Cycling Past 50, 60 and Beyond: Training by Intensity

How to Plan & Gauge the Most Beneficial Training Efforts

By John Hughes, 65 years old

Paris-Brest-Paris ’79, ’87, ’91, ’95, ’99;
Furnace Creek 508 ’89 (Course Record), ’93 (1st);
Boston-Montreal-Boston ’92 (Course Record);
Reno-Tucson record ’94 (849 miles in 54:17, still standing),
Oregon North-South record ’95 (292 miles in 14:23, still standing);
Race Across AMerica ’96; Rocky Mountain 1200 ’04

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Introduction

The median age of RBR readers at the time of our last reader survey in 2012 was 48, so it's safe to assume that our median age is approaching if not past the watershed 50th birthday. Experts estimate that by 2025 more than 25% of the population in the United States and Canada will be age 65 or older. (Taylor, 2008)

As we age—I'm in my 60s and know from experience—cardiovascular capacity, endurance, strength and power all decline. However, by continuing intense workouts on the bike and in the gym we can significantly slow the *rate of decline* of these key performance factors.

Studies show that "When training volume remained about the same but intensity decreased, aerobic capacity dropped by an average of 1% per year." (Friel, Aging: What's Behind the Decline?)

George Thomas is an excellent example. In 2010 he raced the very challenging Race Across the West (RAW), 879-mile non-stop from San Diego, California, to Durango, Colorado, with over 40,000 feet of climbing. Thomas raced RAW on a two-man team with Mick Walsh. They raced as a relay; each took turns racing while the other recovered. Both were in their 40s and they took 2nd place overall.

This year (2014) Thomas and Walsh, now both over 50 years old, beat *all the other 2-man relay teams to Durango*. They even beat five 4-rider relay teams!

How did they do it? I'm Thomas's coach, so I have unique insight into this terrific accomplishment.

Due to a serious injury, Thomas was off the bike for 16 months and could only start training in February for the June race. Thomas has been racing ultra distance for 21 years and has a great endurance and experience base; however, he'd also lost fitness after so long off the bike. Because of the distance and the format, the race demanded both endurance and speed. We met this challenge by *mixing the intensity of his workouts.* He rode:

- **Endurance workouts** of varying lengths up to 100 miles.
- **High-intensity hill repeats**, starting with a few short ones and peaking at 10-minute repeats with only three minutes of recovery between each one.
- **Race pace efforts** when Thomas would ride for 15 to 30 minutes at race pace and then recover for the same amount of time simulating racing on the relay team.

Thomas rode these workouts based on perceived exertion—after 21 years of ultra racing he knows his body well. The program worked. He improved power significantly: he could climb farther during his timed hill repeats. He was also able to complete successfully 18- and 24-hour race simulation rides.

You don't have to be a racer to benefit from intensity training as you age. Training with intensity slows the rate of decline in physiological health and functioning and is important for all senior riders, whether you ride for fitness or performance.

This eArticle complements previous articles by providing specific information on how to incorporate intensity into your rides most effectively, and giving examples of workouts:

Cycling Past 50 series.

1. Healthy Cycling Past 50.
2. Healthy Nutrition Past 50.
3. Off-Season Conditioning Past 50.
4. Performance Cycling Past 50.

Cycling Past 60:

1. Part 1: For Health
2. Part 2: For Recreation

The benefits of intensity and different types of intensity are the same for riders in their 50s, 60s and beyond; however, older riders need more recovery, and the volume of intensity is lower. Listen to your body!

Why Ride Hard?

About 10% of RBR readers list racing as their primary reason for riding, and this includes many senior riders. Intensity training obviously will improve their racing. Why should the other 90% of you include some intensity in your riding?

Including some higher intensity riding will benefit all senior riders. This doesn't mean that you need to add a sufferfest or two to your weekly regimen. Higher intensity riding is like prescription medicine. If you do too much, it's harmful! If you don't take your medicine, then you don't get the benefit. But if you do the right amount of harder riding, intensity helps.

It's important to clarify that intensity riding doesn't mean riding as hard as you can. It means riding harder than you normally ride. How hard and how much depends on your fitness goals.

Increased Health and Fitness

One third of you ride primarily for good health and fitness. In Healthy Cycling Past 50 the three programs included three brisk rides at about the same level of effort as if you were climbing a long hill or riding into a headwind. The Standard and Advanced programs also included some hard efforts. Here's why, according to the American College of Sports Medicine (") new (2011) guidelines:

- "Adults should get at least 150 minutes of moderate-intensity exercise per week.
- "Exercise recommendations can be met through 30-60 minutes of moderate-intensity exercise (five days per week) or 20-60 minutes of vigorous-intensity exercise (three days per week)." (ACSM, 2011)

Riding harder part or all of the time allows you to meet the minimum ACSM recommendation in less time and to do more than the minimum recommended exercise. Here are three examples:

- 12 mph. At this speed it would take a rider about the full 150 minutes per week to meet the minimum recommendation.
- 16 mph. At this speed a rider could meet the recommendation in about 110 minutes per week.
- 22 mph. At this speed a rider could meet the recommendation in about 60 minutes per week!

Unless you are a pro, you probably won't be able to ride at 22 mph for three 20-minute rides—and you probably don't want to! Don't get hung up on how fast you need to ride to meet the minimum ACSM recommendation. The point is that by ***mixing the intensity*** you can do more to improve cardiovascular health than by just riding at a relatively slow speed.

Increased Power

Increased power benefits all riders. This doesn't mean that you have to race up mountains like the pros. Increased power gives you more flexibility in the kinds of rides you can do.

- If you ride for health and fitness, then instead of just doing flat routes you can enjoy rides with some hills. Instead of being frustrated on windy days you can enjoy a good, albeit slower, ride.
- If you like riding with your local club you can do somewhat harder rides. You'll see new country and meet new riders.
- If you are an endurance rider − for example, riding centuries − you can tackle more difficult rides, perhaps in other parts of the country.

More Speed

Another third of you enjoy fast sport and club riding. Speed inevitably diminishes with age. "One study looked at the age-related performance declines in athletes participating in the National Senior Games. The finish times for the top eight finishers in every running, cycling and swimming race for every age group were analyzed. The study found that from age 50 years to 75 years there was a small decline in physical performance per year. Both men and women declined less than 2%. At ages 75 years and older, however, the performance declined rapidly at almost 8% per year. (Jackson, 2009)

Increasing your power obviously increases your speed and helps to counteract this inevitable loss of speed. You'll still get slower—it just won't happen as quickly. Power workouts also prepare you for harder speed workouts.

Better Economy and Cruising Speed

About a quarter of you enjoy touring, centuries and even longer rides. Most of you probably aren't trying to set PRs. Even if you aren't primarily interested in how fast you can go, more power will make you a better rider.

Including some intensity rides in your training will improve your economy, i.e., how fast you go at a given heart rate. Increased economy will help you to do health and fitness rides that are a little tougher. Higher cruising speed will help you to commute faster, especially in bad weather or on the way home to dinner. Higher cruising speed will allow you to fit in a beneficial workout when you are pressed for time. With higher cruising speed you can ride with a faster group on club rides.

Don't envision yourself hammering until you fall off the bike. A little intensity training goes a long way!

Why Does Performance Decline With Age?

Good news: "Only 30% of how we age is determined by genetics, while the remaining 70% is determined by the lifestyle choices we make, including activity." (Wright, 2009) Here's what happens as you get older. All of these inevitably will happen; however, through exercise, especially intense exercise, you can control both the extent and the rate of change:

- **Declining VO2 max.** VO2 max is the maximum amount of oxygen that you can deliver to your working muscles. How much and how fast your aerobic capacity declines correlates with whether you continue to include some intensity in your workouts.
- **Reduced maximal heart rate.** Genetics determine your max heart rate and how much it decreases—hard exercise doesn't help.
- **Decreased stroke volume.** This is the amount of blood pumped with each heartbeat. The heart is a muscle. When you go hard, it expands more fully and pumps more blood per stroke. But a heart gradually loses elasticity and stroke volume—unless you continue to exercise intensely as you age.
- **Lowered lactate threshold.** Absolute LT may fall in older athletes. However as a percentage of VO2 max, with hard exercise LT will remain constant, and may even increase.
- **Less economical movement.** This results in wasted energy. As you age it takes longer for signals to travel through your peripheral nervous system to your

muscles and back. By incorporating intensity, especially sprints, you can help to maintain economy of movement.

- **Decrease in muscle power.** A muscle is composed of many fibers. The more intensely you exercise when riding, lifting weights, etc., the more fibers you activate and keep strong.
- **Less lung elasticity**. As you age your lungs slowly stiffen, making it more difficult to suck in large amounts of air for big efforts. If you continue to exercise and breathe hard your lungs stay more supple.
- **Endurance**. Endurance tends to be limited by the perception of fatigue, which results from the accumulation of metabolic byproducts in the muscles. Intense workouts improve the body's ability to process these byproducts.
- **Body weight**. As we age we tend to put on weight. It's slow—a pound or two a year—but it adds up. Intense exercise is the most efficient way to control weight. The harder you work out, the more calories you burn per minute. Further, after an intense session, your metabolism stays revved up for a while and burns more calories.
  (Friel, Aging: Research, Hughes, 2012)

Benefits of Training with Intensity

Imagine you are riding a gentle climb so easily that you are barely working. The road gets a little steeper and you need a bit more power to maintain speed, but you're still whistling or chatting with your friends. The road continues to get steeper. Now you're talking in short sentences. You can still get all the oxygen you need. You are riding *aerobically* and using your *aerobic* energy system.

The hill gets steeper and you stop talking. You can't get enough oxygen so your *anaerobic* energy system kicks in. Your aerobic metabolism continues to produce power and your anaerobic system provides the additional power that you need to keep climbing. As the grade continues to increase, your anaerobic energy system produces a greater and greater proportion of your total energy.

- **Aerobic metabolism:** metabolizing fat and glycogen (derived from carbohydrates) with sufficient oxygen. At low intensities you burn mostly fat. As you ride harder the proportion of glycogen metabolized increases.
- **Anaerobic metabolism:** metabolizing glycogen without enough oxygen is a different way to produce energy, with lactic acid as the byproduct. Scientists call the area where significant lactate starts to accumulate in the blood the *lactate threshold* (LT). You know you are reaching the threshold when deep breathing turns to panting. If you are using a power meter, Functional Threshold Power (FTP) is the LT intensity that you can maintain for about an hour.

Note that you have two fuel sources: fat and glycogen. The harder you ride, the more of your energy comes from glycogen, although your body is still metabolizing fat. Even the leanest rider has enough body fat to sustain a long ride; however, the body's store of glycogen is limited to a few hours of hard riding.

Because your glycogen stores are limited, it is very important to eat a carbohydrate-rich snack before you ride The ACSM recommends that after the first hour while exercising you should consume 25 to 60 grams (1 to 2 ounces or 100 to 240 calories) of carbohydrate every hour. For more information on nutrition to support your training and eating during rides, see my eArticle Healthy Nutrition Past 50.

Your muscles are composed of many fibers. Many are slow twitch—they fire and contract relatively slowly. The rest of the fibers are fast twitch—they fire and contract faster. Note that slow and fast twitch don't refer to the speed of your cadence but to how fast the muscles contract.

Individual muscle fibers are recruited progressively. On a flat road or a gentle climb you are using some of the slow twitch fibers. As the climb gets a little steeper you recruit the rest of your slow twitch muscles. As you work harder some of your fast twitch muscles start to fire. As the climb gets even steeper, more of your fast twitch fibers kick in. If you sprint for the top, then all of your fibers working.

Riding at different intensities brings about different benefits. It trains different metabolic systems and recruits more muscle fibers.

Benefits of Types of Intensity

Varying the intensity will make you a better, more rounded rider.

- **Recovery pace.** A recovery pace should feel too easy—so slow you're almost embarrassed to be seen on your bike! Recovery exercise helps to remove waste products from your muscles and to relieve muscle tightness and soreness.
- **Endurance pace.** This is the classic long, slow distance pace riding at a conversational pace. Endurance riding trains your body to use more fat for energy, rather than precious glycogen. Riding at this pace helps to maintain stroke volume and lung elasticity so that you can go a little faster even at an endurance pace. Because of the relatively high volume of endurance riding, this also helps to maintain your economy of pedaling.
- **Tempo pace.** This is still a conversational pace, although your sentences are much shorter and you can't whistle. This is like riding into a headwind or up a sustained climb. Riding at a tempo pace brings about many of the same benefits as riding at an endurance pace.

  If you are riding longer endurance rides, try climbing at the tempo pace and riding the rest of the time at the endurance pace. These are the most efficient paces

overall. Riding harder exacts more of a toll on your body and it takes longer to recover during the ride, so that overall your time is slower.

Recovery, endurance and tempo are all *aerobic paces*; the next three are *anaerobic paces*.

- **Sweet Spot (Power pace).** You are pushing a little harder. You can get out a few words but definitely feel like you are working. Your energy balance is roughly 50% aerobic and 50% anaerobic. Because you can ride at your power pace much longer than at the following paces, it's the most efficient at building sustained power.
- **Sub-Lactate Threshold (Anaerobic pace).** You are definitely riding hard, and it's hurting! Riding at this pace will increase the amount of power that you can put out at lactate threshold (LT). It will also slow the rate of decline in your LT as you get older. If you are a strong, fast club rider, then training at or just below your LT will get you fit to hammer up short hills.
- **Super-Lactate Threshold.** If you race, then you also need to train above your LT so that you can stay with breaks.
- **VO2 Max (Maximum Effort).** You thought anaerobic was hard? Try going at your max for just a couple of minutes. Riding this hard will slow the rate of decline in your VO2 max as you get older.
- **Sprinting pace.** Sprinting also helps to maintain economy of movement. When you sprint your nerves are activating as many muscle fibers as possible. Practicing sprinting will improve the way your muscle fibers fire. This compensates for slower neural transmission.

If you race, include some super-LT riding about a month before you start racing to improve your tolerance for lactic acid and to increase your VO_2 max, and then continue this during your main season. But remember, a little goes a long way. If you're not racing, I won't fault you for avoiding the pain.

Ways of Gauging Exertion

You ride to *have fun*. You also ride to improve your fitness and probably to improve your cycling. To get better you need to train the different metabolic systems. This requires a way of assessing how hard your body is working. Here are three methods:

- **Perceived exertion** is the simplest, requiring no equipment. It means learning to listen to your body, to the signals from your breathing and muscles. Lab studies show that perceived exertion tracks heart rate pretty accurately in gauging exertion.
- A **heart rate monitor** tells how fast your heart is beating. It is an *indirect* way of measuring how hard your muscles are working. However, heart rate is determined not only by how hard your muscles are working but also by how well you slept, if

you are excited or stressed, how hot it is, what you ate (e.g., sugar, caffeine), if you are dehydrated, and other factors.

- A **power meter** measures the wattage you are producing at any given instant. It is a *direct* way of measuring how hard your muscles are working and is the most accurate method, but it requires the most specialized equipment and learning how to interpret complicated data.

Once learned, the rate of perceived exertion (RPE) has several advantages over a heart monitor (HRM). RPE is:

- **Free.** You don't have to buy any equipment.
- **Simple.** You don't have to interpret numbers and remember training zones.
- **Faster to respond.** When you change your level of effort, particularly when suddenly going much harder, it takes a few minutes for your heart rate to increase all the way to the new level; however, you feel the new intensity instantly.
- **May be more accurate.** You are gauging how hard your muscles are working rather than how fast your heart is beating, which can be influenced by other factors.
- **Pacing.** With prolonged exercise your heart rate may increase even though your muscles aren't working any harder. This is known as cardiovascular drift. Because your heart rate has gone up, you may think you should slow down. With RPE, you'll continue to ride at the same level of effort.
- **More reliable.** The feedback is not subject to equipment blips or failures.
- **Safer and more fun.** You can look at the road and scenery instead of figures on a gadget.

However, a heart rate monitor has several advantages over RPE, *if it is accurate and not influenced by other factors*:

- **Data for analysis.** With most HRMs you can collect the time spent at different heart rate intensities (zones) for later analysis. For example, how long you were riding at different percentages of lactate threshold. You can then assess if you were riding at the right intensities for different training effects.
- **Recovery.** When HRMs were first introduced in the 1980s the 7-11 pro team used them to learn to ride *slowly enough* on their recovery rides. Most amateurs ride too fast on what are supposed to be easy recovery rides.
- **Intensity.** With RPE you may have trouble pushing yourself hard enough when doing intensity workouts. Or, full of enthusiasm, you may push yourself too hard and burn out before you have enough volume of high intensity. Using a HRM, you have established zones and workout targets that help you to reach and maintain various levels of intensity.

The primary advantage of a heart rate monitor compared to a power meter is simplicity. You only have one number to focus on while riding and to analyze later: heart rate. Because of its simplicity, a heart rate monitor is much less expensive than a power meter.

A power meter, though, has several advantages over both RPE and a HRM:

- **Most accurate.** It measures *output*, what your muscles are producing. RPE and heart rate monitors gauge *input*, how hard your muscles are working.
- **Instantaneous.** A power meter responds instantly to changes in intensity, unlike heart rate, which lags changes in intensity.
- **Reflects training improvement.** As you get fitter, your lactate threshold may not change; however, how much power you can produce at LT increases.
- **Most effective training.** Because power production improves with training, doing workouts based on power is more effective than doing them based on heart rate.

However, a power meter is a complicated piece of equipment. It takes more time to learn how to use one effectively. Although costs are coming down, because of the complexity a power meter is significantly more expensive than a heart rate monitor.

Effective training results from riding at *different* intensities on *different* rides. RPE, heart rate and power can all be used effectively to gauge intensity.

For most recreational riders I recommend using RPE because of the simplicity. One year I coached two competitors in the Race Across AMerica. One used a heart rate monitor and the other used RPE. They finished fourth and fifth. However, the rider using RPE had previously trained with a heart rate monitor and had used it to help calibrate his RPE.

A heart rate monitor or a power meter provides more precise feedback and, if used properly, will yield more improvement. For riders seeking significant performance gains, a heart rate monitor or perhaps a power meter is worth investing in if you are willing to take the time to learn how to use it. For racers striving for maximum performance, a power meter allows you to design workouts to simulate race efforts very accurately and to budget your efforts during races.

Human power production is a continuum. We don't shift gears like in a car. Rather, we increase power continuously as we ride up that ever-steepening hill. For training purposes we divide the power continuum into different sections or zones. Different coaches divide power into more or fewer zones.

Rate of Perceived Exertion

Rate of Perceived Exertion (RPE) is a 1 to 10 scale. One is barely moving and 10 is a maximal sprint for just a few seconds. I have my own way of gauging intensity specifically for cyclists and give the RPE equivalents. Because power production is a continuum, the different paces and RPEs blend into each other.

- **Digestion pace:** This is how you ride after a big meal, an RPE of 1-2. This is the pace for active recovery rides.
- **Conversation pace:** You can carry on a conversation in full sentences, an RPE of 2-3. This pace builds endurance and trains the aerobic system to burn fat more efficiently. Even lean riders have enough fat to help fuel a longer ride, so training this system is important.
- **Hill climbing and headwind pace:** You're on a long, steady grade or riding into the wind. You're working hard enough that you can't whistle but can still talk in short sentences, an RPE of 3-4. At this pace you're improving your cruising speed and training the aerobic system to burn glycogen.
- **Sweet spot pace:** The sweet spot is the hardest to gauge by RPE. You are riding at the harder end of the hill climbing and headwind pace but not yet sub-barf. You can talk in short phrases but not short sentences. An RPE of 4-5
- **Sub-barf pace:** Making a hard, sustained effort, an RPE of 5-6. This is the pace for a 10- to 25-mile (20- to 40-km) time trial or racing up a hill. You're riding anaerobically to train the lactate system to burn glycogen *without* enough oxygen and producing lactic acid—we all know that feeling.
- **Eyeballs out pace:** This is the classic hammering pace, a hard effort for a few minutes with eyes bugging out, an RPE of 6-7.
- **Ouch pace:** Sprinting at an RPE of 8 or more.

How to gauge intensity also depends on who you are. Some people like data and keep extensive training logs, some people don't care for numbers. If data are useful to you, then you may want to use a heart monitor or power meter.

Heart Rate Monitor

With a heart rate monitor your training zones should be established based on your lactate threshold. Sometimes training zones are set based on maximum heart rate; however, max heart rate is determined by genetics and age, not your physical fitness. Defining exercise intensities based on max heart rate would be like telling you what size shoes to wear given your age.

Similarly, lactate threshold is partially determined by your parents and age. However, LT is also a function of how fit you are, so the various heart rate training zones are defined relative to your LT.

To gauge intensity with an HRM you'll need to estimate your lactate threshold. Here's how:

- Pick a time trial course that will take you 25-35 minutes to ride. The TT can be an out and back or a loop that is relatively flat and has no stop signs or lights. The TT can also be a hill climb.
- Warm up thoroughly. For about 20 minutes gradually raise your heart rate to the level you think you can sustain for the time trial. Ride at that heart rate for about five minutes. Then spin easily for about five minutes to recover.
- Then start your heart monitor and race the TT. Be careful not to start too fast. Try to ride at the same level of intensity for the full TT. The more constant your level of effort, the more accurate the test. You may need to repeat the TT several times over several weeks to learn how to pace yourself.
- Note your average heart rate, time and average speed. If you do this as a personal TT, your average heart rate will be very close to your lactate threshold. If you ride in an organized time trial, the competition will make you go a little harder. If your average heart rate is from a competition, then divide it by 1.03 to get your LT.

Power Meter

To gauge intensity with a power meter you'll need to estimate your Functional Threshold Power (FTP). Your FTP is the maximum average power you can sustain for an hour. An hour is a long test—here's a common, shorter method:

- Pick a time trial course that will take you 20 minutes to ride. The TT can be an out and back or a loop that is relatively flat and has no stop signs or lights.
- Warm up thoroughly. For about 20 minutes gradually raise your power to the level you think you can sustain for the time trial. Ride at that power for about five minutes. Then spin easily for about five minutes to recover.
- Then start your power meter and race the TT. Be careful not to start too fast. Try to ride at the same level intensity for the full TT. The more constant your level of effort, the more accurate the test. You may need to repeat the TT several times over several weeks to learn how to pace yourself.
- The TT can also be a hill climb. Many riders have a higher FTP climbing than on the flats, so you may want to do both kinds of TTs.
- Note your Normalized Power (NP), average heart rate, time and average speed. Average power is simply the arithmetic average of all your instantaneous power levels. NP takes into account the variability of your power output and is a more accurate measure of the metabolic cost. Your NP for 20 minutes will be about 105% of your Functional Threshold Power. To get your FTP, divide your normalized power by 1.05.

Training Zones Using RPE, Heart Rate and Power

Now that you understand how to gauge intensity, how do you apply that to workouts? As the hill gets steeper you produce more and more energy aerobically and then anaerobically, and more muscle cells fire. The increasing energy production is described in progressive zones. As noted above, there aren't discrete jumps in energy production. You just work a little harder and one level of intensity becomes the next one. Thus, the RPE numbers blend into one another.

Note that Lactate Threshold is divided into two different zones. Train in the sub-LT zone if you like to hammer on club rides but don't go all out. Train in the super-LT zone if you push it to the limit on club rides and races.

Training Zones Using RPE, Heart Rate and Power

Zone	Workout	Hughes RPE	RPE	Heart Rate % LT	Power %FTP
Zone 1	Recovery	Digestion	1-2	<75%	<55%
Zone 2	Endurance	Conversation	2-3	75-87%	56-75%
Zone 3	Tempo	Headwind	3-4	88-94%	76-90%
Sweet Spot	Power	Short hill	4-5	93-97%	88-94%
Zone 4	Sub-Threshold	Sub-barf	5-6	95-100%	91-100%
Zone 5	Super-Threshold	Eyeballs Out	6-7	101-105%	101-105%s
Sprints	Maximum effort	Ouch!	8+	N/a	N/a

Preventing Injury

Now that you understand the benefits of varying the intensity, you're excited and ready to get started. First, a word of caution.

Heed the words of Neal Henderson, director of Sports Science at Colorado's Boulder Center for Sports Medicine and USA Cycling's Coach of the Year in 2009.

In an interview with *VeloNews* Henderson said, "I try to seek the point of maximum adaptation to the minimum of training stress, rather than to try to achieve the greatest level of fatigue. Excessive fatigue does not guarantee improvements or adaptations."

In a talk, he added that 75% of the athletes he sees over-train (too much and/or too hard), 10% under-train, and 15% get it right—usually the pros who are paid to race. When in doubt, err on the side of less volume and less intensity.

Riding with intensity puts more stress on your muscles and connective tissue. That's why it's beneficial. However, because it puts more stress on your body, you want to do it correctly to avoid injury.

Proper Preparation

Before you start doing harder intensity workouts, your muscles and connective tissue need to be strong enough to stand the added workload.

Endurance base. If you've only been riding 1-2,000 miles per year for a couple of years, then stick to zones 1 through three. If you've been riding for at least three years and ride at least 3,000 miles (5,000 km) per year, then you're ready to start train at the higher intensities. You've built an adequate base to support the harder riding. If you're already riding at least 3,000 miles (5,000 km) per year, then including intensity training is the best thing to do to improve your riding. It's more beneficial than increasing the volume or buying a lighter bike.

Strength training. Resistance training will also help to prepare you for intensity training. This is the concept of "prehabilitation," preparing your muscles and connective tissue to prevent injury rather than rehabilitation after injury. Strength training doesn't have to be going to the gym.

Both Healthy Cycling Past 50 and Cycling Past 60: For Health contain a basic strength-training program, which provides a good foundation. The program and exercises are illustrated on my website. Former U.S. national weightlifting coach Harvey Newton has an excellent Strength Training for Cyclists System as well.

In addition to prehabilitation, resistance training is vital for senior cyclists to maintain muscle mass and bone density as we age. So it's important to make it part of your all-around training program no matter your cycling goals.

Importance of recovery

Without adequate rest you won't get stronger, and you increase the risk of injury. Your body doesn't get stronger when you push it harder. Your body gets stronger *during the recovery phase* after hard workouts.

Overload => Stress => Recovery => Adaptation

(Overload stresses your body, which, through recovery, adapts and grows stronger.)

There are two key elements to good recovery:

- **Healthy diet.** Your body repairs itself and you get stronger when you provide it with the nutrients it needs and don't interfere with your metabolic systems by eating less healthy foods. Healthy Nutrition Past 50 explains in detail what you should eat both to support effective training and for good health.
- **Adequate sleep.** Your body only produces human growth hormone when you sleep. Human growth hormone is necessary for muscle repair and muscle growth. If you short yourself on sleep, then you won't get as strong. If you need an alarm clock to wake up, then you aren't getting enough sleep. Cycling Past 60, Part. 1: For Health explains further the importance of good sleep and how to improve the quality of your sleep.

For more information on recovery techniques, see me eArticle Optimal Recovery for Improved Performance.

Managing Training Load

Before we talk about how to use the different levels of intensity, let's review briefly how training works. The concept of conditioning is simple whether you are exercising for fitness, racing or anything in between.

For continued improvement, you must overload your body progressively. If you just do the same rides every week and don't stress your body any differently, you don't improve. When adding intensity, you should manage these three factors:

- *How much* you ride
- *How often* you ride
- *How hard* you ride.

Initially, don't just add intensity to your week. Mix intensity into your workouts by *reducing other riding*. As a rule of thumb for every hour of added intensity (including warm-up and cool-down) cut two hours of other riding.

To reduce further the risks of injury, follow these five principles:

- At least 80% of your riding time should be at an aerobic pace (zone 3 and lower) and not more than 20% of your time at an anaerobic pace (sweet spot and higher).
- Increase just one type of overload at a time: volume, frequency or intensity.
- Mix hard, moderate, easy and off days each week.
- Progressively build your training for three or four weeks and then cut back for a recovery week before ramping up again or alternate harder and easier weeks with each pair of weeks progressively harder.
- Every two to three months take a physical and mental break for a week. Do just a few hours of easy riding or hiking or playing catch with the kids.

As you add intensity to training, you also need to train more responsibly. It's essential to give your body time to rest, recover and grow stronger.

Athletic Maturity and Choosing Workouts

The benefits of training at different intensities are similar for all riders in their 50s, 60s and beyond. All senior riders can use the workouts that follow. However, the appropriate level of intensity, volume of training and amount of necessary recovery vary depending on *athletic maturity* as well as chronological age. I introduced the concept of athletic maturity in the Cycling Past 60 series. The more mature that you are as an athlete, the more volume and intensity you can handle when working out and the less recovery you may need.

Your athletic maturity is a combination of:

- **Physiological age.** How well your body has held up over those years, which is largely a matter of how well you've taken care of it.
- **Experiential age.** How long have you been riding? Are you relatively new to the sport? Or do you have many years under your wheels?

How Athletically Mature Are You?

To find out, evaluate your physiological maturity for intensity training, using the following six factors (of the nine original factors used in the Past 60 series). Give yourself 1, 2 or 3 points on each factor (see chart below):

1. **Years riding.** How long you have been riding? If you ran before you started riding, then your general aerobic fitness carries over to cycling; however, you need time to develop specific muscle-firing patterns as well as cycling skills. Give yourself a half-year for each year of running immediately before you started riding. Example: you ran for six years and then took up cycling two years ago. You have (6 years x 0.5) + 2 = 5 years' riding experience. But if you ran for six years after college, took a long break and then started riding two years ago when you turned 60, you only have two years of riding experience.
2. **Annual riding.** To assess general aerobic fitness, how many miles (kilometers) do you ride per year?
3. **Longest annual ride.** To also assess aerobic fitness, what is your longest one-day ride of the year in miles (kilometers) with a speed of at least 12.5 mph (20 km/h)?
4. **Weight for 20 step-ups.** To assess lower body strength. One step-up is stepping up onto an approximately 8" (20 cm) step with your right foot and lifting your left foot up to the step, stepping back down with both feet, stepping up with left foot and lifting right foot to the step and stepping back down with both feet. Doing 20

complete step-ups, how much weight can you lift using dumbbells or grocery sacks or a backpack filled with canned food?

5. **Plank.** To assess core strength, how long can you hold the plank? The plank is resting only on your feet and on your forearms (elbows under shoulders) with your body parallel to the floor.
6. **Sit and reach.** To assess flexibility sit on the floor with your legs stretched out in front of you with straight knees. Bending forward at the waist, how close to (beyond) your toes can you reach?

Athletic Maturity

	1 point	**2 points**	**3 points**	**Your points**
1. Years of riding	1-2 years	3-5 years	6 or more years	
2. Annual riding	< 3,000 miles (5,000 km)	3 - 5,000 miles (5-8,000 km)	>5,000 miles (8,000 km)	
3. Longest annual ride	<50 miles (80 km)	50 - 100 miles (80-160 km)	>100 miles (>160 km)	
4. Weight for 20 step-ups	Body weight	Body weight + 10%	Body weight + 20%	
5. Plank	<30 seconds	30 – 60 seconds	> 60 seconds	
6. Sit and reach	-1”	-1” to +1”	> +1”	
Total Points				

Appropriate Workouts by Athletic Maturity

Your Score	**< 7 Points**	**7 - 11 points**	**>11 points**
Appropriate Workout			
Tempo	Yes	Yes	Yes
Sweet Spot		Yes	Yes
Sub-Lactate		Optional	Yes
Super-Lactate		Optional	Optional
Max Effort		Yes	Yes

Note that if you score 7 or more points, you should do a few max effort sprints each week to maintain your VO2 max.

Intensity Workouts

If you have purchased one or more of the Cycling Past 50 and Cycling Past 60 eArticles, then use the workouts below in the programs you're following from those eArticles. *OR* If you haven't purchased one of those eArticles, use the workouts below, depending on your athletic maturity. Remember, for every hour of mixed intensity (hard riding plus recovery, but not including warm-up and cool-down), cut two hours of other riding.

The following workouts progress from least intense to most intense (tempo sweet spot, sub-LT, super-LT, max effort). The harder workouts are not appropriate for all riders. If you want to fit harder workouts into your program, you should master the preceding levels of intensity first.

In putting together your personal program, remember the two cardinal rules of intensity training:

1. *After warming up, if you can't ride at the desired intensity, go home.* Don't wear yourself out doing less than quality work. Give yourself another recovery day or two and do intensity later in the week.
2. *Always finish an intensity workout feeling like you could do more.* The objective is maximum improvement, not maximum fatigue.

This eArticle:

- Gives specific examples of workouts at different intensities.
- Defines the different workouts in terms of heart rate and power as well as rate of perceived exertion.
- Includes both structured and unstructured workouts.

Many riders like simplicity and train by perceived exertion. Some like the feedback from a heart rate monitors. Some riders like the precision of training with power data.

Some riders like structured workouts with timed periods of intensity and recovery. Others prefer unstructured workouts, just mixing up intense efforts with easy cruising.

All the approaches work! George Thomas, who won the two-man relay division in the 2014 Race Across the West, used timed intervals gauged by perceived exertion. And you don't have to stick to just one method or the other, either.

The types of intensity rides are similar; however, the intensities and durations of each type of ride are different. The harder the effort, the shorter the duration.

Always warm up for 20-30 minutes before the hard efforts and cool down for at least 10 minutes afterward.

Times are given for each type of structured workout. If you prefer unstructured workouts, use these as approximate durations. When doing a structured workout, start timing the work interval as soon as you start riding hard. RPE and power respond immediately to an increase in effort; however, heart rate may lag by several minutes. Stop timing the interval when you stop riding hard, even though your heart rate may slowly drop.

Unless you are training to race, always recover fully before starting the next hard effort. The times given for recovery are approximations—listen to your body. If you race you won't have time to recover fully before the next attack, so do your intense efforts with only partial recovery.

You can always mix up the types, intensities and durations of the unstructured and structured efforts to make the ride more interesting. Pacelines are a great way to mix up the intensity. When pulling at the front you are generally riding in the next harder intensity zone than when you are sitting in the paceline. You can also use license plates to mix up the intensity. Use the first digit of a plate to determine the RPE and ride at that intensity for X minute(s). X is longer the lower the RPE.

Tempo Workouts

Tempo efforts are done at the headwinds/hills pace, RPE 3-4, 88-94% of LT, 76-90% of FTP. Tempo rides continue to metabolize fat like endurance riding and also burn more glycogen with enough oxygen. Tempo riding (don't go too hard) is a great way to build endurance if you don't have time for longer, slower rides.

Structured

- **Intervals.** Start with 2 or 3 intervals of 6 to 8 minutes, with 3 to 4 minutes of recovery between each. Increase the number and/or duration of the intervals week by week, maintaining a 2:1 work: recovery pattern, until the work intervals total up to about 60 to 90 minutes.
- **Farm roads.** If your area has a grid of farm roads, ride briskly to the road two intersections away, then easily to the next intersection, then hard, etc. Or you can ride around a rectangle. Two miles (3 km) hard, right turn and a mile (km) easily, right turn and two miles (3 km) hard, right turn and then easily back to the start. Or you can use mileage (kilometer) markers along a road.
- **Leading the bunch.** Take consistent long turns at the front of a group; say for 8 or 10 minutes.
- **Aerobic time trials.** After a month or so of tempo rides, race a 60-minute *aerobic* time trial. Go steady and fast, but not so hard that you can't talk a bit—stay in zone 3. Every month repeat the time trial, trying to go farther but still able to talk a bit.

Unstructured

- **Rolling hills.** Ride up each hill breathing deeply but able to talk in short sentences. Recover on the way down. These work best on big hills or sustained climbs up a valley so that the tempo sections are long enough.
- **Headwind.** Ride into the wind early and then enjoy the tailwind home. It's a great workout and good fun.
- **Brisk after-work ride.** When riding home, increase your average speed by 1-2 mph (1.5-3 km/h). Remember, you are riding more briskly, not time trialing.
- **Coffee stop.** Ride at a brisk pace to a coffee house and then cruise home at a conversational pace.
- **Hustling.** Up the pace to get home before dark or approaching rain.

Sweet Spot Workouts

Sweet Spot efforts are done at the upper headwinds/hills pace and lower sub-barf pace, RPE 4-5, 93-97% of LT, 88-94% of FTP. Sweet Spot rides build sustained power.

Structured

- **Intervals.** Start with 3 to 5 intervals of 4 to 6 minutes, with 2 to 3 minutes of recovery between each. Increase the number and/or duration of the intervals week by week, maintaining a 2:1 work: recovery pattern, until the work intervals total up to about 45 minutes.
- **Farm roads.** If your area has a grid of farm roads, ride workouts similar to the Tempo workouts.
- **Paceline pulls.** Take consistent long turns at the front of a paceline for 4 to 6 minutes.

Unstructured

- **Fartlek.** Fartlek means speed-play in Swedish. During a zone 2 endurance ride pick up the pace when you feel like it and slow down when you feel like it.
- **Push up the hills.** Use the same course you use for tempo rides, just go little harder.
- **Use the wind.** This takes discipline. Ride into the wind for a while, turn around and recover for a bit and then turn around and ride into the wind again. Your reward is riding home with a tailwind!
- **Hustling.** Similar to the tempo workout, alternate riding at a conversational pace with some sections of harder riding to get home before dark or approaching rain.
- **Paceline.** Take long pulls in a brisk (not racing) paceline.

Sub-Lactate Threshold Workouts

Sub-Lactate Threshold efforts are done at the sub-barf pace, RPE 5-6, 95-100% of LT, 91-100% of FTP. Intensity rides metabolize lactate from glycogen without enough oxygen to produce energy.

Structured

- **Intervals.** Start with 3 to 5 intervals of 3 to 4 minutes with 2 to 3 minutes recovery between each. As you progress, increase the duration while decreasing the number of repeats, for example, to 3x10 minutes with 4-minutes recovery.
- **Farm roads.** If your area has a grid of farm roads, ride workouts similar to the tempo and sweet spot workouts.
- **Hill repeats.** Start at a specific point and climb hard for a certain time, e.g., 5 minutes. Spin back down and recover for a couple of minutes. Attack the hill again and try to go a little farther. Start with 2 or 3 repeats. As you get stronger increase the number of repeats and/or the time.
- **Time trials.** As you get fitter, design a course that takes at least 20 minutes to ride, and challenge a friend to race you. Or compete in a club's weekly TT.
- **Hill climbs.** As you get fitter, time yourself on a local hill that takes at least 20 minutes to climb.
  Time trials and hill climbs and hill climbs are very hard mentally, as well as good training, so unless you race, don't do one every week.

Unstructured

- **Fartlek.** Just like a fartlek sweet spot workout. Ride in zone 2, *not harder,* and from time to time shift up to zone 4 … and then back to zone 2.
- **Hammer hills.** Use the same course you use for tempo rides and sweet spot rides, just go harder.
- **Race to the city.** Start several miles away and race to the city limit sign.
- **Escape and chase.** Send a rider down the road. Let a 1- or 2-minute gap open, then chase back into contact. For a tougher workout escape down the road yourself and let the group chase you.
- **Catch and release.** When you spot a rider ahead of you chase hard until you catch the rider and then let the rider go. Do this several times with the same rider or with different riders.
- **Fast group.** Riding with a group that's faster, which forces you to maintain a pace you would not otherwise maintain, is a classic way to improve fitness.

Super-Lactate Threshold Workouts

Super-Lactate Threshold efforts are done at the eyeballs-out pace, RPE 6-7, 101-105% of LT, 101-105% of FTP. Because of their great intensity, these efforts have to be shorter, just a couple of minutes or less. If you race you may make these longer.

Structured

- **Intervals.** Start with 2 or 3 intervals of 2 to 3 minutes, with 2 minutes of recovery. Build to 3 or 4 intervals of 3 to 4 minutes with 2 to 3 minutes of recovery.
- **Hill repeats.** It's often easier to push yourself to the limit on hills than on a flat road. Use the same method as sub-LT repeats; go harder and not as long.

Unstructured

- **Fartlek.** The same as sub-lactate just go harder but remember to ride in zone 2 when not hammering.
- **Hill accelerations.** Hammer short hills and go even harder toward the top.
- **Race to the city.** Start about a mile away and race to the city limit sign.
- **Paceline.** Take fast pulls in a racing paceline.

Maximum Effort Workouts

Maximum efforts are done at the ouch! pace, RPE 8+. Because these are maximum efforts, LT and FTP are not applicable—you put out as much effort as you can. Because these are so hard, don't try to ride at maximum effort, recover for just a few minutes and then go again. Instead, spread these out in your other training rides.

Structured

- **Timed sprint.** With friends, see who can sprint the farthest in 30 or 60 seconds.
- **Speed sprint.** From a pre-determined speed, see the maximum speed you can accelerate to in 15, 30 or 60 seconds.

Unstructured

- **Chase cars.** Pick a color and every time a car of that color passes, sprint after it.
- **Sprinting.** Flat out for city limit signs.
- **Dogs.** Outrun a dog, the classic speed training from the movie "American Flyer."

Measuring Progress

Whether you use RPE, a heart rate monitor or a power meter to gauge intensity, repeating a baseline time trial every 4-6 weeks on the same course under the same conditions is a good idea.

If your time is drops, then your power is improving.

- **RPE.** If you are using RPE, as you get faster your power will increase at the same RPE.
- **Heart Rate.** If you are using a HRM, as you get faster your average heart rate for the TT may go up. This means that your lactate threshold is increasing, that you can put out more power and go faster before you start to accumulate significant amounts of lactic acid in your blood. If your LT goes up, then you should redefine your heart rate zones. Don't worry if your LT doesn't go up, as long as your time improves. If you are already pretty fit, your LT may not change with training although your power output at LT will increase.
- **Power.** If you are using a power meter, then when your time improves your Normalized Power has gone up, and you also should redefine your training zones.

Go for It!

Breaking out of your routine by *varying the intensity* is the fastest way to improve your cycling. Whether you are riding for fitness, going out with the club on the weekend, training for a century, racing or just riding casually, adding intensity will overload your body in beneficial ways—if you include recovery days and weeks to let yourself grow stronger.

By riding differently from day to day, you'll also enjoy cycling more. Varying the intensity opens more routes and increases the number and kinds of riding partners. You can mix in an easy after-dinner ride with your significant other, a mountain bike ride (great unstructured intensity), a fast club ride and perhaps a monthly time trial.

The variety, progress and enjoyment will improve your motivation. At the end of the week you're more likely to say "What a great week!" and start looking forward to the next one.

We started riding as kids because it was play. Just keep playing. Bet I can beat you to the top of this hill! Let's see who can go fastest in this tailwind! **Just keep playing!**

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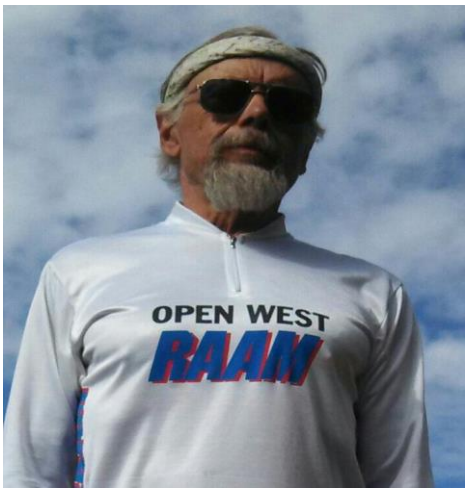
About the Author



John Hughes earned coaching certifications from USA Cycling and the National Strength and Conditioning Association. He enjoys coaching riders with a variety of goals and fitness backgrounds. For more information, visit www.coach-hughes.com.

John's cycling career includes course records in the Boston-Montreal-Boston 1200-km randonnée and the Furnace Creek 508, a Race Across AMerica (RAAM) qualifier. He has ridden solo RAAM twice and is a 5-time finisher of the 1200-km Paris-Brest-Paris. Much of this was accomplished during a 24-year career at Stanford University, where he balanced a professional career, family and cycling.

John lives in Boulder, Colorado, where he served for 12 years as Managing Director of the UltraMarathon Cycling Association and editor of *UltraCycling* magazine. In 2011 he participated in the International Conference on Cycling and Health in Shanghai, China.

John is the author with Dan Kehlenbach of Distance Cycling: *Your complete guide to long-distance rides,* published by Human Kinetics, Champaign, IL

Other Publications by Coach John Hughes

His other publications available from RoadBikeRider include:

Preventing and Treating Cramps

Eating & Drinking Like the Pros**:** How to Make Your Own Sports Food & Drink – Nutritional Insight from Pro Teams

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