

Skills and Fatigue

Under fatigue conditions during a race, what bike skills start to erode the fastest and how to they effect performance and the safety of the rider?

Bike handling and risk respect go pretty quickly when riders become fatigued. You see a lot of riders that handle their bikes pretty well when they are thinking clearly, but when they become fatigued, they make really stupid moves in corners and at the end of races. Especially in sprints finishes! Riders will normally push the risk envelope a little bit in a sprint, but when they are really tired, watch out! It's almost like they don't care or they just want the race to be over with.

You will also see crashes happen right after a very hard section of the race where the pace has been forced for 15 to 20 minutes. This is especially true with less experienced riders; the pace lets up a little and the riders bunch, then because most riders are tired, someone lets their handle bars overlap or wheels hit in a bad position and boom, a crash happens. Lack of clear thought is the usually the problem with this one. My drill instructor use to call the lack of a clear thought a, "brain fart". Unfortunately in a bike race, brain farts can be life threatening. Everyone that has finished a race knows what I am talking about.

I know that a lot of newer riders don't realize just how dangerous a bike race can be. Some riders might not have experienced how harmful a crash can be, some might not want to think about it, or they just don't care. The riders that don't really care are usually adrenalin junkies. But, I know that no one wants to think about putting him or herself at risk.

Risk aside, I have seen a lot of crashes that could have been prevented by practicing bike handling drills, clear thinking and not panicking. It is one thing to be competitive in a bike race, but it is a whole other story when you see riders make stupid moves because they don't conceptualise the risk their move causes. Not realizing that others may not be at their handling skill level.

Along with panicking and not thinking, lack of real riding knowledge is a problem with riders. I know that riders just don't know how to or do bike handling skill drills; even experienced riders don't practice bike handling skills. Every club should make a very concerted effort to get their members to go through bike handling drill sessions every spring or before the racing starts in their area. This would prevent the majority of race crashes. More experienced riders could help newer riders obtain some needed skills or get some practice in themselves. You would think experienced riders would know how to ride a bike, but I have even seen professionals that were never exposed to bike handling skills. In other words, they are really bad riders. Bike handling skills are the first fundamentals of bike racing and unfortunately they are the last to be learned.

I hate to see it, because with some bike handling drill sessions, quite a few crashes might have only been near misses.

What are things the cyclists can do to correct these diminishing skills during a race?

Bike handling skills and risk management should be thought about even before going to the race. When you are fatigued and disoriented, your body does what you practice. That is why the military practices the same thing, over and over; because when a soldier is very tired they will do exactly what they practiced. So if you practice bike-handling skills on a regular basis, 90 percent of this fatigue/diminishing skills problem is solved.

Another thing riders should do on a consistent basis is course observation or training route familiarity. Just walking around a race course, looking for dangerous areas will make a race less risky. It would be a good thing for a rider to look for depressions or potholes, newly paved sections, loose gravel or just patched potholes, off camber turns, sewer covers, painted lines on the pavement, or even roads that narrow from 2 lanes down into 1 lane. Road narrowing is especially dangerous in a race.

Riders really need to be familiar with the route they are using. I once saw a guy hit a depression in the road immediately after a corner on the first lap; he hit his front brake, causing him to cartwheel. Ouch! I know that he only learned about the depression when he hit it and he also didn't know what corrective action to take when you are in that type of handling situation. If he had known about the course dangers and how to handle them, his crash would not have happened.

Another example is when I saw a guy crash badly in a master's race after going over some train tracks. He ran over wet painted lines immediately after the train tracks. It had been raining out, the road was wet, and there was a turn right after the train tracks; instead of keeping his bike upright in the wet turn, he leaned his bike just like he did a hundred times on dry pavement. Leaning his bike and hitting those wet painted lines was a recipe for disaster. This poor guy laid his face wide open and was knocked unconscious. I am sure that if he had known what he was suppose to do in a wet turn (if he didn't know how to handle his bike) or was thinking clearly, this crash would also not have happened.

So kids, we have learned the hard way that course knowledge and bike handling skills can be a Godsend when you are tired and not as focused as you could be. Just the knowledge of the course and how to correctly handle your bike in all situations in the back of your mind, will help. Your subconscious can do some amazing things if you use it.

During training what should a cyclists do to improve these skills to counteract these situations?

Making sure you are physically ready for a race or event and practicing bike handling skills will counteract many possible dangers. Without pictures, here are a couple of bike handling skills that are very useful.

Bumping

1. Pair yourself with another rider of similar size and weight.
2. Make sure your handlebars are of similar height from the ground. This will prevent them from locking when you are touching them together.
3. Start slowly riding around side by side on a flat, safe course.
4. Gently lean and bump your elbows and shoulders into one another, making sure that you are looking straight ahead when doing so. Also make sure that your elbows bent and relaxed to act as shock absorbers. Relaxing your elbows with also let you easily ride in a straight line.
5. After becoming more comfortable with the bumping, work on leaning on the other rider. If your partner moves away quickly, you will fall over; so make sure you practice pulling your bike back underneath you and pulling your body back above your bike while keeping your line of travel. Just in case you experience a rider "disappearing" in a race and you need to know how to handle yourself.

Wheel Touching

In a race when someone pushes his or her rear wheel against your front wheel, you should know how to react.

1. On a safe, flat course (like a grass athletic field), have a rider take the lead in front of you. The lead rider should ride in a straight and steady manner. The lead rider should listen to you when you are letting them know what you are doing, but not look back at you.
2. You should then match their partner's speed and bring your front wheel up until just over lapping the lead riders rear wheel.
3. You should then gently brush your front wheel into the leads rear wheel; then back away.

Tips to remember:

1. Both riders' elbows should be relaxed, bent and slightly pushed out.

2. A tendency to overreact and panic is normal and should be avoided. Just pulling your bike back underneath you should help keep you upright. Overreacting and panicking is usually the cause of most crashes when wheels touch.
3. Always steer away from the lead rider, don't turn your bike. Turning will cause your centre of gravity to move to an undesirable position.
4. When someone pushes his or her rear wheel into your front wheel, you should counter with the same amount of force. Or it will turn your wheel too much and crash.
5. If you slow down and your wheels separate, you must steer straight and not over correct. Doing so will also make you crash.

Warming Up

What are some of the things you try to accomplish with your warm up session?

When most people think of warming up, they think of starting to sweat, breathing harder, warming up the muscles and stretching. Well, there is more to it than that. Also, stretching before a training session or race is not always the best time for it.

The things that happen when you warm up properly are increased blood flow, increased efficiency of the nervous system, lubrication of the joints and tendons, excretion of phlegm from the lungs, increased efficiency of oxygen exchange, increased utilization of micronutrients and increased efficiency of heat radiation.

With the increase of blood flow comes dilation of veins, arteries and capillaries; your blood moves around your body in greater volumes and blood that was pooled in capillaries and body parts moves to be used. Remember, blood carries oxygen. But most importantly, your muscles are bathed in blood making them more pliable and less prone to injury.

Your nervous system goes through an increase in efficiency of firing of the motor neuron units and the synapses wake up. When you start to ride you will notice that your joints become smoother and the roughness that is under your patella (kneecap) is gone. When you start to ride, your body increases the lubrication of cartilage. Your body also sends nutrients to these body parts for repair or for strengthening.

When you warm up, you also increase the efficiency of the utilization of nutrients. The enzymes that burn fat and carbohydrate increase in number and get better at burning these fuels. The other enzymes that convert lactic acid back to glucose also become greater in number and better at their job too. Your cells become more receptive to taking in nutrients like vitamins, minerals and hormones, making you a healthier person.

There is a coating of phlegm on your lungs when you start to ride and your body wants to get rid of it. That's why you may cough and sputter after a race or hard warm up. You will either cough up this coating or you will get rid of most of it by evaporation when you breathe. When you increase the demands on your body in your warm up, your lungs want to increase the efficiency of oxygen exchange so they don't have to work as hard to get you the oxygen that you need. The alveoli in your lungs open up making oxygen exchange greater and your rib cage expands to increase the amount of air you can take in.

You also sweat. No kidding, right? We all know that when you sweat you radiate heat through your skin. Well, your heat radiation becomes greater and more efficient at its job too. But, you have to be well stocked with this fluid called water.

Another part of the warm up is getting in a positive attitude. This can make or break a race for you. So think positive!

The last thing is stretching. Contrary to popular belief, the warm up is not the best time for stretching. A University of London study showed that stretching before exercise caused a decrease in the contractile force of the muscle. Which means, you are weaker after you stretch. The best time to stretch is after a ride or race and on your off days. Besides, your muscles are nice and pliable with the increase of blood in them.

Describe the warm up session you use prior to a training ride? How does it change prior to competition?

Your warm up will depend on what type of ride you are doing and what you are working on, but the base will always be the same. If you are going for a recovery ride, it means that you should make sure that the first 20 minutes are in zone 1 or about 65% of your maximum heart rate. For an endurance training ride, it's the same as the recovery ride. For an interval session, you should ride for 20 minutes in zone 1 and then 10 minutes in zone 2 with 1 or 2 increases of effort to your anaerobic threshold for roughly 2 minutes. After that, you are ready for intervals.

The race warm up that I see work the best is the same as the interval warm up with a couple of modifications. You start with 20 minutes of zone 1, then 10 minutes of zone 2 with a couple of efforts that are the same as you will use in the race. After that, you should stay in zone 1 or 2 for about 10 minutes so you can start your race fresh. The most important thing is your warm up should last about 20 to 30 minutes; because it takes that long for your circulatory and nervous system to get to the point of maximum efficiency. Plus, your cells think that you are doing anaerobic exercise for the first 7 minutes.

One other thing that is important to a warm up is the mental warm up. Think about how you want your race to go and how good you want to feel during the race.

Do you cool down? If so, what do you do?

Cool down is as important as the warm up. Your body heat dissipates, you convert lactic acid to glucose faster, your body uptakes more nutrients and expels toxic waste products that you create.

The last 10 to 20 minutes of a ride should be in zone 1 and after a race you should ride around for 10 to 20 minutes in zone 1 also. The best thing that you can do after a race or interval session is a couple of hours after the ride, ride rollers at a very easy intensity for about 15 minutes. Usually after a race, you have a car ride that makes your blood pool in your legs. This short roller session will get the blood flowing again, carrying waste products to be expelled. This means you will be more recovered the next day.

The typical training ride should end like this: 20 minutes before you stop, eat a carbohydrate bar or drink a carbohydrate drink of some kind, finish the ride in zone 1. When you are done, get off your bike, stretch and drink lots of water through the rest of the day.

The end of a race should end like this: At the end of the race, have someone give you a carbohydrate drink. Drink this while you are doing your cool down of 15 to 20 minutes in zone 1. After your cool down, stretch and eat a low fat sandwich of something like turkey, lettuce, and tomato on whole wheat bread. The sandwich should be eaten within 45 minutes of the end of the ride. You could also use a protein drink, but the sandwich costs less for almost the same benefit. With intervals or a ride over 2 hours, you should also end with eating a protein source.

The last thing is to clean up or take a shower as soon as you can. You will ward off saddle sores and rashes. No one needs that!

Climbing

Natural Climbers-

You might not believe this, but everyone has the ability to climb. I know what you are thinking, "You have to be out of your mind!" I can't climb at all! I always get dropped when I am in a race or on a group ride with my team or friends. Well remember this, some are just a lot better at it than others. You say, "No fake, Jake!" Realize that climbing well is a cause of genetics, training, diet or just plain having a good attitude towards climbing. No matter what, you can climb better on your bike if you really want too and are truly committed to it. Just look at Laurent Jalabert, he is a natural sprinter that has become one of the best climbers in the world!

Some people are just born to climb better than others do. Usually these people have a lower body mass index (are very light weight), lengthened hamstring and gluteus muscles, have an extremely high amount of cross fibres in their slow twitch muscle fibre, are natural time trialists that have worked extremely hard at developing their climbing ability or are a combination of some or all of these qualities. If you are a natural climber, you usually are very fast at getting up steep hills, as you would find in criteriums, or drop everyone on

long switch back climbs. This genetic selection was up to God and your parents. Some people are just not made to climb as fast as others do; however you can still climb better if you apply your training to do so.

One of the first things that you have to do to become a better climber is to evaluate your strengths and weaknesses as it pertains to climbing. Do I climb better on long endurance climbs, short intense climbs or do I just stink at climbing? After you do that, you can effectively set up a training program that will help you become a faster climber.

Another thing that you have to look at when evaluating your climbing ability is, "what is my ideal climbing weight?" On the flat land, you can be heavier and still stay with the peloton at speed. It is a total different story when climbing. You may lose 2 to 3 minutes on a climb because you are 10 pounds over your ideal climbing weight. But don't think you will be able to gain the time back on the down hill unless you put out some extra effort. Because, you won't. Unfortunately, gravity doesn't always work like that.

One thing that you have to look at is not losing too much muscle when getting to your ideal climbing weight. I have seen to many riders that where too thin and anorexic, then they thought they had to lose weight to get better at climbing. WRONG! If your body mass index is below 19 or 20 and your body fat percentage is low like between 5% and 8%, you do not need to lose weight. Most times I will have to tell a rider that they need to up their muscle weight. Once they do that, they find that they can climb better than they ever have. Once your body mass index gets above 23, your climbing will suffer a little. Riders that have a BMI above 24 or 25 usually are sprinters or time trialists and have trouble with climbing.

Some of you newer riders are asking, "how do you figure your BMI?" Well, you take your weight in kilos and divide it by your height in meters squared ($\text{kg/m}^2 = \text{BMI}$). One of the best ways to find your ideal climbing weight is to look at what your BMI and your body fat percentage are. If they are in the right range, like I just described, then you need to keep a daily weight chart and when you are climbing well, record it. Cross-reference that information with your weight chart and that is your ideal climbing weight. Just for the record, most Tour de France riders have a BMI of 22 to 22.5.

Technique-

To climb faster, you have to start with your climbing technique. You would think, well just stand up and go, right? Not so fast my young one! First thing is to make sure that you carry some momentum into the climb. I was recently told in a race, "Momentum is your friend and you, my friend, are full of it!" The faster you start a climb, the more gravity or should I say, lack of it, can get you up the hill faster. This works great with shorter steep hills and attacking at the start of longer climbs. You just have to make sure that you are not in your anaerobic threshold zone when you start the climb, or you will blow up badly on the climb. If you don't know your AT zone, just make sure that you can talk in at short sentences when you reach the start of the climb.

When you climb sitting down, you want to make sure that you keep your weight back far enough that your rear wheel does not skip around and that your hands are on the tops of your handlebars. This hand placement opens up your chest, so you can breathe better. You also want to make sure that you move your upper body from side to side to transfer your weight. You move your upper body a couple of inches to the side that is in the pedal down stroke. This will help you push the pedals down. You can also grab the handlebar a little harder on the opposite side of the down stroke. So when your right leg is pushing down, you pull up a on the left side of the handlebar with your left hand. Another handy trick is to make sure you are using your hip flexors to pull up on the cranks during the back part of the pedal stroke.

There are a couple of ways that you can place your body on your saddle when climbing sitting down. You can move farther back on your saddle and use your quadriceps (thighs), gastrocnemius and soleus (back of calf) more to spin the crank around. You can move forward on the tip of your saddle, using more of your hamstrings, hip flexors and tibialis anterior (front of calf). You can also sit in your regular neutral cycling position. If you sit while climbing, it is best if you move a little from one of these positions to another to utilize different muscle systems, giving the others a chance to recover. If you are strong enough, you will not have to move around on your bike. You can just sit and spin up the climb. However, that is not the reality for most of us.

Climbing when you stand can be the most powerful way to climb; you can utilize your whole body climbing this way. This technique is very effective on short steep climbs. To climb out of the saddle, first have your hands on the brake hoods. That way, you will open up your chest for better breathing and you can use the bars as levers to pull against. Next, make sure that you don't run your back wheel into the front wheel of the rider behind you. If you push your bike back when you stand up, the rider behind you can hit your back wheel, knocking your back wheel out from underneath you, making you crash. To prevent this, when you start to stand,

make sure that one of your pedals is in the 2 o'clock position and you push down on that pedal as you start to stand. This prevents the dreaded, "bike throw back." You will make a lot of friends if you don't throw your bike back. Trust me! As you are climbing, move your body from side to side for the weight transfer again. Pull up on the opposite side of the handlebars, just like when you are sitting. Also this time, your toes, knees and nose should be inline over the pedal that you are pushing down. Make sure that as you push down with one leg, you are pulling up with the other. Did you notice I did not say to rock your bike? Rocking your bike excessively wastes energy in the transfer of power to the rear wheel, the same as in the sprint. While out of the saddle climbing, your weight should be back over the bottom bracket. In climbing, this might mean that your butt is in front of the bottom bracket because of the angle. However, if you drew a line from you hip socket through the centre of the bottom bracket and extended that line, it would point to the centre of the earth. Wow, I feel like Jules Verne. The important part is to keep your weight balanced so the front wheel does not feel squirrely and your rear wheel does not skip around. Watch your breathing also; take large breaths. Get into your natural rhythm of climbing at your own speed. If you don't, you will blow up and have to slow way down to recover.

This is the most important thing in all of climbing. LOOK UP THE ROAD! It is really easy to look down at the ground or to look at the rider's wheel in front of you because you are suffering and trying to concentrate. Don't do it! If you lose your focus for even just a moment, you can run into a rider in front of you that is losing speed. And we all know what that means. Raspberries all around.

I have heard all of the comments about whether a rider should sit or stand while climbing. I truly believe that there is not a climbing position that is most efficient for everyone. Whether sitting or standing. I believe that it is up to the individual rider to find their way in this matter. Because of genetics, one rider may be more efficient standing. That person may have stronger, more efficient hamstrings! In short period of time, you will find out what style of climbing is best for you. One addition to this line of thinking though - when you climb while seated, you are using less energy. But climbing, standing or sitting, is a matter of the steepness of the climb, genetics, training, BMI, strength and the ability of the rider.

The cadence of your pedal stroke should also be looked at. Too high of a cadence will cause you to not utilize your leg muscles fully. While too low of a cadence will cause you to bog down and over use your legs. The cadence where you feel most efficient at will be the best one for you at first. You will know where it is when you feel your lungs and legs working hard together. Neither one will be maxed out while the other is still going strong. In your training, you should perform cadence tests to find your optimum cadence.

One last thing that you can do to help your climbing, is to climb sitting for about 10 seconds then climb out of the saddle for 10 seconds. Repeating this over and over. It uses different muscle groups to max and then lets them sort of recover before hurting them again. Thanks a lot, right?

Equipment-

Here is the untalked about of part of climbing, equipment selection. You hear everyone talking about using lighter wheels, but not about other equipment. Like handlebars, crank length, position of brake levers, tires, frames, gearing, light weight components, shocks and bar ends. First lets start with frame selection.

If you are a category 1 or a pro, you might want to have a frame suited for climbing. The way to make a bike frame better for climbing is to lower the bottom bracket height by a centimetre or have the bottom bracket height at 10 ½ inches. The frame should also have a shorter wheelbase, shorter rear stays and a more upright seat angle. I believe that most bikes have too laid back of a seat angle for other positioning reasons, but that is another article in itself. These changes will make the bike have a lower centre of gravity, thus making the bike track better. You won't have to fight the bike while trying to stay on a line. Not fighting a bike in this case will cause you to have less upper body movement, saving energy for pushing the pedals around. Plus you will have less upper body fatigue. I have to say this! The only problem with having a lower bottom bracket height or longer crank length is that it puts the pedals closer to the ground when you are pedalling. You say, "duh!" Well in turns, this can be a very bad thing. Especially in high speed turns. It is much easier to clip a pedal and go down. So watch it!

Lighter wheels are great for climbing. You just have to make sure that your weight is not too much for the wheels to handle. I have seen a lot of heavier rider's taco wheels, just because they were too heavy for the rims or the amount of spokes in the wheel. All of the specialty wheel sets are great, but make sure they will be suited for your purpose and your weight. I have seen it too many times when a rider uses the wrong equipment and they crash or have to drop out of a race because of their over zealousness.

Handlebars are also important in the fact that the wider the bar, the more leverage you can get from them. Plus you will open your rib cage up for better breathing. If you normally use a 40 cm width handlebar, put a 42 cm on your climbing bike. Since we are on the handlebars, positioning of the brake levers can help. Having your brake levers a little higher on the bars will not cause you to have your weight too far forward. This will make it easier to keep your weight back and over your bottom bracket. Plus, it is easier to apply more force on the handlebars when using them for leverage.

Components are a major item with riders trying to make their bike more climbing friendly. Honestly, I think their time should be spent better elsewhere. Most riders should look at their own weight before finding the lightest of the light to put on their bike. Very, Very light means very, very expensive and easily breakable. In my eyes, it's not always worth the cost or effort. You can easily lose 2 to 3 pounds of fat off your body and it will improve your climbing better than any lightweight, expensive components. Also with your components, make sure that your shifting works under load before starting a race with climbing. I learned this lesson the hard way. I was racing in the State Championships road race and on the first climb my shifting wasn't right, causing me to mis-shift. By the time I was able to get it into a gear, the front pack was up the road. The only thing I saw for the rest of the race were rider's that were getting dropped.

Crank length is another thing that you might think about. I don't completely believe in this either. Yes it makes a small difference in the fact that a longer crank length makes it a little easier to push a larger gear. But, this longer crank length causes your body to change your cycling position. Using muscles that you have not trained and pulling on tendons that have not been stretched to accommodate this new position. This makes it a lot easier to get hurt. I don't believe the risk is worth the benefits. Train consistently and effectively and you won't need a longer crank length than what you have been fit for.

Here's a big one, the bail out gear. Bail out gears are for wimps. No, just kidding! If it is a climb that you are afraid of or have not done before, the bail out gear can be a lifesaver. However, the gearing on your bike should already suit most climbs in the part of the country that you live in or you might need to train better. You will need to talk to an experienced local coach to find out what gearing will be right for you.

Tires, this is mostly for mountain bike riders, but I have a tip for road riders too. Mountain bike tires for lots of climbing should be pumped to a little lower pressure for traction and the tires should be larger, like 2.25. The grip orientation of the tire and the knob placement is also important. The knobs on the tires should be spaced apart more and you should make sure that the tire orientation is correct. This tire information also works well in mud and sand. For the roadies, make sure that you use a wider tire like 700X23. This will give you more traction on the climb and on the decent. You don't need a skinny tire to slide out from underneath you during a descending turn.

Shocks and bar ends. For climbing, tighten your shock up. This makes it easier to hold a line. Remember, this saves your energy. Bar ends are great for giving you more leverage on the handlebars. Just like brake lever placement on road bikes. The bar ends should be tilted up a little. The only thing that you need to watch for is that bar ends are a catch all. If you are in a really wooded area, you need to weigh, whether or not; it is worth the risk of crashing because your bar ends get caught on a branch.

Training-

The most beneficial thing that I have seen for climbing may make a true roadie sick, it is climbing on dirt with a mountain bike. While climbing on a mountain bike, if your weight is too far forward, your back tire will spin causing you to lose traction and letting you know that you are not doing it correctly. Also on a mountain bike, your balance is much more important. The last thing is that climbing with a mountain bike makes you pedal in circles better. If you pedal in squares or only push down, you will have surges in speed and your back tire will spin out.

Some of the ways to train for climbing better are making sure you are on a climbing ride once a week, climbing accelerations, big gear training, short hill surges, pyramid hill workouts and specific resistance training.

To start with the specific workouts; you should make sure that you train on a similar climb once a week for 4 to 6 weeks before the race that you want to do well in. You can also do climbing accelerations. They go like this: Locate a hill that will take about 30 seconds to climb. The grade should not be so steep that you can't make it in the required time. Do 2 to 3 sets per training session with 3 repetitions per set for a total of 6-9 efforts. Time of each effort should again be 30 seconds or so. The effort for each acceleration should be at your maximum. Take a 5-minute break in zone 1 or 2 between efforts and between sets. If you feel that you can not

complete all of the efforts or if you start to slow down to the point that you can't make the effort at full steam, stop. You will be farther ahead if you watch what your body is telling you.

If you are from flat land and you have a climbing race, try doing big gear training. Get on a flat road and put your bike in a large gear so your rpm's are around 65 to 80. Don't let your rpm's fall below 60, it is too hard on your knees. You can do this exercise, sitting or standing. It's up to you. Ride for about 5 to 10 minutes, rest for 5 to 10 minutes, then do it again. Do between 3 and 6 of these efforts. Don't do this type of training for more than 2 months without a break from it or you could develop patella tendinitis.

Short surges are just that. When you are on a ride with rolling terrain, half way up every other hill, surge your speed to the top. This is like fartlek training. Just have fun with it and do what you feel like.

Another thing that can improve your climbing is hill pyramid training. You find a route that has hills with varying heights and climb them so to max out at the top of each one. The first hill should be the shortest, having a 30 to 45 second climb. The next should have between a 1 to 1 1/2 minute climb. The last should have about a 3 to 5 minute climb. You should rest in zone 1 or 2 between climbs for about 5 to 10 minutes. Once you do the third climb, lasting about 3 to 5 minutes, then you start back down to the 1 to 1 1/2 minute climb. Ending with the smaller 30-second climb. Do 1 or 2 sets of these.

Resistance training for climbing is best done by working on strength in the off season. You will do this during the fourth and fifth phase of periodization, which each phase will last approximately 4 to 6 weeks. Repetitions of 6 to 8 with 3 minutes of rest between sets and working up to 4 sets once a week on the following exercises:

45% Leg press

Hip flexors (multi-hip machine)

Leg curl

Seated calf raise

Also trunk exercises of crunches, hanging leg raises and roman chair raises should be done twice a week. Doing 2 sets the point of exhaustion with 2 to 3 minutes of rest between sets.

Tactics-

Psyched out

The first tactic you can use to your advantage is to not psyche yourself out. Let your opponents psyche themselves out, while you remain calm. They will be doing irreparable harm to their climbing ability. You should relax. Just relax. Not so much that you go to sleep, but be calm. Don't worry about the climb, just go at your own rhythm.

Taking advantage

Before you get to a climb, make sure that you stay out of the wind. Make the other teams or riders pull you up to the climb. That way you will be fresh for the climb, where they are pretty well spent before they start. At the bottom of the climb, attack! If the others are toast, you will be able to get away. Staying out of the wind is also a good tactic to use if you want to control the pace. At the start of the climb the others are taxed, you are not. Just ride at the front controlling the pace while everyone else is trying to recover. Recovery on a climb is a hard thing to do, even if you are going slower than what you could do.

You will need to watch the other's in order to take advantage of their exhaustion. Look for body movement, bike handling and heavy breathing. If your opponents look like they are working very hard and there is a lot of upper body movement, you can be pretty sure they are maxed out. Along with this, they will not be controlling their bikes very well. They will be all over the road. The last thing, which is very important, is they will be breathing very fast and taking big breaths. They won't be talking, that's for sure! You can use these things to your advantage. You can act in the manner I just described and fake your opponents out. Waiting to attack when you think it is the right time. However, you have to watch some people very closely because they will try this tactic too. Look for the sweat!

Faking it

If you have to fake a climb, here's how. Start a climb near the very front of the pack. As you are climbing, go at your own pace and slowly slide back through the pack. At the end of the climb you will be at the end of the front group. This is also a good way to use less energy if you are a strong rider and you want to have more speed than your opponents at the end of the race. They will be going hard on the climbs, while you will be taking it easier. They will be toast, while all they can see is your butt flying up the road saying, "See Ya!"

Attacking from the back or front

Attacking from the front or back can catch your opponents off guard. Attacking from the front is best when you have a natural climber that can pace you up the climb to the point where you decide to attack. This not only makes it hard on the other teams, but you have the benefit of a draft for a while. Saving your energy. The other way to attack from the front is to just up the tempo to the point that the others can not follow. This is always very psychologically damaging to other riders. At that point they just about give up. You can also weave across the road if you are at the front. It makes the other riders very mad and forces them to work at staying on your wheel. They expend more energy getting upset and trying to follow your wheel. One thing to remember when doing this, watch for riders coming up behind you or you might ride into them. Not a pretty sight!

Attacking from the back is best accomplished when the other riders are unfocused. By either watching for signs of their exhaustion, when they are fumbling around with their shifting (like I was) or when they are taking a drink. Just let the others get about 3 to 4 meters ahead and then jump. Make sure that you have just enough speed that they do not get on your wheel and that you are not over extending yourself to the point that you will blow up. This tactic is best suited for small groups.

Not again

Another tactic is to have one of your team mates repeatedly attack the group on a climb, making them chase. You on the other hand, are using the other teams draft, saving your energy. When you can sense that the others have had just about enough of it, you attack. If you get reeled in, attack again and again. There will be a point very soon when the others will give up or won't be able to chase you down again.

Some do's and don'ts

If you can help it, don't let a natural climber get very far. Try to draft them and make them do the work. They may not like it, but if you let them go, you won't see them again until you see them on the podium. Don't blow up on a climb. It is better to go a little slower and try a catch on the down side, than to blow up and risk not catching back up. Blowing up will take a lot longer to recover from than slowing down to your rhythm. Plus if you blow up, your reflexes are bad and you could cause a crash.

If you are going to try to catch someone that has attacked, the best way is to up your tempo gradually to the point that you are going a mile or two faster than they are. You will eventually catch them without using too much energy. If you can stay with the leaders on a climb, do so. You have nothing to lose. You might just surprise yourself. The other thing is not to go too hard too early in a race. If you are in a multi-climb race watch that you don't worry about the flyers in the first two thirds of the race. They will probably get caught and dropped. The real leaders will come on strong in the last third of just about any race.

Stage racing

The last thing is stage racing. I will give you the best thing that you can do to win. Use the time trials and climbing stages to gain time, all of the other stages are for recovery. Do not try to expend anymore energy than you have too on these days. Just sit in and stay out of trouble. Let your team do the work or better yet, let the other teams do the work. All you have to do is to make sure that you are not losing time to the important opponents that you are racing against for general classification. Good luck with your climbing!

Sprinting

So you want to go fast and beat all your riding partners to the finish line. Well here are some tips in a two part series on technique, conditioning and tactics to help you achieve your sprinting goals.

Types of Sprinters

There are 2 extreme types of sprinters. Very fast, short term sprinters and slower, longer-term sprinters. Short-term sprinters usually have great attacking speed and can go faster than anyone for about 100 to 200 meters. These people have a predominately large muscle makeup of fast twitch type 1 muscle fibre. They don't have great high-speed endurance and usually struggle during a race until the sprint comes and then they are gone. These people are the ones that profit greatly from lead outs and have to make their opponents do most of the work during a race. They can bridge small gaps in lighting speed and make people think they are sandbagging when they really aren't.

Longer-term sprinters are the ones that can sprint from about 500 meters and burn out their opponents. These people are made up of mostly slow twitch type 2 and type 2B muscle fibre. They are the ones that jump off the pack with about a half a kilo to go and hold everyone off. Just enough to make you sick. They don't need the lead outs that short term sprinter need so bad, but are able to use lead outs that start about 3 to 5 kilometres out to their fullest.

Most of us fall somewhere in between these to extremes and you have to remember that people have different physiological structures. Shorter muscle bodies, the amount of cross fibres in the muscle and enzyme efficiency are just some of the things that make people into great sprinters. However, you can beat anyone by using the right techniques, tactics and the right conditioning to maximize your own performance.

How to Sprint using the right technique

So you are in your riding position, seated in the saddle, hands in the drops. You are getting ready to sprint. Your wrists should be on the outside of the handlebar, elbows bent. Your back flat. The reasons for having your hands in the drops, wrists on the outside and elbows bent are; when you are in the drops, you have more control, you have more leverage when you wrench on your bike and your hands are next to the brakes if you need to use them. Having your wrists on the outside of the handlebar gives you more handling control and puts less stress on them. Putting less repeated stress from angular pressure on your wrists will help you prevent the development of carpal tunnel syndrome. Having your elbows bent also gives you more handling control. If someone bumps you during the sprint, your elbows will act as a cushion or shock absorber; keeping your upper body stable and your centre of gravity where it should be, so you won't crash. Having straight, stiff arms is the number one cause of rider crashes after not watching what you are doing. Also, you can stick your elbows out to psychologically hinder any riders that are coming up from behind to pass you.

Now it's time to sprint, come up off of the saddle a couple of inches smoothly without throwing your bike backwards. Throwing your bike backwards can cause you to slam your rear wheel into the rider behind you, causing them to crash from losing control. You may also crash from this; by having your rear wheel knocked out from underneath you. Keep your back flat and your weight back over the bottom bracket. In the beginning of your sprint as your pedal goes down, push the bike a little to the opposite side. Remember, I said push your bike over a little! That means about 3 to 4 inches. Keeping your weight over the bottom bracket and off the saddle a couple of inches, you'll keep rocking your bike from side to side to help you accelerate. As your pedal revolutions increase after about 25 to 50 meters, stop the rocking motion and let your bike become stable

underneath you. You'll want to have the maximum weight transfer to the pedals as you can. This is accomplished by keeping your weight back over the bottom bracket, with your hips over the bottom bracket, and not rocking your bike after you get this initial acceleration. If your rear wheel starts to skip underneath you, your weight is too far forward over the bike.

Now that you have accelerated on top of the gear, shift up to the next biggest gear. Keep your leg speed up. This is very important, too low of a leg speed will cause you to bog down at the end of a sprint. Too high of a leg speed will be inefficient, causing you to not be as fast as you could be. Make sure you keep breathing during your sprint. This is very important! You may be anaerobic, but the small amount of oxygen that you receive from breathing may get you that extra 1 to 2 meters that wins the sprint.

Remember to KEEP YOUR HEAD UP and to LOOK DOWN THE ROAD. Concentrate on what you are doing. A classic example of not watching the road in front of you are: Wilfried Nelissen's Tour crash of 1994 and Djamolidin Abdoujaparov's Tour crash in 1991. Sorry, but if they would have taken personal responsibility and watched where they were going, neither one of them would ever have crashed. If you don't believe me, watch the tape and see that both of these riders have their heads down and are not watching where they are going. Especially when Nelissen ploughs into the policeman.

When sprinting uphill at the front of a group have your hands on the top of the brake hoods and move just a little forward with your weight. Having your hands on top of the brake hoods is a bit more dangerous. However, it opens up your rib cage, lets you breathe easier and is more efficient when going uphill. Make sure you are very careful and you only use this technique when sprinting uphill. Trying this on the flat while in a pack will not be too smart; you will not have as much manoeuvring control as if you had your hands in the drops and your elbows bent. Plus, you do not have as much accessibility to the brakes.

Conditioning

You know how to sprint now, but what about getting faster? Making yourself faster is not that hard. However, you have to be consistent with your training and you need to eat correctly. To quote a gentleman that I met at the CABDA bike show, "There are too many fast food bike racers. You see them at Burger King before the race and you see them there afterwards". Is this like anyone you know? To make muscle stronger so you can sprint faster, your muscle needs to be more efficient (recruitment of motor neurons) and larger (hypertrophy). The way these two things happen is by training and diet.

First, let's tackle the diet thing. Real quickly, you need to eat whole foods that have nutritional value. Like fruits, vegetables, whole grains, a bit of extra protein, good fat (canola oil, fish oil, olive oil, and flaxseed oil) and take your supplements correctly.

To make muscle you need to take in more calories than you expend. The extra protein is from the fact that you are an endurance athlete and you burn protein as you work out. Body builders don't need that much more protein than the average person. However, endurance athletes need over twice the amount of protein than a body builder.

Next the training part. The best thing you can do is to weight train in the off season to get stronger and increase the muscle size. Then in the season, you should do sprint workouts after you get better at riding hard. Usually about a month to 2 months into your season.

Weight training for sprinting is best summarized by training with a good periodization weight program with an emphasis on doing heavier weights with less repetitions during the last two phases of the training cycle. This is in combination with high speed spin sessions on the wind trainer before the leg weight training session or after 2 to 3 days of recovery from the leg weight training session. You should only weight train each muscle group on your legs once a week as to give them sufficient recovery before the next weight training session because you will be doing a hard ride or hard training once more during that week. Repetitions and rest during the strength cycles would be as follows:

Repetitions	4 to 8
Sets	3 to 4
Rest between sets	3 minutes

Exercises in order:

45 degree Leg Press

Lunges

Leg Curls

Seated or Standing Calf Raises

Crunches (you will have to do more repetitions as 4 to 8 is unrealistic)

Oblique Crunches (you will have to do more repetitions as 4 to 8 is unrealistic)

I don't believe in doing power cleans or squats with heavy weight for cycling training because most people don't do the exercises biomechanically correct for their body. Also, your body was not constructed to do these types of exercise with a heavy weight in a proportionate body/lifting weight ratio. Long term damage to your back is very likely if you use too much weight and lift incorrectly. I think these exercises are great during the learning or transition phases, but not the more intense phases.

What you can do on the road to improve your sprint is to do sprints. Pretty simple and straight forward, right? Well, not so fast grasshopper! You need to do sprints, not intervals that you think are sprints. The best way is to get a training partner and drag race, not using each other's draft. If you have a group ride and you want to do sprints then it needs to be a big drag race. You can simulate racing and sprint training, however not all of the riders will be doing sprints. They will be the lead out people and they will be getting in interval training.

Another other thing is that you should only do up to 6 full out sprints in a sprint session, because you are breaking down muscle tissue and you don't want to break it down too far.

You can also do a motor pacing session with sprints, just have the motor bike lead you out to a speed that you can sprint by and drag race the motor bike. Sprints should be an all out effort for about 200 meters and followed by about 10 minutes of rest between sprints. If you aren't sure how far 200 meters is, it's about 2 telephone poles in distance.

You can do sprint training by doing downhill sprints, flat land sprints or uphill sprints. Mix it up and work on the type of sprint that you will have in the in the up coming race that you want to be outstanding at. The sprint training for that should start about 3 to 4 weeks before the race you are picking for greatness.

Mt. Biking

So how does sprint training relate to Mountain Biking? Well, the type of strength required for doing small climbs is the same as doing road sprints. If mountain bikers want to climb faster, doing road sprint workouts will help.

Tactic 1 - Attacking

Attacking when you sprint is as important as how you sprint. If you don't time your attack well, you will increase the chance that you will lose! Sprinting is an art of utilizing your physical and mental capabilities to maximize your performance. Sprinting too soon or too late and you will lose. Not using the wind in your favour or not using the draft of others and you could lose. Doing things right and you will most likely win. Even if your opponent is stronger or more experienced than you.

You need to know the strengths and weaknesses of the riders in your race, as well as your own strengths. The more you ride with others and the more you race, you will find out if you have a very fast short sprint or if you are not as fast but can hold top speed for a long time. You will be able to use this information about yourself to make the race, your race and not dictated by someone else. Also, if you race enough, you will just know from experience who are the racers and who are the tourists out to have a nice day riding fast as they can. Once you know who is good to have in a break that you can beat in a sprint, who is a long slow sprinter or who is a short, very fast sprinter, you can make the mental choices that will help you win.

Attacking on a hill is the hardest thing to judge, unless you ride the course before your race and sprint up the finish. Testing the finish will give you a very good idea of when to start your sprint. You will know if the others are sprinting to soon, so you will be able to draft until it is the real time to go. Leaving the others behind.

Attacking on a downhill is just as important. Most of the time the lead rider, the second or third rider is in the best position to win. The steeper and shorter the downhill, the more you will need to be at the front. It is still a good idea to test the sprint area to see when is the best time to start the sprint. You might have your top speed for a longer time than you think.

Tactic 2 – 2 up sprint

2 up sprints usually occur when there are 2 people in a break, in a match sprint, going for a prime with a wheel sucker or maybe just 2 people on a training ride. 2-up sprinting is knowing when and how your opponent in going to sprint and what you are going to do about it. Are you going to initiate the attack or are you going to respond to one.

If you know that you are much stronger than the other rider you are going against, it might be a good idea to attack sooner and burn your opponent out. They just won't be able to keep up with you. Nelson Vails use to do this in downhill street sprints. He would just go to the front and hold off the other riders. Part of this is that downhill attacking technique and part is because he knew that he could hold off any increases of speed by others.

If you are going to start the sprint from the front and you are a fast short-term sprinter, you will need to keep the other rider at bay. Start from the front and keep the speed at a slower pace, however not too slow that your opponent just wants to go to the front. You need to keep them pinned in behind you. Riding on the opposite side of the road or track from which the wind is blowing does this. The other rider will want to draft and keep out of the wind, pinning them in against the curb. It will also limit the rider to starting the attack from one side, which you will be able to see when it happens. If you let the other rider attack from this situation and you know that you are stronger than they are in the distance left; just as the attack starts, attack yourself. Keeping the other rider behind you and making them come around you. This will waste more of their energy, while saving yours.

On the other hand if you know that your opponent has started the sprint too soon and will burn out, you can use their draft to save your energy and to sling shot around them.

If you are pinned behind your opponent, have a long sprint and want to start it early, watch them until they lose their concentration. It might be that they look the other way for a minute, take a drink close to the finish or fumble with a mis-shift from their derailleur. These are just a few of the most common things to look for when an attack opportunity opens up. You can usually get some distance from them while they are analysing what just happened.

If you are pinned in from the rider in front of you, you can start to slow a little to open about 3 to 4 meters between you and your opponent. Then attack! By the time your opponent has time to react, you should already have a gap and substantial speed difference.

Tactic 3 – Small Group Tactics

Small group sprinting is best done with a teammate or teammates. However, you can use your opponents or other teams mistakes or work to profit and win the sprint.

If you are in a break alone with roughly 8 people or less this tactic works well. Just time your rotation in the paceline so you end up in the back at the time you want to attack. As soon as you get to the back, open about 3 to 4 meters behind the last person in line. Don't hesitate, attack! Take off using the slipstream of the paceline to accelerate. About 1 ½ meters before you are going to hit the last rider, launch off to the middle or opposite side of the road or track. You will not want to give the riders in the group the chance to grab your wheel and use you. If you get a wheel sucker, your attack was not fast enough, period!

You can use this same manoeuvre if you have one or two teammates in with you. Make sure that your teammate is in front of you and set it up that as soon as you rotate back, your teammate opens the gap and you both take off together. Your teammate will be leading you out. If you have a couple of teammates in the break with you, you can take off with one while the other in front blocking for you. This is not that hard to do, but it takes practice and everyone needs to know their job and what's going on at the right time. Discreet communication is key to this tactic. Hand signals and verbal cues work very well for this.

Tactic 4 – Field Sprints

Field sprints can get pretty dicey and very dangerous. That is why having your team control the field by riding the last couple of kilometres at the front going very fast is so important. If your team is controlling the field, your sprinter's chances of winning are very good. You have to make sure that you have a designated sprinter and that they are feeling good to sprint or you may have to pick someone else to do the job. Having another sprint, faking the other teams out by having your marked sprinter sandbag is a good psychological weapon. The others will think your sprinter is going to sprint for the win and while they are watching them, someone else is taking off for the win.

Here are a couple of tactics for field sprints. To be effective with field sprinting on a team there has to be a lot of communication and advance planning. The best way I have come up with is to have about 5 people at the front in the last 2 kilometres of a race doing a lead out. The first 3 riders are for leading out. The 5th is for blocking. Just as the 3rd rider from the front is starting to die and the sprint is about to open up, the 4th rider takes off and the 5th rider just sits there, BLOCKING! The other teams will have to come around to chase. By that time, it is too late and your team has won!

If you are all alone, just watch the other teams at the end for the line up. Usually if you are 4 to 7 riders' back you can see who is going to launch. Just jump on their wheel and when the road opens up in front of you, go for it. If you do this, you have to be sure that the rider that you are using is going to be able to make an opening and is going to be able to go or they may die out on you. Leaving you in a bad position.

There are about a hundred different ways to play this out, so use your imagination or learn from watching race videos.

One last thing to remember, to win a race with a sprint, you must be there with the first group at the end of the race. Good luck with you sprinting.