

MIDDLE DISTANCE IS NOT SHORT LONG DISTANCE

Kevin Prendergast

Introduction

From time to time both Athletics Australia and the Australian Track and Field Coaches Association arrange events into event groups. They appoint people to be responsible for providing some leadership to coaches and/or athletes in the various groups, and the groups serve as a point of contact for the athletes and coaches for their mutual benefit. Both organisations continue to devalue middle distance running, and to provide less than optimal service to middle distance athletes and coaches, by lumping middle distance in with distance. It could be that nothing is meant to be gained by having event groups, and they are not meant to bring about improved performance. In that case it would not matter if marathon running was in the same event group as hammer throwing. However if event groups do matter it would be wise to group events so as to have maximum commonality of skills, theory and practice. On this basis middle distance deserves its own event group.

Place of Middle Distance in Spectrum of Running Events

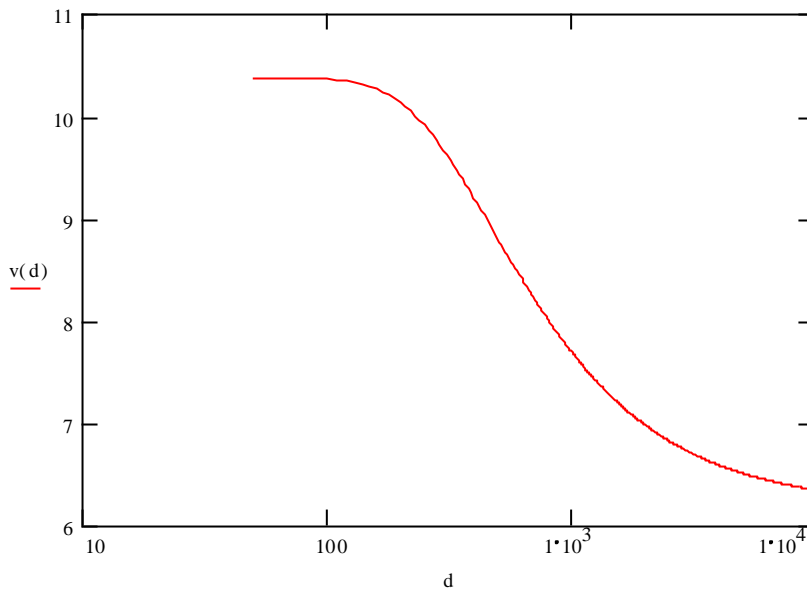
If we look at the average speed of each of the world record performances in the spectrum of running events we get a good picture of the characteristics of the various events, and we can see where middle distance belongs among them. Apart from the obvious fact that there is considerable difference between 100m and 10,000m speeds (about 40% difference), the picture of world record speeds gives us two further interesting and relevant pieces of information. The speed of the sprints (100m and 200m) is virtually the same, and the speed of the distance performances (5000m and 10,000m) differs by less than 5%. Speed in both ranges is approximately distance independent. On the other hand the speed in the range of events in between these two is very much distance dependent. The range of events between sprints and distance is appropriately named *middle distance*, and in it distance doubling results in a loss of speed of about 10%.

In the graph of the equation of world record speed as a function of distance, derived from world record performances, the curve has two relatively flat sections, joined by a sloping section. The relatively flat sections are the sprints and distance, and the sloping section is middle distance. The *knee point* of the curve is after the 400m and the *ankle point* is before the 3000m. The 400m event is at the end of sprints and the 3000m event is at the beginning of distance. This graph is shown below, and the distance is shown on a log scale, in order to give sprints and distance equal prominence.

GRAPH OF SPEED v DISTANCE(LOG SCALE) FOR MEN'S WORLD RECORDS

$d := 50, 60, \dots, 10000$

$$v(d) := \frac{10.38}{1 + e^{-0.391 - \frac{669}{d}}}$$



Characteristics of Sprints, Distance and Middle Distance

Sprints are characterised by an all-out effort, which can only be for a very short time. There are refinements of course, such as that the effort must be controlled, particularly in the 200m. However the essential and dominant feature is that nothing is held back, in order that there can be rapid acceleration and high top speed. It is all over in less than half a minute and what you could do in half an hour does not particularly matter. Sprint events are explosive. The limiting factor is how fast you can get energy out of your body and onto the track.

At the other end of the spectrum, distance events are about having a high steady state speed. The most important attribute is the top steady speed you can maintain, without the need to slow down, for more than half an hour. What you can do in half a minute does not matter much. Of course there are refinements here too; the ability to produce and withstand speed variations about the steady state speed is useful, but it cannot make up for lack of a good steady state speed.

Middle distance has characteristics of each of the above, and as well has its own characteristic. Of course the speed is not the quality of the sprinter, nor can the steady state effort match the ability of a distance runner. However when the first 200m in an 800m race is considered, we can see that it requires real speed ability, since it must be produced with an effort considerably less than 100%, so that the rest of the race is possible. A quality steady state speed is also necessary, because the duration of a middle distance race is well beyond that of a sprint. However it is obvious that steady state pace alone is insufficient to

produce a quality middle distance run, once the speed part of the race is over. Something more is required, and that something characterises middle distance running. It is the ability to limit the fall in speed with increasing distance.

It is clear that, in terms of characteristics of the three event groups, middle distance has as much in common with sprints as with distance, and indeed is sufficiently different from both to warrant not being regarded as an extension of either.

Energy Systems

It is the energy systems that provide the sprints, middle distance and distance events with their individual characteristics. Energy systems provide fuel to power the running effort, in the same way as petrol tanks provide the fuel for cars. However whereas there is normally just one tank for a car, the runner has three systems. The first is the creatine phosphate (CP) system, and it provides immediate energy. It has small energy capacity but can provide that energy at a great rate, i.e. it is a high power system. That makes it ideally suited to sprints, which do not involve much work (but don't tell that to a sprinter) and therefore don't require much energy, but the energy is required at a great rate.

The second system is the lactic system, which is discussed below. The third energy system is the aerobic system, which has a large energy capacity but cannot deliver it at anything like the rate of the CP system. It can deliver energy at a constant rate over a long period, which makes it ideally suited to distance running.

The CP system followed by the aerobic system will not provide sufficient energy for a quality middle distance performance, and more energy is required. This comes from the lactic system, which, though it is used in both sprinting and distance running, really becomes prominent in middle distance. It is the bridge that provides the vital link between the powerful CP system and the enduring aerobic system. It provides energy for speed above steady state speed, though not as fast as CP speed. Its energy capacity is greater than that of the CP system and less than the aerobic system. The aspect that makes it so appropriately the middle distance system is that it is self defeating; the lactic acid produced as a by-product of the operation of the system gradually chokes the system off. The higher the speed the greater the rate of demand on the system, and the less time it lasts. This is what makes the speed in a middle distance race so distance dependent. A good lactic system has two features: it produces energy at a sufficient rate to enable a speed well above steady state speed, and it has a high degree of tolerance to the inhibiting lactic acid produced, and thus is able to minimise the diminution of speed that accompanies increased duration.

Racing and Training

Training ought to be determined by the required racing performance, otherwise it is a hit and miss affair. We look at the structure of the racing performance, to see what is required, to what extent, and when. Then we build a training program to develop the attributes required and to integrate them into an overall effort. Since the energy systems power the event, one view of the training program is the development of the energy systems. It is obvious that from this point of view a program for a middle distance runner will be quite different from that for a sprinter or distance runner. Even though sprints and middle distance running have some attributes in common, as do middle distance and distance running, the emphasis on

the attributes is different, the integration is different, and the timing of attribute development could also be different.

Event Groups

What is the purpose of event groups? There might have been from time to time a stated purpose, but in any case we can surmise. It seems a good idea to have some sort of formal grouping of athletes and coaches, who can provide cooperation, mutual advice, exchange of views, and the building of a body of knowledge, under the leadership of a respected person, in the interest of improving overall performance in an event. Such an arrangement promotes the attitude that it is more satisfying to be part of an increase in overall standard of an event than to win with a low level of performance. It recognises the contribution of everyone - coaches for their ideas and athletes for their efforts - in raising the standard. If a common purpose can be generated, events groups would seem to be well worthwhile. The best thinking of coaches and the best efforts of athletes in cooperation would surely produce performances superior to individual efforts.

There could be such a group for every event, but that might be too unwieldy to control, and in any case coaches coach a range of events and athletes benefit from doing more than one event. It is reasonable therefore to have events groups for the purpose described above. If so, it is also reasonable that the events in a group be similar, require the same attributes, have basically the same theory, and require similar training.

Middle Distance Event Group

By the description of an ideal event group above, middle distance should be a separate event group. It does not fit well with distance, even though it has some attributes in common, because speed is important in middle distance but not in distance, and the emphasis on aerobic development and lactic development is different. If it is not a separate event group, there is too great a danger of a distance mentality developing in middle distance runners, particularly if the most successful runners are distance runners, and this would be to the detriment of the development of middle distance.

Something needs to be said about the 400m event. It is not a sprint, but not far from it. It is about 10% slower than the 100m and 200m, but is about 15% faster than the 800m, which well separates it from middle distance. Nevertheless the structure of the 400m performance is similar to that of 800m. The CP system sets it up, then the lactic system sustains the effort, albeit with reducing speed, and towards the end the aerobic system supports the effort. The difference is that the aerobic system is called upon to a greater extent in the 800m than in the 400m, and training is programmed accordingly. Even so, 800m training is much closer to 400m training than to 5000/10,000m training. Also there have probably been more international 400/800m runners than 200/400m runners. All of this supports separating 800/1500 from 5000/10,000.

Conclusion

If having events groups is meant to improve the performance of athletes in those groups, then, for the sake of middle distance running in Australia, middle distance should be separated from distance and put into its own event group.