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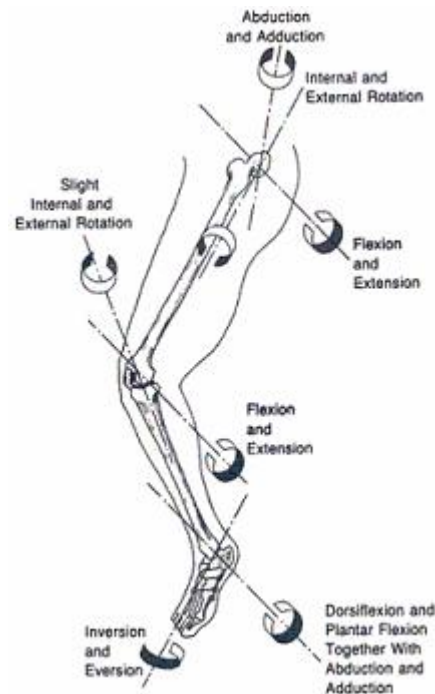
Is it your feet? Setting up your bike - Part 2

Back in article number 11, we talked about the importance of setting up your shoes correctly. The point of the text was to emphasize the value of having a proper shoe/cleat set up. In conjunction with that, we need to talk about the importance of proper pedaling technique. As was shown in our diagram from Ed Burke's book *Science of Cycling*, there are a lot of bones and muscles involved in turning the pedals.

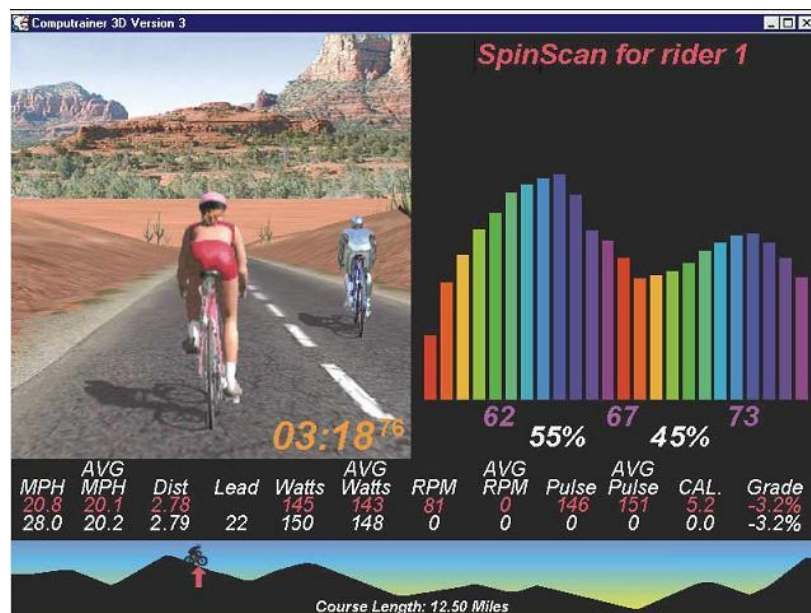
Since you are the engine in this system, you should be very concerned about power output. The speed at which you move your legs is directly related to the speed of the bicycle. However, cadence is only part of the formula. Jamming the pedals around at 95 rpm is not the same as a smooth fluid motion at 95 rpm. A smoother, faster pedaling technique will not only save you energy and make you more efficient, it will give you a strategic advantage. You will have more reserves and present the appearance of a more capable athlete. But there is more to pedaling than just appearances.

Let's say you are riding a time trial and you are lucky enough to have no noticeable wind. You feel good and pick a gear coming out of the turn around that you hope will take you to victory. You hit your rhythm and push for the finish line. Half way home your legs begin to bog down and you slow slightly. At the finish you find you have come up short. As you take an easy ride to unwind, you feel sure you could have done better. Could it have been your choice in gearing? Perhaps a slightly smaller gear pedaled at a slightly higher cadence could have given you that margin of victory. Developing a good pedaling style allows for more versatility when conditions change for the worse. I have seen too many cyclists get a poor performance in a time trial because they refused to shift to a smaller gear. Your gear choice should be made solely on what you need at the time. If you can ride a 40K time trial in 55 minutes using a 53/16 gear, then don't try using a 53/12 where you will struggle to finish. Do not worry about what people think about your choices. Show them you know what you are doing by beating them in a race.

Your choice in gearing is directly related to your pedaling technique. Pedaling technique is not just pushing down and pulling up with the leg muscles. It is the attempt to apply constant force to the pedals and therefore, forward motion to the bike at all times. Over the years there have been many studies done on the dynamics of pedaling. Top athletes have been used as lab rabbits in an effort to analyze their pedaling technique. The problem with trying to pedal properly is that it is not a natural motion. The muscles that push down (quadriceps, rectus, vastus, etc.) are more powerful than the muscles that pull back (gastrocnemius,



soleus, tibialis, etc.). When pedaling, these pulling muscles cannot equal the power of the muscles pushing down. As a result, the leg muscles pushing down will always be wasting a certain amount of energy lifting the opposite leg. The secret is to move the weaker or smaller muscles in a way that limits the extra work the opposing, larger muscles must. Lots of training sessions have been developed over the years to help with this idea. Some, like the single leg pedaling drill require the athlete to develop higher levels of muscular coordination by having them keep their bike moving using just one leg at a time.



The term ‘Technology’ is really nothing more than the referral to the use of devices to help people do something. Technology in recent years has brought about training with a power meter as the standard for determining performance. However, power meters by themselves cannot determine how well you are pedaling. This requires more information than just cadence, speed and watt output. Despite the sophistication of the many great systems available, there is only one training device that can analyze your pedaling technique: The CompuTrainer by RacerMate. So how do you use it properly to improve your performance?

When you decide on your race gearing, the choice should be made on physical efficiency. That is, the highest possible forward bike velocity for the amount of energy expended. Most athletes make their gearing choices based on the terrain they will be training or racing on. Flat terrain competitions will require closer sized cogs than hilly or mountainous terrain. By closely monitoring your power output, heart rate, cadence, breathing and pedaling technique during training, you can effectively choose the right gearing and cadence for any race. The built in CompuTrainer software includes a very nice and somewhat overlooked program called Spin Scan. Using this software when training will help you identify the weak areas of your pedal stroke and give instant feedback when the proper pedaling technique is applied.

This program uses a cadence sensor in conjunction with a computer controlled load generator to track your power output to the pedals during 360 degrees of rotation. You can see instant feedback with a graphic representation of every part of your pedal stroke. The display shows the athlete, in fifteen degree increments, where during the pedal stroke any changes are taking place. By watching the graph on the screen, the athlete can use the CompuTrainer like an instant biofeedback device.

Since every athlete is different, their pedaling technique and gear choices may also be different. The problem with racing a bicycle is that you are trying to combine a human being with a machine. The human body produces the propulsion with the leg muscles which were designed to move the leg up and down for walking or running. The bicycle wants your leg muscles to produce motion that goes in circles. That is why good pedaling does not come naturally. Using a CompuTrainer allows the athlete to see when they are performing the proper technique. By getting a feel for which muscles are being used, the athlete can then go back out on the road and duplicate that same pedaling feel.

The pedals are the athlete's only power connection on the bike. Poor pedaling can also effect your position on the bike, aerodynamics and overall efficiency. Since a large portion of a cyclist's work is pushing air out of the way, position has a number of impacts on performance. You should put a conscious effort into perfecting proper pedaling technique every time you ride.

When athletes I coach first start using Spin Scan, they discover muscles they never knew they had. That's because they haven't been using them before and they tire quickly. It helps encourage them to stretch and strengthen those muscles. As mentioned in Article 11, the other key element to keep in mind is how your feet are attached to the pedals. A poor bike fit, especially the shoe/cleat position can undermine any chance of proper pedaling. Finding your ideal position on the bike is not only a meticulous process, it is an ongoing one as well. This is especially true of growing junior athletes who are constantly changing size and shape. As you refine your pedaling technique, it is important to be objective about what adjustments are truly helpful and which are not. For example, if a particular adjustment to your cleats brings your legs closer to the frame of the bike that can be a good thing. It is improving your aerodynamic profile. On the other hand, if that adjustment also causes you to lose power at some point of the crank rotation, then it is not a good thing. Any adjustments made should bring real improvement or they are not worthwhile.

There is also one last point to consider. When it comes to determining your riding position, be careful not to make drastic changes that can overload connective tissues and muscles. Remember to keep good records of your position, any changes you make, why you made them and what the effects to breathing, power output, heart rate and pedaling were. Not only does this help track your progress, but if you ever get another bicycle, you will have an exact history of how it should be set up.

Good Luck!