About Using Time, Instead of Distance, For Your Training Program

This article discusses the benefits of using TIME, rather than DISTANCE, for your performance improvement training program. It will be shown that the time-versus-distance basis ranges from immaterial for most 30 year olds to a virtual necessity for 60+ year olds. However, even younger, inherently slower runners [e.g. newbies] will also benefit using time-based training. Every 70+ runner experiences a far greater effort to run 5 miles than when they were younger. Physically, the effort, in fact, is actually far greater, as we'll see in this article.

First, a few facts to establish the basis for this paradigm:
- When running, the principal energy expenditure is the spring-off on the trailing foot and swinging the leg forward, plus some energy expenditure by the stance leg to move the body forward.
- Thus, the total energy required to run a given distance is primarily determined by the total number of strides required.
- The cadence is close to 180 steps/min for all typical runners.
- As we age, our stride-length decreases while our cadence remains essentially the same.
- At 7min/mi, there are 1260 steps/mile and at 10min/mi, there are 1800 steps/mile. Note, that for any given distance, it requires 43% more energy to run at the 10 minute pace, compared to the 7 minute pace, simply because there are more steps required. It requires ½ the total energy to run a 2:10 marathon compared to a 4:20 one.
- Typically, recreational runners run about 30 to 40 miles per week.
- Below is a table depicting the USATF Age-Graded-Tables predicted time given a 70% [Good, but not exceptional] runner. Notice: The curve is starting to bend at 40 and is increasing dramatically at 60+. Note, the effective distance increases proportional to the number of strides required because the runner's stride-length has decreased.

Age/ Male	10K Time	Pace	Effective Distance
20	0:38:46	6:14	6.2 mile
30	0:38:27	6:11	6.2 mile
40	0:40:36	6:32	6.6 mile
50	0:43:51	7:03	7.0 mile
60	0:47:41	7:40	7.7 mile
70	0:52:24	8:26	8.5 mile
80	1:02:30	10:22	10.5 mile
90	1:28:46	14:19	14.3 mile

Running coaches historically dealt primarily with high school and college athletes. As such, they could expect all members of a team would complete their warm-up and tempo runs at essentially the same time. So, using distance was obviously simple, e.g. run 4×400m, run 5 miles, etc. Virtually all training programs use distance; but, there is no science-based reason for this. One mile, 5 miles, 10 miles, 20 miles, etc. are firmly etched in runner's brains.

These days, it's not so simple. Note, from the above 10K table, on average the 30yr-old will finish 14 minutes before the 70yr-old and 24 minutes before the 80 yr-old. This is due primarily to the change in stride-length, commensurate with aging. Keep in mind, this article is focused on age-related pacing; however, everything also applies to inherently slower runners regardless of age, e.g, brand new runners.

A modern, science-based training paradigm is based on the following:
- It is well established that optimal performance-improvement training occurs at, or slightly above, one's vVO_2max.
- There appears to be no science-based guidance for the time athletes should spend doing speed workouts each week. Obviously, too much speed-work will cause a breakdown [over-train syndrome] and/or injury and too little won't help the athlete achieve his or her goal. However, most professional runners spend about 20% each week. So, just use 10% to 20% per week. Aim for 20% if you are in great condition and have an important race upcoming, 10% minimum.

- Recovery time between fast intervals should not exceed about 45 to 60 seconds. Shorter is better, especially if one is in good race shape. Slowly shorten your rest intervals as you improve over time, aiming for 20 seconds. One of the benefits of speed drills is to teach the body to process lactate for energy. The lactate level declines rapidly following a high-speed interval; so, it is advantageous to resume the next fast interval while there is some lactate leftover from the previous fast interval.

Given all of the above, let's create a training paradigm.

First, you need to choose an average weekly time [distance is OK if your pace is < 9:00mi/mi] for doing performance training. Note, the amount of time and personal goal(s) can very be modest [e.g Just want run easier and maybe a little longer] to all out racing, both short, e.g. 5K, and long, e.g ultra marathons; and, everything in between. 40mi/wk is a good starting point for those intending to race well. 60mi/wk and above should be used sparingly, because there is an increased risk for injury or over-train syndrome. Note: There is a subtly here; the table below is in distance rather than time. Just choose a time based on your pace and go with it. E.g. Use a 10min/mile pace for 5hrs; that's about 30miles per week.

Don't forget this total time per week includes your speed workouts time, roughly an hour.

Pace	30mi/wk	40mi/wk	60mi/wk
7min/mile	3:50hrs	4:40hrs	7hrs
8min/mile	4:00hrs	5:20hrs	8hrs
9min/mile	4:50hrs	6:00hrs	9hrs
10min/mile	5:00hrs	6:40hrs	10hrs
12min/mile	6:00hrs	8:00hrs	12hrs

Second, select your endurance-workout [long run] pace. If you know your vVO_2Max pace [See note 1] use it, add 45sec/mile. e.g. your vVO_2Max pace is 8:15min/mi, use 9min/mile [8:15 + 00:45 = 9:00]

Third, select your speed-interval pace. It's simple, just use your vVO_2Max pace for anything shorter than your vVO_2Max test distance. Anything longer, just slow down a bit. More detail on this subject is beyond the scope of this article.

Finally, calculate your speed workouts time per week. Just calculate 10%….20% of your chosen weekly time. e.g. $0.15 \times 10hrs = 1:30hrs$ per week. Before you become alarmed, see Note 2 below.

Summary
Runners older than about 50 and especially after 60, and inherently slower runners should use TIME, and not DISTANCE, for training. This insures their running energy expenditure will be close to the total energy expenditure of faster runners. Otherwise, they risk spending excessive energy running effectively longer distances. E.g. using the first table, the 70 year old, intending to run to 40 miles-per-week will effectively be running 51.5 miles, energy wise.

Runs organized by coaches and running clubs, etc, should use time-based runs for groups which have runners over 50 or 60 years of age and inherently slower runners.

Notes:
1. vVO_2Max pace can be measured accurately on a standard 400m track. Run 6:00 minutes as fast and far as possible. See Running Economy & vVO2max for details.

2. You can easily incorporate speed-workouts in your regular weekly runs. Some examples: Assume you do 1 hour on the track and you run 6 days per week. You can easily pick up an hour of fast work by always running the last 10% of your daily runs fast. Or, do some Fartleks [look it up]. Just keep the recovery time between fast intervals well under 1 minute, contrary to what you may read on the internet. [See above: "Recovery time between fast intervals should not exceed about 45 to 60 seconds"].

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