2:00, 1:58 and 1:56! Coe led them all. Afterwards, he confessed that he did a 5km pace session at 13:20 speed each week. I ventured the opinion that he could run a good 5km anytime. He agreed, but said he didn't like the event! It is doubtful whether any 800m runner before or since could have completed such a session in such times.

What is the significance of a 5km pace session? It is 95% VO₂ max and, according to the world's leading work physiologists, Costill, Cooper, Daniels and Astrand, it is the greatest improver of oxygen uptake. Coe's VO₂ max has been measured at 82mls.kg.min., one of the highest ever recorded, yet he never exceeded 50 miles a week. This mileage frugality pales into insignificance compared to Bannister's 28 miles per week. But Bannister, like Coe, did 3 x 1.5 miles at 5km pace each week on the track. Coe's coach, his father, has stated that 'Five kilometre pace running is golden. It eradicates the need for big mileage'. The aforementioned physiologists advocate 5 x 1km at 5km pace with 60 secs rest as being the ideal workout.

This raises the important issue of what speed to run these 5km sessions if the athlete has never raced the distance? A simple rule-of-thumb method is to multiply the 1,500m speed by three and add three minutes - eg, best 1,500m time = 4mins x 3 + 3mins = 15mins (72/400). Thus a good session in this case would be 5 x 1km in 3 mins with 60 secs rest. It can always be adjusted and improved when executed comfortably.

A weekly training programme

As I've said, the 800 metres event is two-thirds anaerobic, one-third aerobic. So the training must reflect this. Here is an example of such an allocation:~

Day 1: Aerobic - 80 per cent - 5 x 1km at 5km pace – 60 secs rest. 95% VO2 max

Day 2: Anaerobic - 83 per cent - 1 x 350m, 1 x 300m, 1 x 250m, 1 x 200m, all full out with good recovery

Day 3: Anaerobic - 67 per cent - 1 x 600m, 1 x 500m, 1 x 400m, all at target 800m pace with good recovery. 130% VO2 max

Day 4: Aerobic - 98 per cent - 10 mile run, 75 secs per mile slower than for one's best mile time. 80% VO2 max

Day 5: Anaerobic - 95 per cent - 3 x 4 x 200m full out with 30 secs rest and 400m walk after each set

Day 6: Rest

Day 7: Race or time trial - 600m or 1,200m or 400m, or in strict rotation, ie, one week, 400m, next week, 600m, third week 1,200m.

We come now to some significant statistics with regard to the 800m event. The average age at which world records are achieved is 25, though this does not preclude good times still being performed for a further five years or more. African athletes tend to run their best 800m times a little earlier than Caucasians. There are, of course, great exceptions to the rule - for instance, Willie Wulbeck ran 1:43.65 aged 29, Aouita was the same age when he ran 1:43.86, and Kipkurgat ran his fastest 800 (1:43.91) when he was 30. They were not world records. Women 800m runners tend to peak later than men, at age 26; world records on average are achieved at around 28.

These age statistics indicate that there is a limited time-zone for world-class performances, so considerable thought should be given to the progress that has been made and not made. A runner may have an excellent endurance conversion from his 400m time, eg $48\text{secs} / 400\text{m} + 4\text{secs} = 52\text{secs} \times 2 = 1:44\text{secs}$. Further improvement will not come from increased endurance - the four-second rule is the maximum possible. But if the 400m speed is lowered by a second to 47 secs and the same endurance quota remains, the 800m potential is 1:42. Likewise, a runner aged 22 with a flat 400m time of 46 secs who continually runs two laps together eight seconds per lap slower than for his best 400m ($46 + 8 = 54 \times 2 = 1:48$) must realise that if this differential is altered by just two seconds ($46 + 6 = 52 \times 2$), he will improve by a massive four seconds (1:44).

The best weight for two-lappers

Another important factor that affects the acquisition of greater endurance is body weight relative to height. Coe was 5ft 9in tall and weighed 119lbs (1.753m / 53.978kg). That is about 40 pounds lighter than the average non-active man of the same height - or 35 per cent less! While this may be too extreme, a figure of 10 per cent less (in this case, 144lbs) must be considered the maximum allowable weight for the height. Thus, the average man of six feet

(1.829m) in height may weigh 176lbs (84.368kg) but for two-lap purposes he should not exceed 159lbs (72.121kg). Weight is lost by the avoidance of high-fat foods and a gradually increasing volume of work.

The end product of training is to race successfully. This involves two problems: the racing programme, and race tactics. There is plenty of statistical evidence to show that in a six-month period the fifth to seventh 800m raced is most likely to be the fastest. However, it is for each athlete to check his or her racing diaries to find out when peaks have been achieved in the past. The aim is to perform well on the right day, which may be an Olympic final. The races should be arranged so that the likely peak will occur when it matters most.

Tactics are important. Although it is the contemporary trend to cover the first lap two-seconds off one's best 400m time, this is physiologically unsound, because races executed in this way inevitably have a second lap at least five seconds slower than the first. The last 200m is often the slowest of the race. Level-pace running is a powerful weapon. The world-record 800m indoors was broken this way, as was the 1992 Olympic women's 800m gold, in two almost identical laps. Level-pace running is not level-effort running. The time to increase effort is in the third 200m of the race off a moderate first lap, with all-out effort over the last 200m. Running in the second or third lane throughout the race will add half to one-and-a-half seconds to the overall finishing time - a common occurrence even in world-class races.

Psychological racing is useful. A 1,500m is raced at the beginning of the month. Then a 400m. And at the end of the month, the 800m. The first tests endurance, the second speed, and in the third they both come together.

Thoughts on strength training for middle distance runners

Frank Horwill

From the year 1965, coaches veered away from the title "weight training" for runners, they preferred the description "strength training". This was because weight training facilities then were not freely available, also, because there were other methods of gaining strength.

Rationale

Runners when given muscular endurance and power strength tests, were quickly divided into two groups by the results:

1. Those capable of running sub 52secs/400 (male) and 56secs/400 (female).
2. Those incapable of running this speed.

It was found that those in group 1 possessed better all round physical strength, and greater specific strength (legs), and had run good times for 800m/1,500m. Those in group 2 had run moderate 800/1,500m times and possessed reduced all round strength, often they possessed

poor leg strength. They tended to run distances from 5km to 10km and farther. The relationship of strength to speed had been firmly established.

Types of strength

There are three types:

1. Muscular endurance
2. Power
3. General endurance

The first involves repeating a sub-maximal exercise many times (press-ups, squat- thrusts, chins). The second involves the ability to move maximum weight for a very short period. The third is the ability of the heart to pump enough blood around the body to supply sufficient oxygen for the required speed. The heart is a muscle.

Discussion

Since 1965 it has become increasingly apparent that there is no hiding place in the longer distances for the athlete without good 400m speed. A blatant fact when the last lap of a 10km race is run in sub 53secs. Speed is rate of stride x length of stride. Speed is relative. A runner who can cover 400m, in 52secs, should cover 800m in 1min 52secs (56 + 56), in turn, 1,500m in 3mins 45secs (60/400), 3,000m in 8mins (64/400), 5km in 14:10 (68) and 10km in 31:00 (72). If this cannot be done it usually indicates that (3) above, general endurance needs improvement.

What type of strength?

Power is required to sprint, the greater the leg power the greater the stride length. Muscular endurance is required to run longer distances much of this comes from the act of running. More comes if the act of running is made more difficult, e.g. running up hills, running in sand, running with ankle weights, running in water suspended by a buoyant vest. This also improves the heart muscle.

There is little point in a runner being able to lift huge weights overhead: such work is not required in running. Thus, all strength training should be specific to the task of running. One of the advantages of muscular endurance exercises is that the heart is made to work as if running.

Methods

- a. Multigym
- b. Loose weights
- c. Isokinetic
- d. Using bodyweight
- e. Elastic strength

Method (a) is safer than (b), but (b) gives a more realistic measure. (c) ensures the same stress throughout the lift. (d) is convenient and relevant to running. (e) is exaggerated running

or parts of the running action. There is a danger with (a) and (b) of becoming obsessed with the "body beautiful syndrome". In middle distance running great muscular bulk is detrimental to oxygen utilisation after 45 seconds. Few gyms possess (e) and with limited leg work relative to running. Runners are recommended to use (d) and (e), because visits to gyms, which are time consuming, are avoided, and can be done on the track or at home.

Progression

There comes a point when a muscular endurance exercise peaks. It is then time to perform the same exercise against greater resistance. For example, when 100 ordinary press-ups are recorded, they are made more difficult by raising the feet off the ground. This applies to every exercise where bodyweight is being moved.

Examples of bodyweight exercises:

Exercise	Description	Target	Effect
Press-ups	Front support with back straight	100	Arm and shoulder
Extension press-ups	Arms fully extended beyond head	15	Back and shoulders
Side support leg raising	Supported on right hand and leg, leg raise	40	Trunk and arms
Sit ups	Feet not anchored, knees bent	60	Abdominals
Single leg squat	Keep one leg parallel to ground	10	Thighs and balance
Crab walking	Walking in crab state	30secs	All round
Hop	One leg 25cm	10	Thigh and lower leg

These exercises should be done every other day during the winter, once a week in summer.

- • • RE: What college sub 1:52 800m runners lift weights? What type? 11/1/2006 4:50PM - in reply to [800man](#)
 -
 - [Reply](#)
 - [Return to Index](#)
 - [Report Post](#)

calf raises, squats, hamstring curls, leg press, leg curls 1 day a week, bench, bi's, tri's, pull downs, pull ups 2 times a week, I also do alot of plyometrics and hill sprints.

fresh-1:57

soph-1:53

jun-1:50

Read more: http://www.letsrun.com/forum/flat_read.php?thread=1609608#ixzz3wTCcUcF8