



Sunday, July 12

SWIM

BIKE

RUN

MISC

COACHING[home](#) » *heart rate drift and pacing***Heart Rate Drift and Pacing****By Coach Steve**

Heart rate monitors [HRMs] give us a way to measure our training efforts, but there are several physiological and environmental factors that influence the numbers we see. Understanding these variables as they apply to pacing throughout a workout, and from day-to-day in changing weather conditions helps us stay at consistent effort levels.

Every aerobic workout you complete will be subject to increase in heart rate [HR] as it progresses. Your HR will increase both during warm-up (from resting levels), and then more gradually after warm-up as you continue at the same pace. For example: As you begin your run at exactly 8-minute per mile pace your heart will take a few minutes to respond to aerobic demands from the semi-sedentary state pre-run. This means there's a lag time involved as your HR increases to the rate needed to supply sufficient oxygen-carrying blood necessary to maintain the steady pace. This lag time gives you a lower, but rapidly building HR reading for the first ½ mile of a run. The time it takes for your HR to rise and level-off will vary from athlete to athlete and by environmental conditions (more on that later), therefore it can take most of the first mile before you get to a consistent, steady reading.

So now you're running at an even pace and your HR is up to the target number for the workout; if you just hold this number according to your HRM you'll be doing the workout exactly as your coach recommended, right? Well, not necessarily. Even at an even pace per mile post warm-up, your HR will creep up ever so slightly as the workout progresses; this is what we call heart rate drift. This 'drift' factor will vary in its severity, influenced by both weather conditions and hydration (lack of) throughout your run.

The HR drift you'll experience can be minimal on cool days, or substantial on hot days. For example: On a hot day with no additional hydration coming in, your HR can increase by 10% over a 45-minute run even though you're holding a steady pace. In this case your blood's viscosity increases as fluid is lost, and your heart rate will continue to increase proportionally as it attempts to keep up with the oxygen demand of your pace. Even with sufficient hydration on hot days your HR will drift up to some degree and you'll need to adjust your HR ranges accordingly if you want to maintain even per mile pacing, or a negative split.

Pacing recommendations

I favor even pacing or negative splits for all runs. A negative split is when your speed increases during the run so the second half is faster than the first - even one-second faster for the second half counts as a negative split. Your speed increase can be slight, or substantial depending on the desired effect. I believe pacing this way in training helps teach your physiology not to fade on race day. I also believe your body 'remembers' the last training you did most clearly, and it attempts to adapt to that. Adaptation to physiological stress is what endurance training is all about!

As you take the effects of HR drift into consideration, adjustments should be made to keep consistent pacing. For most workouts with a specified HR, you'll need to begin by holding your HR a little lower and finish a little higher than the desired average for the entire workout. If you look for the recommended average HR from your first stride you'll be sprinting from the outset to get to that number, then as the run progresses your pace will slow as the drift factor allows progressively less speed at the same HR. This sprint-out-from-the-start-then-fade is exactly what you don't want to happen in races, so I recommend you avoid it in training too.

Here's an example of even per mile pacing by heart rate: I want to take a 10k run with an average HR of 75% of max with an even or negative split. For the first ½ mile I go mostly by feel, taking occasional looks at the HRM to check HR, making sure I don't go too high too soon. By the mile mark I look for about 72-75% HR and keep my HR there for the first half of my run. After the 5k mark of my run I raise my effort (or simply hold my effort even as I let heart rate drift up above 75%) to get that even or negative split. This means I'll need to hold at about 75-78% for the second half of my run. To complicate pacing further, I need to adjust for hills on the course that will take my HR higher. I set a limit about 5% higher for the hills and make sure my HR comes back down on the downhills, then back to my desired HR on the flats.

After a few runs where you adjust your effort to target specific heart rates for even or negative split pacing, the numbers you need to hold at certain parts of the run become obvious. If you have the fine pacing feel to gradually raise your HR 1-2 beats per mile all the better. If you start too fast don't worry, just finish up, adjust and get it right next time.

The weather can make a difference as well, over time that will also become a known variable you can compensate for too. In very long races like Ironman events everyone fades (in pace) on the run, even the top pros. At that distance they're probably holding the same heart rate, but due to the physiological changes with accumulating fatigue, pace drops off. The goal is to minimize this so you can really run the whole marathon instead of succumbing to the frustration of a walk/jog finish. The key is not to start fast, and have your hydration/nutrition dialed-in before race day!

The same HR/pacing rules hold for rides, though my experience is drift takes longer to occur at the slightly lower effort level of rides. Heart rate monitors I've had didn't work in the pool, so there you should go by relative perceived effort [RPE] and pace by time. This brings up a good question: Can you perfect your pacing without using a heart rate monitor? You can, but for most athletes (especially athletes new to endurance sports), a HRM is a great tool to measure your training efforts.

• all content © Tri-eCoach 1999-2009 / [send coach steve a question](#) / follow me on [twitter](#) •