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Flat Pedal Revolution Manifesto

The science and logic behind using flat pedals to become a better rider.

Manifesto (noun): a written statement declaring publicly the intentions, motives, or views of its issuer.

The Flat Pedal Revolution Manifesto is the result of a long and unintended journey. As a strength coach with a passion for mountain biking I never wanted to become a leader of the Flat Pedal Revolution, much less put together this manifesto for the cause. However, it is a cause that I have embraced and feel is worth fighting for.

At the heart of this revolution is a fight to debunk the common myths about the value and drawbacks of both flat and clipless pedals, especially for new riders. Everyday mountain bike riders are told by people at bike shops and trail heads that you can't pedal nearly as efficiently or effectively without clipless pedals. Plus, every magazine and website you read has countless ads and articles touting clipless pedals and shoes, reinforcing the message that they are essential to mountain biking bad assery.

I know this because I've experienced it firsthand. When I started riding mountain bikes I was told that I needed to get into clipless pedals ASAP - only beginners and downhillers used flat pedals. I saw the charts showing how I needed to be attached to my pedals to allow for the most efficient pedal stroke. Although I was having fun and making progress on every ride I also felt that I was somehow holding myself back by riding flat pedals.

Eventually I decided to take the plunge and try clipless pedals. Over the course of a month I spent hours practicing getting in and out of them but I could never get my left foot to cooperate to the point I felt comfortable on the trail. After falling over at a stop sign because I couldn't get unclipped I figured I would have died if that had happened on the trail and decided to go back to my flats - they were way more fun and less stressful.

I figured I would take flats as far as I could and switch to clipless pedals when I felt that my pedals - and not my fitness and skills - were holding me back. After more than 10 years of riding I'm still waiting for that day…

These myths also keep a lot of riders trapped using clipless pedals despite the fact that they don't like the mental stress of using them. I get emails every week from riders thanking me for "giving them permission to try flats" (their words, not mine). They tell me how they have rediscovered their passion for the trail because of flats, otherwise they might have simply quit riding. Plus, they all report no decrease in speed on the trail, simply more fun and less stress.

Over the years I've not only seen how well you can perform with flat pedals - both with myself and with other amazing flat pedal riders I have met - but I've also come across a lot of information that explains why that is. This info debunks the common myths surrounding the pedal stroke and how clipless pedals supposedly enhance it, shedding new light on a subject that is still misunderstood by the vast majority of riders.

My hope is that this Flat Pedal Revolution Manifesto will serve as the jumping off point for a lot of thought and conversation about this subject. I created it as a resource for both myself and other riders to point other riders to quickly get them up to speed with core principles of the cause - flats can make you a better rider in some ways, just like clipless can make you better in others. Knowing the facts about each is the key to being the best rider possible.

As the only resource in the world that both debunks the common myths surrounding the pedal stroke and gives essential advice to help riders improve their performance on flat pedals I hope that those of

you who are already part of the revolution will point your friends and riding buddies to it when they ask why you wear flat pedals.

If you are reading this because you are curious about flat pedals and haven't tried them yet I hope that this info will give you the confidence and tools you need to take that plunge. Once you see that there is no magical pedal stroke only allowed by being attached to your pedals you'll be shocked to find out just how fast you can be on flats.

So, in conclusion, remember that this is not about flat pedals being better than clipless pedals, it is about understanding the real value and application of both systems specifically for mountain bikers.

Being pro-flats isn't the same as being anti-clipless and misapplying either pedal system in the name of blind ideology isn't helping advance our sport as a whole.

Ride Strong,

James Wilson

MTB Strength Training Systems

p.s. I need to ask your help get this information to the riders who need to hear it. Please post it on Facebook, Tweet it, post a link to it in the mountain biking forum you frequent - anything that will help spread the word about the Flat Pedal Revolution. Like any true revolution, the only way it can be won is to work together on a grassroots level. My voice is nothing compared to our collective voices and this is information a lot of riders around the world need and are looking for.

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Part 1: The Science

Slides from the Korff and Mornieux Cycling Efficiency Studies

Below you will find the slides from the Korff (et al. Med Sci Sports Exerc 2007; 39:991-995) and Mornieux (et al. Int J Sports Med 2008; 29:817-822) Cycling Efficiency Studies that I will reference many times in this manual. It is important that you know that there is real science behind what I am going to talk about and that it is not just based on my opinion.

I'd also like to point out that as far as I know there are no studies supporting the need to pull up on the backstroke. Along with the other evidence I will bring up later, this means that the true science-based view of the pedal stroke is the one I present in this manual.

Effect of pattern of force application on efficiency

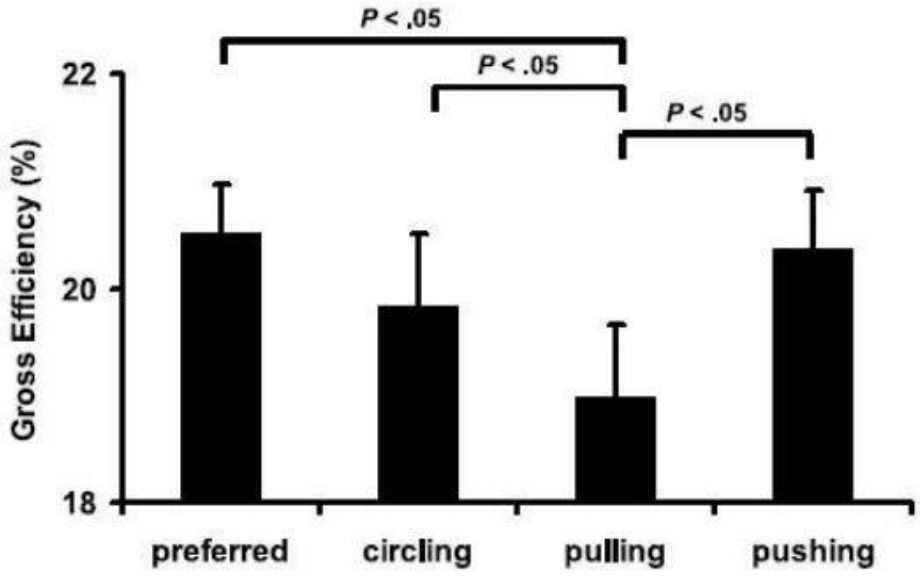


FIGURE 3—Effect of pedaling technique on gross efficiency (GE). Group means and standard deviations are shown.

Korff et al. Med Sci Sports Exerc 2007; 39:991-995

Click here to see a High Res image of this slide

- Note how the preferred and pushing pedaling technique are the most efficient.

Effect of pattern of force application on efficiency

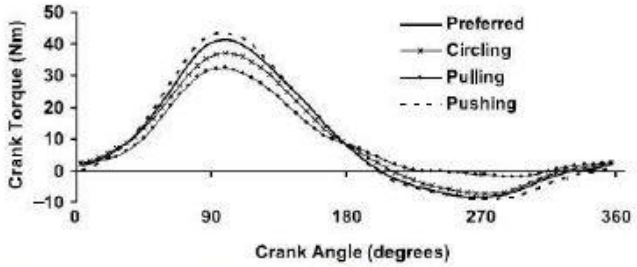


FIGURE 1—Torque profiles for different pedaling conditions. The profiles shown are the averages across all participants for each pedaling condition.

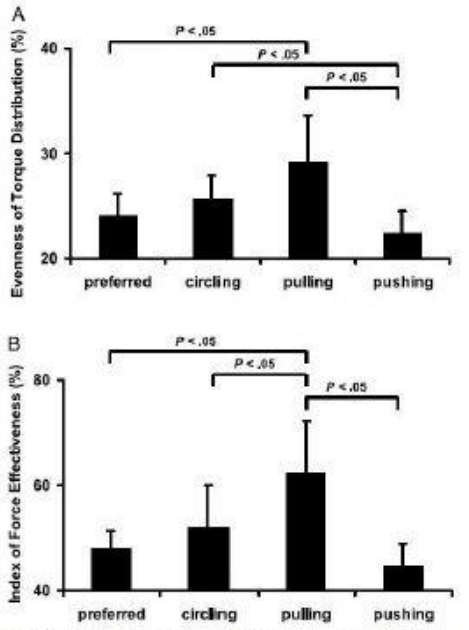


FIGURE 2—Effect of pedaling technique on the evenness of torque distribution (ET) (*A*) and the index of force effectiveness (IFE) (*B*). Group means and standard deviations are shown.

Korff et al. Med Sci Sports Exerc 2007; 39:991-995

Click here to see a High Res image of this slide

- Note how the preferred pedaling technique (letting people pedal how they wanted) and the pushing technique (telling someone to purposefully push down harder) look very similar.

- Note how pedaling in a circle decreased torque.

- Note how pulling through the top resulted in a large decrease in peak torque.

These last 2 slides suggest to me that we naturally want to pedal in the strongest, most efficient way which is to push hard into the down stroke and not focus on what the trail leg is doing. When we start trying to outsmart instinct (you want to spin in circles and/ or pull through the top) we literally decrease pedaling power and efficiency.

Pattern of force application in elite cyclists vs. non-cyclists

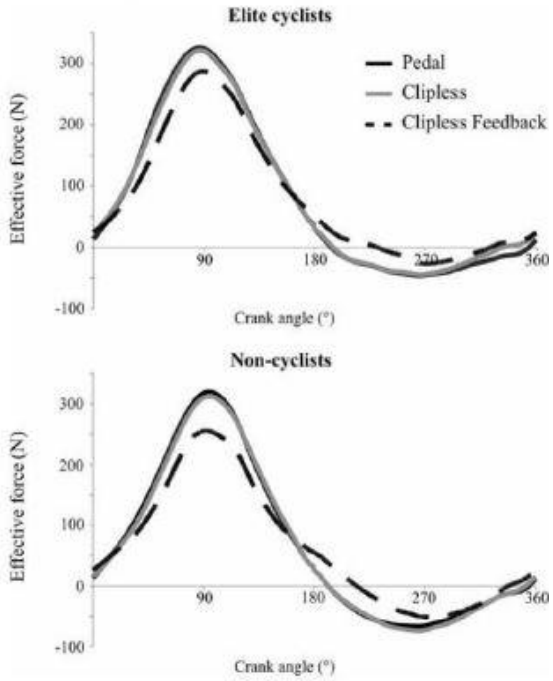


Fig. 1 Right effective pedal force during one crank revolution at 60% of the maximal aerobic power and 90 rpm for the three different pedalling conditions (Pedal: simple pedals without toe-clips; Clipless: clipless pedals; Clipless Feedback: clipless pedals with feedback). Data were averaged on all subjects for each elite cyclists and non-cyclists group. The standard deviations have been purposely omitted for better clarity.

Mornieux et al. Int J Sports Med 2008; 29:817-822

Click here to see a High Res image of this slide

- Note how both untrained and trained cyclists pattern of force application are practically the same.

- Note how the level of force being applied and the pattern of force application stays the exact same for flats and clipless pedals.

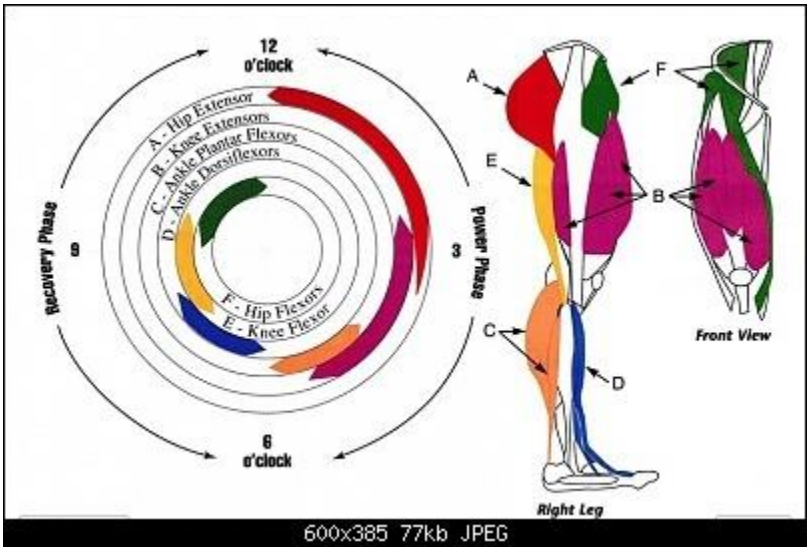
- Note what happened when people were given feedback on how to use clipless pedals (I'm assuming the usual pedal in a circle instructions) their force application pattern changed and their peak force dropped off.

This study shows that there is no special pedal stroke allowed by clipless pedals. In fact, since force application at the pedals was the same for both you should be able to pedal in a similar manner with either pedal system, suggesting that if you can't ride flats you may have some issues with how you apply force to the pedals.

Which Muscles are Really Used During the Pedal Stroke?

One of the most persistent myths in the mountain biking world surrounds the pedal stroke and goes something like this - without being attached to the pedals you cannot use your hamstrings properly which forces you to rely too much on the quads the power the pedal stroke. By not being able to curl the knee joint during the upstroke of the pedal stroke you create muscular imbalances and tire out the quads faster, or at least that is what most of us have been told. However, this understanding of which muscles are used and how they are used during a pedal stroke is completely wrong and potentially dangerous over the long run.

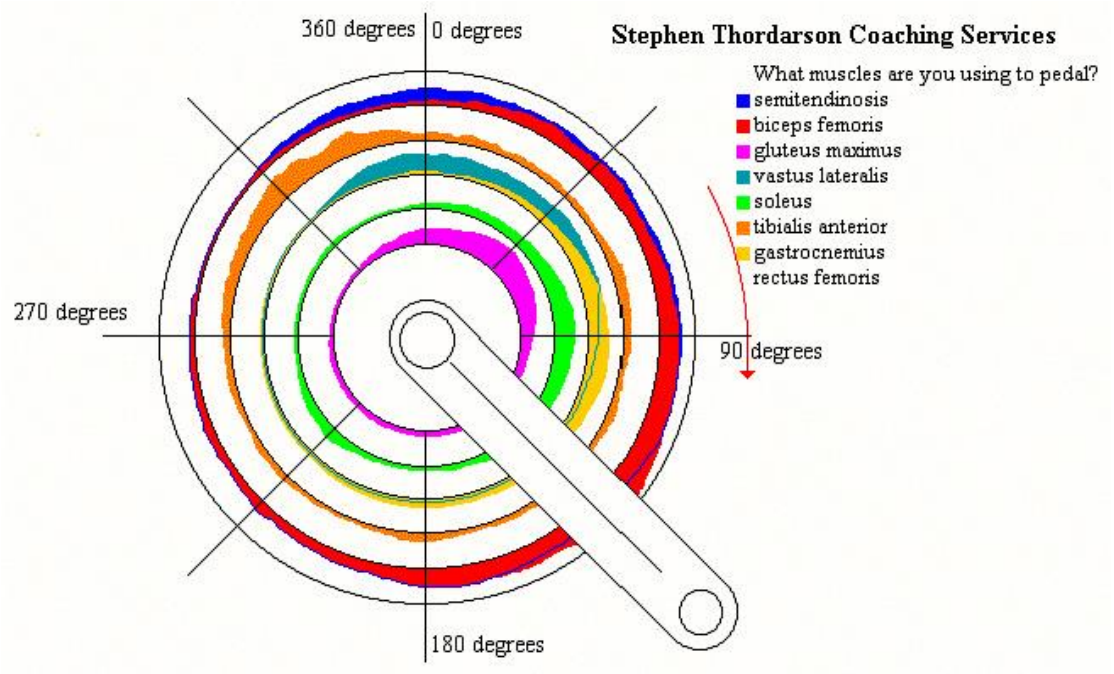
When I ask why someone thinks that the muscles are used this way during the pedal stroke I am invariably led to some variation of this picture/ chart:



According to this theoretical model of muscles used during the pedal stroke the hamstrings are used maximally from 8 o'clock to 10 o'clock position while the glutes and quads are responsible for the downstroke part of the pedal stroke. This paints a completely false picture of the situation and leads a lot riders to assume that the hamstrings are only there to flex the knee joint on the upstroke, which would be impossible to do if you weren't attached to the pedals. This, of course, would mean that it would be impossible to optimally pedal without clipless pedals, which is where the faulty logic that tells rides that it is impossible to pedal optimally without them stems from.

The problem with this whole notion is that this chart is completely theoretical and based on how the muscles work in isolation from each other. Unfortunately, the reality of how the muscles work together to create the actual pedal stroke movement is much different than what this chart tells us.

To illustrate this fact here is another chart of a pedal stroke I came across while researching this article. It is an actual EMG readings, not a theoretical model:



As you can see the Biceps Femoris (fancy talk to hamstring) is most active on the downstroke and least active on the upstroke. In fact, where first chart shows the hamstring to be most active is actually the place it is least active according to the EMG in the second picture. In other words, the first chart is flat out wrong and in no represents what is actually happening during a pedal stroke.

Take another look at the second picture and you'll see how the downstroke finds all of the muscle groups lighting up and the upstroke sees very little activity by comparison. This also underscores the findings in the Mornieux (et al. Int J Sports Med 2008; 29:817-822) and Korff (et al. Med Sci Sports Exerc 2007; 39:991-995) Cycling Efficiency Studies I have referenced in the beginning of the Flat Pedal Revolution Manifesto.

In those studies you see that a powerful downstroke with the lead leg and a more passive return of the trail leg was the most powerful and efficient way to pedal. You shouldn't be worrying about trying to create power on the upstroke, which means that you can create the most powerful and efficient pedal stroke without being attached to your pedals.

The problem stems from how the first chart is based on an assumption that all muscles that cross a joint are there primarily to flex that joint, as if the muscles on the front side mirror the actions of the muscles on the backside.

The human body is not set up so that the muscles are mirror images of each other - the hamstrings are not the "backside" quads. The hamstrings are made to powerfully extend the hips while less powerfully flexing the knee, the quads are made to powerfully extend the knee while less powerfully flexing the hip. Together they both work with and counteract each other to produce lower body locomotion. Train the hamstrings to flex the hips and stabilize the knee and the quads to flex the knee and help stabilize the hip joint - that is how those muscles function in real life and how we should train them, not based on the old model of training each muscle that crosses a joint to powerfully flex it.

In fact, trying to have a rider curl their hamstring to produce force on the upstroke is unnatural and asks the knee to produce force in an unstable position. Your hamstrings are not made to produce power by curling at the knee and instead are made to produce power at the hips while helping to stabilize the knee joint. The idea that you need to curl your leg through the bottom and upstroke portion of a pedal stroke is simply wrong and based on old and faulty logic - you want to flex the hip to push the leg through the bottom of the pedal stroke, not flex the knee.

Just like when running you don't want to produce power by flexing the knee, you simply use knee flexion to get the leg back into position for the next "push". The human body is made to push, not to pull, and trying to apply pulling (curling the knee is a pull) to lower body locomotion isn't the most effective thing to do.

You want to produce your power at the hips, not the knee joint. The reason that a lot of riders have the knee issues is because the knee joint lacks stability, not strength. On a side note this is why I am an advocate for standing up more to pedal because it forces the knee and hips joints to act and stabilize more naturally than seated pedaling does.

So what does this mean for you?

1 - You can (and should) be able to pedal your bike very effectively with flat pedals. This myth is one of the most common ones I hear from riders as to why they don't want to try flat pedals when in fact flat pedals will actually clean up and improve your pedal stroke. I have written extensively about this on my site and before you assume that I hate clipless pedals I suggest you read the article Just Because I am Pro-Flats Doesn't Mean I am Anti-Clipless.

2 - You should train your legs to produce a powerful downstroke using the hips as the primary power source, not the knee joint. This means that leg curls and leg extensions are bad exercise choices since they reinforce this "knee powered" pedal stroke. Exercises like single leg deadlifts and single leg squats are much more effective since they train the legs to drive from the hips, not the knees.

3 - When riding don't worry about "spinning circles" or "keeping equal pressure on the pedals". Do not try to curl the hamstring through the return portion of the pedal stroke. While a good, efficient pedal stroke may feel like you are spinning circles the reality of what your muscles are doing to produce that feeling are much different. Your body has one way to optimally produce lower body locomotion and you simply want to apply it to the pedal stroke.

The idea that you cannot optimally use your hamstrings during a pedal stroke without clipless pedals is based on faulty logic and theoretical models. Now that we have a more accurate insight into what is actually happening we see that models like the first picture/ chart need to stop being used as a way to think about pedaling our bikes. The hamstrings are one of the more important muscles used during the pedal stroke but it is how they work in concert with the other muscles of the lower body on the downstroke - not by themselves on the upstroke - that form the reality of pedaling your bike.

Does this video really prove that flats are more efficient than clipless pedals?

In case you missed it last week, a video showing a rider pedaling more efficiently on flat pedals than on clipless hit the internet. It obviously sparked a lot of debate and, I think, a lot of riders missed the point of the video in their rush to praise flats or defend clipless.

But, before I get too far into what I think this video did show us about both pedal systems, here is a quick recap in case you missed it (you can also see the video below)…

https://www.youtube.com/watch?v=CNedIJBZpgM&list=PLUdAMlZtaV11LAqXNLDr38oTXh9RuyiRY

In a nutshell, these guys from Global Cycling Network posted a video last year telling people that a proper pedal stroke involves pulling up on the backstroke. In some of the feedback they got it was pointed out to them that there is no evidence for that and that the evidence we do have actually tells us that we shouldn't pull up on the backstroke.

The rider in the video sets up the test by saying that he doesn't agree with the results of those studies because he "feels" that he is applying force somewhere other than the downstroke. And to prove it they are going to do a test in both clipless pedals and flats to see if pulling up on the backstroke is more efficient.

The plan is for him to go about 300 watts for 10 minutes and measure his heart rate, PRE, blood lactate levels and level of oxygen consumption. He'll go first on clipless pedals so he can pull up on the backstroke and then on flats so that he can't pull up at all.

Despite being on crappy flat pedals and using his clipless pedal shoes (hardly a fair comparison to a decent set of flats and shoes), the end result of the test was that the rider pedaled more efficiently on flats. He consumed less oxygen to complete the test on them than he did on the clipless pedals, which obviously shocked everyone.

Then things started to get funny…or sad, depending on how you look at it. Despite hearing what the results were, the rider refused to believe that flat pedals could be a viable option.

His first excuse was that he needed his clipless pedals to bunny hop his bike. His second was that – despite learning he didn't need to pull up during the test - he was still certain that in some situations he was pulling up on the backstroke to add power to the pedal stroke. He seemed pretty certain before the test about his need to pull up on all efforts so this response was somewhat surprising.

For me it was sad to see how brainwashed this rider has been by the cycling industry. He literally believes that it is impossible to ride your bike effectively without being attached to his pedals. Despite knowing that you don't need clipless pedals to bunny hop and experiencing the efficiency you can have on flats his mind can't let go of the "clipless are better than flats" narrative that has been drilled into his mind.

Instead of curiosity at the results and how it might benefit him as a rider you see excuses and rationalizations for why it shouldn't be. And this response was pretty typical from the clipless pedal apologists across the internet.

It seems that the clipless pedal apologists never let a good theory get in the way of the data and they immediately set about poking all sorts of holes in what was an admittedly "unscientific" test".

But this is where things started to get out of hand. All of a sudden the debate changed from "do you need to pull up on the backstroke" to "flats vs. clipless pedals". Hell, the video was posted with that title in it, which didn't help matters at all.

The test wasn't looking at the pedal systems, it was looking at the pedal style. And what they found was that the pedal style that flats force you to use is the more efficient way to pedal.

What the video showed was that your pedal stroke should be the same on flats or clipless pedals and that if you try and change it you end up with a less efficient pedal stroke. There is no magical pedal stroke that you can achieve by pulling up on the backstroke – it is a fairytale that every time they try to prove its existence, they only find it doesn't exist.

The real takeaway lesson from the video was that clipless pedals let you get away with a less efficient pedal stroke because you *can* pull up on the backstroke. When the rider in the video was actively pulling up he was consuming more oxygen and working less efficiently because he was trying to override his body's natural way of moving.

When he didn't have this option he was forced to let his body function more naturally, which means letting the downstroke power things while the trail leg pulls up just hard enough to not interfere with that downstroke. This is how you run and walk and how your body optimally powers lower body locomotion…and that doesn't change just because you are on a bike.

All this shows is that not pulling up on the backstroke is more efficient than pulling up. You can employ this pedal stroke with either flats or clipless pedals, the difference is that flats force you to do it that way while clipless pedals let you get away with less than optimal technique.

<u>And this is where the opportunity lies for riders</u>…it isn't in changing from clipless to flats, it is *using* flats to help train your pedal stroke and then applying that improved pedal stroke to your clipless pedals. If the rider in the video spent some time on flats and re-trained his pedal stroke, I'd bet that he would be just as efficient on clipless pedals, plus he would have the advantages that secure and stiff platform can provide for power transfer purposes.

But if he just went back to riding clipless all the time how would he know if his pedal stroke was still optimal? How could he be sure that he wasn't starting to pick up some bad habits again?

The only way to ensure you have an optimal pedal stroke is by spending some time on flats each year. This is why I recommend that every cyclists who uses clipless pedals – both mountain and road - use flats at certain points during the year to train their pedal stroke and skills so they'll be better clipless pedal riders.

Now, can someone please tell me what is so crazy or insane about that advice?

It isn't productive for anyone to try and simplify this complex issue into "which pedals system is better". This video simply pointed to a way that we can use flats to become better riders.

I'll conclude with one of my favorite quotes from strength coach Ian King –

"I hate to use the words "always" and "never", it just shows a lack of critical thinking skills."

Saying that one pedal system is better than another is just like saying that you should "always" use one and "never" use the other, which ultimately shows a lack of critical thinking skills. There is a time and place for both systems and once we stop arguing over which is better the sooner we can learn how to make better use of them both as they relate to mountain biking.

The science behind foot position.

J.R. Van Sickle Jr, M.L Hull/ Journal of Biomechanics 2007 – This study showed no difference in power or economy between pushing through the ball of the foot and the mid-foot pedal position. They thought that there would be a decrease in those factors since you couldn't use the ankles for leverage and push with them. However, this wasn't the case and they found that pushing through the ball of the foot wasn't "better" or the optimal way to apply power into the pedals. In fact, they also found that the mid-foot position took stress off of the calf and Achilles tendon, placing it on the hips.

ELMER, S. J., P. R. BARRATT, T. KORFF, and J. C. MARTIN. Medicine & Science in Sports & Exercise 2011 – This study found that the hips (glutes and hamstrings acting to extend the hip joint) were the major drivers of the pedal stroke at all intensity levels. This means that the quads are never the major driver of the pedal stroke .

Collectively, these studies have shown that:

1 – The mid-foot position also allows for better recruitment of the hips.

2 – The hips are the major muscles used in the pedal stroke.

So, if your hips are the major drivers of the pedal stroke and the mid-foot position allows you to better recruit the hips then it would seem that the science favors a the mid-foot position for better hip recruitment.

Barefoot Pedaling - Do clipless pedals increase overuse injuries?

On a road trip a few years ago I listened to the audio-book Born to Run. If you don't know, this book it is essentially about the barefoot running movement and a tribe of Indians in the Copper Canyons of Mexico. It is a fascinating book that interweaves a great story with a harsh look at the reality of what the modern running shoe has done to our feet and bodies.

It chronicles the history of running and pinpoints when things started to go wrong. An activity that our ancestors did all the time suddenly started crippling modern man with injuries. I cannot recommend the book enough – even if you don't run it is still a chilling look at what our attempts to improve on the body have inflicted on us.

At the heart of it is how the foot works. The foot contains 25% of the total bones in our body and is a marvel of natural engineering. When running the foot is designed to pronate slightly, strike mid-foot and roll in, compressing the arch from the top. This loads the arch and allows it to spring some of that energy back into propulsion.

We screwed it up with running shoes by over-stabilizing it. There is a lot of evidence presented, both scientific and anecdotal, that supports the notion that we need to avoid restricting natural foot movement. Arch support and cushy heels have allowed us to develop a running style that creates lazy feet and an unnatural stride, both of which contribute to a very high injury rate. With the foot not working properly the knees, hips and low back are thrown out of alignment and suffer repetitive use injuries.

For a lot of people this is not really big news. There was even an article in the New York Times that talked about barefoot running and strength training. The Nike Free is a testament to this as well - it is basically Nike's way of saying "yeah, we screwed up but we can still cash in on the truth".

So, if this is the case with running and strength training, is it also the case with clipless pedals and shoes? The shoes basically do the same thing that the running shoe does – stabilize and restrict foot movement. They also provide arch support and an unnatural surface to drive into (too soft with running shoes and too stiff with clipless shoes). Hell, you can't even walk straight in those things because of how much they alter your foot's natural movement.

And being clipped in locks you into the exact same repetitive range of motion for thousands and thousands of RPMs. Your body was not made for this and instead lasts longer if there can be some minor differences in how it moves.

Maybe I'm wrong but I think that some of the knee, hip and low back injuries among riders is caused by the unnatural foot movement during hours and hours of pedaling with clipless pedals. A look at the injury statistics tells me that something is terribly wrong. One website I found (you can link to the article by clicking here) told me that 85% of cyclists are suffering from one or more overuse injuries at any given time.

Read that number again…*85% of all cyclists*. Since that number includes road cyclists the vast majority of those riders use clipless pedals. Here are a few other numbers from that site:

- 49% reported neck problems

- 42% reported knee trouble

- 36% reported groin/ glute pain

- 30% reported back issues

Based on the statistics, overuse injuries are at an epidemic level in our sport. Something is obviously wrong and I think I know what.

Just like people have realized that we need to preserve natural movement when we run and strength train we need to do that on the bike as well. Sitting on a little seat while hunched over with your feet strapped into tight, restrictive shoes that are attached to your pedals is pretty far removed from how are intended to move. It is no wonder that cyclists suffer more injuries than just about any other recreational sport.

I think that we need to get away from the unnatural way of pedaling and use a more “barefoot” approach. To me, “barefoot pedaling” means trying to restore more natural foot movement and posture. This requires a two part approach.

Part one is using flat pedals and shoes like the 5.10’s, which have pliable soles and no arch support. This will help the feet move more naturally and allow for minor deviations in foot placement. Part two is standing up to pedal as much as possible. This will get the neck and spine straight, the hips under the shoulders and utilize a more natural movement pattern.

Of course, I know that people will argue that they won’t be able to pedal nearly as long and far and with that I would agree - at least at first. Trust me, you will be able to go for epic pedals using the "barefoot" approach once your body has built up to it. However, based on the number of injuries in our sport I think that right now most people tend to ride too long and far anyways. They have unnaturally secured weak links to allow them to achieve performance levels their body is not really ready for.

If you are a professional and make a living from your riding then perhaps that is a fair trade off. There is a saying in high level athletics – where good sport begins, good health ends. Top athletes realize that high level performance has nothing to do with health and they are willing to make that sacrifice. However, to me it makes no sense for a rider who does not make a living off this sport to subject themselves to a repeating cycle of pain and injuries in order to gain a small potential mechanical advantage.

In conclusion, I hope that you will think about getting a good pair of flat pedals and 5.10’s and giving “barefoot pedaling” a shot and see how you feel. You may be surprised at how you feel both on the trail and, just as importantly, the day after a hard ride. Give it 4 weeks of practice and I’ll bet you’ll be just as fast if not faster than you are right now…plus you won’t have the common aches and pains so many of us just learn to live with.

I know that not everyone will agree with me on this and I completely understand. The “clipless pedals are the only way to go” mentality is deeply entrenched in our sport and it won’t go away overnight. I just hope that this article has at least given you something to think about to best apply efficient, functional movement to the bike.

Part 2: Debunking Common Clipless Pedal Myths

Being Pro-Flats Isn't the Same as Being Anti-Clipless

This article is one that sums up my overall position on this whole "flats vs. clipless pedals" debate. The internet is a double edged sword for me on this subject because, on one hand, it allows me a platform to easily get my ideas on this subject out there to riders who need the info but, on the other hand, **it is easy to read one thing I write and take it out of context**.

I have created a couple of dozen articles and videos over the last few years explaining the multiple layers of my position but **I understand that not everyone has read/ seen more than a couple of them, making it easy to misunderstand my ultimate position**. To add even more confusion, my blog has seen me flesh out my ideas and positions in front of a live audience and those things have evolved over the years.

I realized after my article on Which Muscles are Really Used During the Pedal Stroke (found in this manual) that a lot of riders still think that I dislike clipless pedals and **every time I point out a myth about them or promote the use of flats I am, in essence, saying that clipless pedals suck and are worse than flats**. I think that some riders even envision me harassing everyone I see about the subject and will only ride with someone if they are on flats. However, this is far from the truth.

I wrote this in a response to a comment and I'll repeat it here because it sums up my overall position perfectly-

I am not anti-clipless pedals, I am pro flat pedals. I think that both have their place in riding and that misuse of either system in the name of blind ideology is bad for our sport.

This is a very important distinction because it means that I am not saying that one is better than the other, simply that both have pluses and minuses and, unlike the vast majority of the cycling world, I champion the advantages of flats. I do believe that there are a lot of myths and half-truths surrounding the subject - mainly on the perceived disadvantages of flats - and **riders deserve to know both sides of the story before making a decision about which is better for them**.

I think that there are pluses and minuses to both pedal system but for too long the deck has been stacked firmly against flats, **with a downplaying of any disadvantage to clipless pedals and no mention of any advantage for flats**. There were even some pluses being stacked on the clipless pedal side that simply weren't true, like the need to be attached in order to pull up harder during the upstroke.

All I am trying to do is help bring the whole story to the table, which means that I have to point out the advantages of flats, the disadvantages of clipless pedals and clear up the myths surrounding the whole subject. Taken out of context of the bigger picture it is easy to take those things and interpret my position as being "anti-clipless".

I almost have to come across as "anti-clipless" in some cases just to start dragging this debate back to center...but I am really not a "flat pedal only" zealot.

This really hits home for me when I find myself actually defending the use of clipless pedals for higher level racing. Clipless pedals do have advantages in some high performance situations like racing and when someone starts going down the road of flats being the best choice for everybody, all of the time I find myself defending their use, given that whoever was using them could ride flats in the first place.

Which brings me to my last point - **what I am against is the use of clipless pedals before someone can ride at a proficient level with flats**. I think that there is a process for learning how to pedal and maneuver your bike on the trail and that it begins with flats and, even if you do use clipless pedals, you should retain your ability to ride at a reasonable level with flats. Flats keep you honest and force you to learn good technique and clipless pedals should make you faster by enhancing that good technique, but this is not the case with most riders on clipless pedals.

Most riders have never spent any real time on flats, much less a good set of flats and flat specific shoes like 5.10s, and instead went into clipless pedals right away. My message to them is not that they should throw their clipless shoes and pedals away but that **they will get more out of them and be better overall riders if they took a break from them and re-learned how to ride with flats**. After learning how to ride without them you'll find clipless pedals to make you even faster when you go back to them.

Before I close, I do think that it is important to point out the elephant in the room - **clipless pedals do contribute to crashes and scare new riders away**. I have spoken to too many riders who start their injury story off with "I couldn't get unclipped" and other cyclists who talked about how they tried mountain biking but being clipped in scared them to pretend that this isn't happening.

I think that new riders should spend at least 6-12 months learning on flats before considering the switch to clipless pedals. **The snobbery of riders who are able to ride clipless pedals at a high level and then dismiss people's very real fears and concerns with an "I've never had any problems so neither should you" attitude as they continue to tell every new rider they meet that they need to get clipless pedals ASAP is ridiculous**.

So ride clipless pedals, I honestly don't care. If you took the time to learn on flats and are using them for high performance/ racing situations then they can offer an advantage. **Just don't tell me that there are not very real disadvantages to clipless pedals for the new and average rider (especially for mountain biking) and that you cannot be a very good rider on flats**. Like I said before, being pro-flats isn't the same as being anti-clipless and misapplying either pedal system in the name of blind ideology isn't helping advance our sport as a whole.

Why pedaling efficiency has nothing to do with your pedals.

Pedaling efficiency is one of those terms that gets thrown around a lot, especially when the discussion turns to flats vs. clipless pedals. One of the talking points coming out of the Clipless Pedal Media camp is that clipless pedals let you pedal more efficiently, which is a main reason that you are told you "need" them.

The problem is that most of the people who repeat this term over and over again in defense of clipless pedals have no idea what it really means. And this makes it nearly impossible to have a rational discussion about the subject when one side of the debate is using terms incorrectly.

So let's break it down and look at what the term "Pedaling Efficiency" really means and how this understanding applies to how we train both on and off the bike.

The term Pedaling Efficiency refers to the power output of the legs in relation to the amount of energy the body is expending to create it. The important thing to realize about this definition is that it refers to how the body is creating the power, not the total power output seen at the pedals.

Total power output at the pedals is a different thing and this is where most people's misunderstanding about the term comes in.

Pedaling Efficiency refers to how the body is creating the pedal stroke and how much power the legs themselves are creating as a result. Power output at the pedals indicates how much of that power is getting transferred to the pedals.

You can use the same pedal stroke and be creating the same amount of leg power with the same amount of efficiency but you can see different power output at the pedals based on the pedal system being used. But this doesn't change the overall Pedaling Efficiency.

And this is what you see with flats and clipless pedals. Clipless pedals are not allowing you to use different muscles or use your muscles in a different way – you use your legs in the exact same way with either pedal system.

So this is why there is no difference in the Pedaling Efficiency between flat and clipless pedals. You use your legs the exact same way, creating the same amount of power and using just as much energy to do it as you do with clipless pedals.

The Mornieux (et al. Int J Sports Med 2008; 29:817-822) and Korf (et al. Med Sci Sports Exerc 2007; 39:991-995) Cycling Efficiency Studies as well as this EMG reading all show that this is exactly what is going on, and that trying to pull up on the backstroke or "spin circles" actually results in a less powerful, less efficient pedal stroke. This is a well-known fact in high level coaching circles and this myth is only spread by people trying to sell you on why you need clipless pedals.

The difference in the two pedal systems lies in the positive attachment point from clipless pedals allowing some riders to get more of that power to the pedals, not in a different or "more efficient" pedal stroke.

And, as I mentioned in this article, this makes clipless pedals like a "weight belt for your feet". They are something you can use to enhance your good technique that you built training "raw" with flats pedals. Just like the weight belt can quickly become a crutch for bad technique if used to early and too often in the gym, clipless pedals can become that same crutch if you never train without them.

I'd also like to bring up you would see the same thing if you compared a good pair of clipless pedals and shoes with a crappy pair of pedals and shoes. The difference in the power output you'd see isn't because the better pair let you "pedal more efficiently", it just allowed more of the power to get to the pedals.

So, the take home message is this – your Pedaling Efficiency has nothing to do with the bike or pedals you are on. It simply refers to how your body moves to create the pedal stroke. The role of equipment in how efficiently that power is put to use is something completely different.

Pedaling Efficiency doesn't mean whatever the Clipless Pedal Media wants it to mean in their talking points. Being armed with this knowledge will help you make better decisions for yourself as well as be able to speak intelligently with those who don't know any better.

Now, what does this mean for your training and riding? If you really want to maximize your pedaling efficiency you should do two things…

1) Get stronger. Strength is essentially a measure of how efficiently you can move. The more of your muscles you can use and the better coordinated you are in their use the stronger you are. Using exercises like Stagger Stance Squats and Stagger Stance Deadlifts will train your body to move as a more efficient unit to create the movement patterns needed for the pedal stroke.

2) Train with flat pedals for a few months every year. Since your pedal stroke looks the same on flats as it does on clipless, then spending time on flats can't help but smooth out your pedal stroke. Since you don't have the attachment point you will be forced to learn how to pedal properly, more importantly, to maintain that efficiency as you fatigue. If you want to become really efficient with your pedaling then make sure you take the "weight belt" off and train "raw" every once in a while.

I'd like to point out that what both of these methods have in common is that they are a form of Inefficiency Training. This is where you purposefully create a less than perfect environment and force the body to adapt by becoming more efficient.

When you add weight to an exercise or advance to a harder variation of an exercise you are doing it to create an less efficient environment than before. As your body becomes more efficient with that new environment you see progress in the form of more strength. But it all really boils down to efficiency and how to challenge and improve it.

Riding with flat pedals can also be seen as a form of Inefficiency Training. By creating a less-than-perfect environment for the foot and legs you force them to become more efficient in order to adapt.

This is one of the reasons that I hammer on this whole flat pedal thing so much – flat pedals are the best way to train your pedal stroke. You use mobility and strength training to improve the basic

movement efficiency in the gym and then use flat pedals to improve your specific movement efficiency on the bike. You can then use clipless pedals to enhance that good technique and get even more out of your clipless pedals.

But the common narrative given to most riders is that clipless pedals somehow let you improve your Pedaling Efficiency and that this means you need to use them as soon as possible and you need to wear them all of the time.

And this lie keeps thousands of riders trapped by their pedals and unable to develop pedal strokes and skills that would help them improve more than anything else they could do.

It also keeps them from getting as much as they could from their strength and mobility training. Since they never allow the body to fully adapt to their improved movement and strength to the bike - often relying on bad habits they don't know they have – they cut their results short. Spending time on flats ensures that you are getting the maximum transfer from the gym to the trail.

How clipless pedals really work…and why they aren't "better" than flats.

One of the hardest things to overcome when having a discussion about the value and role of both flat and clipless pedals is that everyone knows that the fastest riders in the world use clipless pedals. Most World Cup and National Level DH races are won on clipless and every XC and similar discipline is won on them as well.

Hell, you even have some studies that show a (slight) increase in power from using them too.

This would all seem to indicate that they are "better" than flats, right?

Unfortunately the answer is a little more complex than a simple yes or no. To answer that question let me pose another question to you…

In the weight room, can you deadlift more weight with a weight belt on?

I'm sure that everyone reading that question would agree that yes, all other things being equal if you strapped a weight belt on you could lift at least a little more weight than you could without it. This is why pro power lifter and Olympic weightlifters use them.

Now, ask yourself the same question we apply to clipless pedals…*does this make lifting with a weight belt "better" than lifting without one?*

Again, in this situation most of you reading this won't be so quick to answer "yes". Most of us recognize that just because you can lift more weight with a weight belt that certainly doesn't make it "better" than not using one.

In this situation we naturally recognize the need to not use the weight belt all of the time for everything we do. Building your core strength and movement without the aid of the weight belt will help you be stronger and more injury resistant both in the gym and in the real world.

So the answer to the question of "is a weight belt better than lifting without one" is that *it depends on the situation.*

If you are using a max load and trying to break a PR on the deadlift then it might be a good idea to use one.

But if you are just doing a regular workout you should probably "train raw", which means to use no support equipment. The strongest guys in the world know that the stronger you are "raw" the stronger you will be when you use the weight belts and other support equipment.

So, let's bring this back to the question of "are clipless pedals *better* than flats"? And right now some of you may be wondering what the hell a weight belt has to do with clipless pedals and your feet.

The truth is that clipless pedals are really just a weight belt for your feet. They improve your performance through the same basic mechanism, which is to artificially strengthen the weak link the kinetic chain.

Now, this is where I have to back up and explain why this statement makes little to no sense to most cyclists. The reason is because we have been taught that *clipless pedals enhance your performance by allowing you to use your legs in a different way than you can with flats.*

We've been told that you need to pull up on the back stroke while you are pushing down with the other leg. The story is that this ability to use the hamstrings and hip flexors to pull up is what is adding additional power to the pedal stroke.

And that seems to make sense when you first hear it. On paper, that is exactly what you would design a machine to do.

But what we've found out is that this is not what is going on. There are 2 studies and an EMG reading I've found that show that this picture of the pedal stroke is a myth and doesn't exist. If you aren't familiar with the Mornieux (et al. Int J Sports Med 2008; 29:817-822) and Korf (et al. Med Sci Sports Exerc 2007; 39:991-995) Cycling Efficiency Studies I have them referenced in the Flat Pedal Revolution Manifesto.

What science has shown us is that the human body prefers to push down hard and let the trail leg return in a more passive manner. Just like when you run, you are pushing hard with the lead leg and pulling up just hard enough to get the trail in place to push hard again.

And, the dirty little secret among the pros and those have actually looked at the science is that clipless pedals can help…but not that much. Among the top riders we're talking a few percentage points of an increase, which is huge for them but certainly not the huge difference we're lead to believe exists.

In other words, take the pros clipless pedals away and they are still the fastest riders in the world. But take your average riders clipless pedals away and they are like a fish out of water.

Add it all up and something isn't right. There has to be another explanation of how clipless pedals help increase pedaling power because *there certainly isn't a magic pedal stroke that only exists when you strap your foot the pedal.*

And this is where the analogy of the weight belt comes back in. When you wear a weight belt you aren't using your leg muscles in a different way or recruiting more of your leg muscles. Your legs produce the same power in the same way so that isn't how a weight belt helps.

The weight belt helps because it artificially strengthens the weak link in the kinetic/ movement chain, which is the core. More of the power that you are producing with your legs gets transferred through the core and into the upper body, which is holding the weight.

It is this increased power transfer through the weak link in the movement chain that results in the increased performance.

And this is exactly what is happening with the "weight belt for your feet", also known as clipless pedals.

The science has shown us that they don't let you use your legs in a different way or let your legs produce power more efficiently. They just artificially strengthen the weak link in the movement chain, which is the foot.

By solidifying the foots ability to transfer the power being generated into the pedal, clipless pedals help a little more power make its way into the crank arms. And that shows up as increased pedaling power in the lab and in certain racing situations.

Plus, in mountain biking the foot can get knocked out of place from pounding down the trail so not having to worry about that can also help when you need to be your fastest.

But, just like with a weight belt, there are advantages to training "raw" and not letting the technology that can enhance performance become a crutch for lazy technique.

Even if you find that clipless pedals make you faster, using them all the time for every ride is still not a good idea. You need an opportunity to train your pedal stroke and technical skills "raw" to *keep them sharp and reduce the wear and tear on your body.*

This is why it is important that new riders not be rushed into clipless pedals too soon. They need the chance to train their pedal stroke and skills "raw". Being rushed into clipless pedals can allow them to build bad habits and not allow them the chance to develop their skills properly.

This is also why it is important for every rider to spend some time on flat pedals. We would all see the problem with the guy in the gym wearing his weight belt every day, even for something simple like bicep curls. But we think nothing of strapping on clipless pedals every day for every ride, *which is essentially the same thing.*

The truth us that you will actually be faster on clipless pedals if you spend time on flats. It isn't a matter of one pedal system being better than the other, it is about understanding how they exist on the same continuum and how they can work together to create a high performance rider.

I'd argue that by letting your ego get in the way - not wanting to show up for a group ride with flats and put up with the comments and/ or being a minute or two slower on a ride - you are actually holding back your performance with clipless pedals.

So, in conclusion, clipless pedals certainly do benefit some riders in certain situations. But that benefit is not derived from allowing your legs to do something different than what they can do on flats.

They do it by artificially strengthening the weak link in the movement chain, which is the feet. However, the tradeoff is potential bad habits and unnatural weak and tear on other joints.

This means that if you are going to use clipless pedals that *you should have a strong base built on flats* (I suggest at least a year on them exclusively) and that you still use flats to keep your pedal stroke and skills honest while reducing potential overuse injuries

Learn to ride on flats. After building a strong base on flats then you can consider using clipless pedals for racing and high performance purposes. *But don't use clipless pedals as an everyday crutch or think that you need to use them to be a really good rider*. This approach will let you use both pedal systems to maximum effectiveness for your needs instead of getting caught up in the dogma of which is "better".

Why you don't want to push through the ball of your foot when you pedal.

Your feet are an important contact point with the bike. Without your feet being in the right place you will pedal with less power, be less stable through technical trail sections and set yourself up for an overuse injury.

The problem is that most riders have been given the wrong idea about where to place their foot on their pedals. You see, we forget that at one point someone took a guess about where to place the foot on the pedal and today we simply take it as gospel.

But what if the original "pedal stroke theorists" were wrong? What if they didn't realize that they were looking at things the wrong way and applying the wrong logic sequence to the problem?

In other words, what if the current advice about where to place your foot on the pedal is based on faulty logic in the first place?

But before we can even start getting into the logic sequence of where you want to place your foot on the pedal we need to back up and answer an even more important question…

Does pedaling a bike require an *engineering based* or a *movement based* solution?

For a lot of people this is the first time they have ever heard this question. They've always assumed that there was just one logic sequence you could use to arrive at the perfect pedal stroke so let me explain the difference.

And once I do you will see how important this question really is.

The engineering based solution looks at pedaling the bike from the bikes point of view – if we were going to design a machine to power this bike, what would we want it to do?

However, the movement based solution looks at things from the human organism's point of view – how do we take the way the body is hardwired to optimally move and apply it to the bike?

For a long time the engineering based solution has been the dominate train of thought in pedal stroke theory. When you do that you can come up with all sorts of nifty ideas on how to add power to the pedal stroke.

The two most common pieces of advice from the engineering based solution are to pull up on the backstroke to keep even tension on the pedals and to place the ball of your foot over the axle of the pedal so you can push and pull through the ankle.

Both of these things make sense… in theory. If I was designing a machine from scratch to pedal a bike I'd have it pulling and pushing at the same time while also extending and pulling with every joint to add to the potential power.

The problem is that the human organism isn't a machine and comes pre-wired with ways it likes to move. For example, when you push down hard with your lead leg there is an automatic activation of the muscles that retract the other leg. Your body is pre-hardwired for you to focus on pushing hard and letting the Passive Mechanics of the body reset the other leg to push down hard.

Runners know that and this is why they don't try to add forward power with the return of the trail leg. They instead focus on simply driving their lead leg into the ground.

You waste energy and start to lose power when you try to overcome the body's pre-wired Passive Mechanics. And this is exactly what you see in the Mornieux (et al. Int J Sports Med 2008; 29:817-822) and Korf (et al. Med Sci Sports Exerc 2007; 39:991-995) Cycling Efficiency Studies I have referenced in the Flat Pedal Revolution Manifesto.

This idea of a movement vs. engineering based solution extends to foot placement as well. From the engineering perspective you would want the ankle to extend so you could push through the ball of the foot. Heck, it even looks like how you run or walk so it has to have some basis in movement as well, right?

Again, not so fast.

When you look at the foot and lower leg from a movement based perspective you see that there are two very different ways for the lower leg to act.

The first is running, walking or jumping. In these activities you are wanting to move your center of gravity from over your base of support so you can change position in space. These does require a push off through the fore foot to "jump" in order to break contact with the ground so you can.

Pushing through the ball of the foot to propel ourselves forward.

But this isn't the only way that we move. We also need to move in a way where our center of gravity stays on top of our base of support. Squatting and deadlifting in the gym are good examples, as are bending over to pick up a box or standing up from a chair in the everyday world.

When we move this way we want our feet to stay solidly planted to the ground for maximum balance, muscle recruitment and power transfer. We don't want to come up on the ball of the foot because it will actually decrease strength and balance.

Feet staying firmly planted on the ground.

The foot and lower leg act very differently in these two situations and so we should figure out which most closely resembles pedaling so we can apply it. And when we are pedaling our bikes we are not actually moving our center of gravity forward – we are pushing the pedals away from us and the bike is carrying our center of gravity with it.

Pedaling your bike is much more like squatting or deadlifting than running or jumping. And when you look at the lower leg and foot mechanics of this type of movement you see that you do not want to be balancing on and pushing through the ball of your foot.

This is why you naturally go to a mid-foot position on flat pedals. If you don't have someone telling you that it is wrong and strapping your feet to where they "should" go most people would naturally find this foot position themselves and stick with it.

Your body, which is infinitely smarter than all of the experts who are "lecturing birds on how to fly" in this matter, instantly recognizes what they don't – that you are far more balanced and powerful in that mid-foot position than you are trying to balance on your toes.

Don't place the ball of your foot on top of the pedal axle, look to place it in front of it.

When you are squatting or deadlifting you want to keep your weight balanced on your feet. Your calf is helping to stabilize the ankle by isometrically contracting to help with the power transfer through the feet into the ground. If you try to have the calf stop stabilizing isometrically and ask it to move so you can push through the ball of your foot it will result in much less power and force being transferred into the ground.

So, this means that when we pedal our bikes we also want to have a mid-foot position. This foot position will automatically allow for better recruitment of the hips, which are the strongest muscles in

the lower body and the real secret to pedaling power. You'll also be more balanced and stable when you stand up to pedal or get into the attack position for technical sections and downhills.

And just in case you think you might lose some power from not being able to use your ankle and calf muscles to push and pull, this study (*J.R. Van Sickle Jr, M.L Hull/ Journal of Biomechanics 2007*) showed no difference in power or economy between the ball of the foot and the mid-foot position…which means that the ball of the foot isn't "better" or it would have won. At worst you won't lose anything by using the mid-foot position.

However, it did show an important difference in *how* that power was produced. They found that driving through the ball of the foot placed more stress on the calf muscles and Achilles tendon, while the mid-foot placement took that stress and put it on the hips.

This is interesting when you consider that the hips – and not the quads – have been shown to be the major drivers of the pedal stroke (*ELMER, S. J., P. R. BARRATT, T. KORFF, and J. C. MARTIN. Medicine & Science in Sports & Exercise 2011*).

Taken together, these studies point to a pedaling platform that optimizes the mid-foot placement to best recruit the hips, which are the main muscles used to power the pedal stroke.

As a bonus, since this mid-foot position doesn't require us to strap our feet into what your body recognizes as an unnatural position, it is yet another reason that you don't need clipless pedals. Anyone who tells you that you need them for finding the perfect foot position and forcing your feet to stay there is selling you an engineering based solution that doesn't work with your body's natural ways of moving.

Another problem with the engineering based solution for foot placement is that machines are inherently fragile and hate disorder. You want to smooth out as many rough edges as possible and look for symmetrical, repeatable movement.

But, like I pointed out earlier, the human body is not a machine, it is an organism. And organisms that move are inherently Anti-Fragile. This means that, up to a certain point, they actually benefit from some disorder and "noise".

Your body literally uses this disorder to improve and when you try and take it away by smoothing out all the rough edges you actually fragilize the system.

In other words, your feet were never meant to be put in the exact same position every time they touch your pedals. They also aren't supposed to be strapped down so they are in the exact same position for your entire ride. Yes, your feet working to maintain position uses more energy compared to strapping them into clipless shoes and pedals but that movement is needed to keep the system healthy.

Quick side not - this is another reason that I advocate that riders who do use clipless pedals still ride flats at least part of the time. It will keep your pedal stroke and skills sharp while also allowing for the feet to move more naturally.

This need for "noise" and disorder is something that the engineering based solutions doesn't account for. Organisms thrive off of some disorder, machines break because of it and so there is a much different mindset and logic sequence used for each.

So don't fall for someone trying to sell you on the need to find the "optimal foot placement position" and then forcing your foot in that exact same position every time you ride. This is actually much worse on the body than letting your foot have slight variations in how it is placed on the pedals despite the engineering based theories of how this "wastes energy".

As you can see, how we answered the engineering based vs. movement based question led us to a very different view of where we should place our foot on the pedal. It is kind of like Alice's rabbit hole – you can get sucked pretty far down it before you know it so make sure you choose the right one in the first place.

When you start to look at pedaling and maneuvering your bike as requiring a movement based solution you start to see things in a much different light. Instead of trying to force the body to move in way it doesn't want to in the name of some engineering based theory, learn how to work with your body's natural ways of movement and apply them to the bike. It will open up the door to much higher levels of performance and while placing much less wear and tear on the body in the process.

Avoid this critical foot position mistake and improve your agility on the bike.

Humans love metaphors. You know, where you compare something you know about to something you don't know about, which makes that something new easier to understand.

For example, telling you that something "tastes like chicken" is a metaphor. So is telling you that falling in love "feels like a roller coaster". Or that riding your bike feels like…well, I'll let you fill in your own metaphor.

If you think about it, we rely a lot on metaphors to help us make sense of the world. And for good reason – they work great!

I use them a lot myself to help riders understand how certain exercises can help them on the trail. Once you understand how the hip hinge and body position connect to each other you'll never look at either one the same way again.

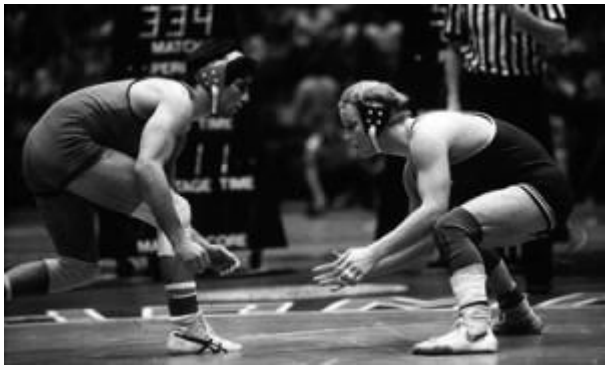
However, metaphors have a downside. As great as they are for helping us quickly understand new things, *they can also be used to confuse people as well*. Since they are a substitute for actual knowledge and experience in an area, if the metaphor is faulty it can be hard for most people to catch it.

And this can lead to a lot of confusion about things.

A great example of this is when discussing if you want to be on the ball of the foot or not when riding your bike. One school of thought is that you need to be up on the balls of your feet because "that's where you are in your athletic stance" and being "flatfooted" makes you less "agile".

The problem is that while this sounds great, this is not a good metaphor. Most people who use this metaphor have never wrestled or played the sport they are referring to or else they would know that no one is out there just bouncing around on the balls of their feet.

In fact, you'd be hard pressed to find a picture of an athlete in this mythical "balls of the feet" position. For example, after looking around at pictures of wrestlers for this post I realized that none of them were on the balls of both feet. At best they would have one foot flat and be up on the ball of one foot but mostly you saw a lot of this:



Flat footed and ready to change levels.

As you can see, both of these guys are “flat footed” and yet they still look pretty “agile” and ready to move and respond. When moving around on the wrestling mat you spend a lot of time “flat footed” and rarely find yourself up on the balls of both feet.

When I brought this up with a guy who actually wrestles he laughed and said that being on the balls of your feet actually makes you *less agile.* He said that "you can't change levels on the balls of your feet". And in most cases this reduces your movement options.

Now, don’t get me wrong. Obviously being on the balls of your feet makes you more agile in some cases. If you are an infielder in baseball or a goalie in soccer and you are waiting for the ball to come at you then yes, this would be a good time to be in that position.

But even then, if the ball came right at you then you wouldn’t stay up on the balls of your feet – you would drop your heels to field the ball.

Here's a guy named Derek Jeter - most people seem to think he was pretty good - showing us how being “flat footed” makes it easier to change levels and field a ground ball.

Derek Jeter with his feet flat so he can change levels.

So, now that we’ve established that athletes in these metaphors already use the balanced foot position a lot more than you would thing, let me pose one more “challenge” to this metaphor…

Try doing a set of kettlebell swings on the balls of your feet. Or better yet, don’t and just imagine how awkward that would be. You certainly wouldn’t feel or look very “agile”.

So why is this?

If being on the balls of your feet makes you more agile then how come your body instinctively keeps your heels down a lot while moving or doing KB swings?

The answer is that being on the balls of the feet only makes you more agile in one narrow sense. If you need to get ready to run or jump then this position does make you more agile.

But if you need to change in your level and position– a.k.a. move your hips – then this foot position actually makes you less “agile”.

No one just stays on the balls of their feet all of the time. When you really think about it, most sports require a mix of being balanced on your feet to change positions and being on the ball of the foot to move once in those positions.

The big difference is that on the bike we never move our foot off of the pedal, we just need to be able to change hip position a lot. Again, since the foot doesn't break contact with the pedal during the pedal stroke it makes it unlike any other sport in the world.

In other words, some metaphors from sports that require position changes *and* movement – like wrestling, football or baseball – don't work. It can be like comparing apples to oranges, which leads to bad metaphors and confusion.

And bad metaphors have been used for a long time to explain why we do things in cycling that we now know don't really make sense. In this case, the truth is that *using a midfoot position on your pedals will help you improve your ability to move around on your bike*, not take away from it.

A more balanced, stable foot will help you tap into your body's own natural movement abilities instead of ignoring them. Riding mountain bikes is hard enough without handicapping yourself with bad foot position based on outdated metaphors that don't really apply to our unique sport.

Why you don’t need “pedal float” and how it can hurt your knees and low back.

One of the biggest obstacles I face when trying to discuss clipless vs. flat pedals with riders is that there are a lot of pseudo-technique that has been developed by the clipless pedal industry and sold to the cycling world. For example, one of the common things I hear as an argument against flats is that they don't allow for "float" since the rubber of the shoe sticks to the pins of the pedal and does not allow for lateral rotation of the shoe. This is said as if that is a bad thing since the shoe and pedal makers all promote "float" as an essential element of a pedal.

However, what gets lost is that float is not a natural thing - the two dimensional activity allowed by float in no way resembles the three dimensional action the foot takes when walking or running. Float was created because it was better than the simply locking the foot into place and allowing for no movement at the foot, which wreaks havoc on the knees.

If you look at how your foot works off the bike then you see that the contact patch with the ground at the point of pushing off does not move laterally and instead stays planted. Your foot, on the other hand, went through a whole series of movements in all three dimensions as it struck the ground mid-foot, bent and rolled through the arch to the forefoot and then pushed off from there. Your foot needs this specific movement sequence, not some manmade mish-mash of crap created by "optimal float".

You cannot just look at the end of a movement and disregard how your body got to that point in the first place. The clipless pedal and shoe does just that - the attachment point is placed based on maximizing the push off point of the foot and severely restricts the action the foot normally takes to get there. Float is simply an attempt to minimize the damage from such a disregard for natural foot movement.

So yes, flat pedals don't have float which is actually another reason that I ride them. Float is a sad tradeoff for the natural foot movement my body needs to stay healthy as I rack up the miles/ hours on the trail. Again, use clipless pedals for what they were intended to be - a performance enhancer on race day, not as a fall back crutch for a lazy pedal stroke and riding technique. And don't let industry created hype terms scare you from trying flat pedals and seeing how much better your joints feel and your riding improves.

Are stiff soled riding shoes not only unnecessary but potentially harmful?

Most riders get confused on the need for a stiff soled riding shoe because they assume that since clipless pedals have stiff soles, they need stiff soled shoe for an efficient pedal stroke. The problem is that we think that clipless pedals have stiff soles strictly for performance reasons when, in fact, it is really an attempt to solve the problem of how unnatural the clipless pedal interface is with the foot.

While having a stiff sole can help in some situations that I'll go over later, in general there is a huge difference between your foot being supported by the pedal and being supported by the sole of the shoe. **On flat pedals your foot is able to drive into the pedal itself while with clipless pedals the sole of the shoe must provide the platform for your foot to drive into. This creates a very different dynamic that impacts how you move and perform.**

The reason that you must have a stiff soled shoe for clipless pedals is that the attachment point with the pedals is too small to drive your foot into (your foot is actually touching less than one square inch on the pedals) so the soles of the shoe itself become that platform your foot needs. Without a stiff sole providing some sort of platform your foot would be forced to balance on and drive into the attachment point itself, which would be very uncomfortable and inefficient. The stiff sole acts as an intermediary of sorts, allowing the foot to drive into it and then transferring that force into the attachment point with the pedal.

On flats a very different dynamic is allowed to take place.

Because the actual interface with the pedal is so large (you have several square inches of actual contact space with flat pedals) your foot can use it directly for support and to drive into. Just like when you are off of the bike, your foot is allowed to naturally interact with the surface it is touching instead of relying on an artificial means of support and energy transfer. Because of this difference a super stiff soled shoe on flat pedals is unnecessary. What's more, one could argue that continual use of them is actually counterproductive from a natural movement point of view.

Your body is designed to let the foot articulate as needed so it can interact directly with the ground and this doesn't change when you sit on a bike. **When you stiffen the sole of the shoe to act as the support for the foot you also change how the foot can articulate** - the stiffer the sole the more you are "locking" the foot into place and interfering with how it would naturally articulate. You cannot change how one joint moves without placing more stress on some other joints and over time that locked up foot can come back to haunt you.

In short, you do not need a stiff soled shoe when riding and, in fact, it can actually cause long term problems.

Now, with all that said a stiff soled shoe can improve performance and safety in certain situations. For example, I like to ride with 5.10 Impacts when riding downhill or Freeride type trails because the thicker, stiffer sole will provide more cushioning if I have to eject mid-air and come down hard on my feet. I

don't like them as much for trail riding because I find the sole too stiff for lots of pedaling and my feet feel more comfortable with a more minimal soled shoe like the 5.10 Spitfires or Freeriders.

A stiff soled shoe can also provide a more efficient power transfer into the pedals for racing situations - but at the expense of altering how your foot moves which can cause problems over the long run. **While the idea that the same shoes that make you faster can also hurt you over the long run is new in cycling, it is not a new idea in sports.** In fact, I originally learned of this idea that shoes that can increase performance can also cause long term overuse injuries while running track in high school.

In the track world we all knew that even though your racing spikes made you run faster, you didn't train in them. They were for race day and high performance practices (which were rare) because the same things that those shoes did to give you a short term performance increase on race day would tear you down eventually if you used them too much in training.

In other words, just because something made us faster didn't make it "better" and understanding how to juggle what would allow us to train injury free with what would make use faster was part of the game. The truth is that having a super stiff sole on a riding shoe is not only unnecessary, it is potentially harmful if used exclusively over the long run. Find a pedal and shoe system (flats and 5.10's work real well) for your everyday riding that allows your foot to move freely and drive directly into the pedal interface itself and save the stiff soled shoes for specific racing/ performance applications.

Why clipless pedals don't really "connect" you to your bike...

One of the more common reasons I hear from riders about why clipless pedals are better or needed is because they "connect" or "attach" you to the bike. However, I think that there is a difference between being "connected" to your bike and being "attached" to it. The two have nothing to do with each other and this causes confusion when discussing the pros and cons of either pedaling system.

To make my case I point to trials riders like Ryan Leech and Danny McCaskill. You can't tell me that they don't feel connected to their bikes yet they are not mechanically attached in any way. Connecting with your bike happens at a subconscious level and has nothing to do with having your feet attached to the pedals.

However, to connect with your bike you must first connect with yourself. If you don't have the body awareness needed to intentionally apply strong movement to the trail then there is no way you can connect with your bike, at least not at the same level you could.

Clipless pedals simply attach you to the bike and shouldn't affect how you actually move on the bike. You should be able to ground your feet so they don't fly off and be able to pedal without your feet coming off no matter what pedal system you use. Losing your mechanical attachment point to the bike should not drop your performance by more than 3-5%, otherwise you're not creating the movement in the most efficient and powerful manner in the first place.

I think that this gets lost in the whole discussion – the pro riders that everyone points to in defense of the superiority of clipless pedals can rip with flats as well. They can flat out ride a bike and know how to apply a clean, efficient pedal stroke and riding technique regardless of the pedal interface.

Sure, they may be faster with clipless pedals but it isn't this massive performance gap that you see with the average clipless user.

There are lessons that you learn from being able to ride, manual, bunny hop and jump with flat pedals that you can get around learning with clipless pedals. Learning those lessons will make you a better rider with clipless pedals if you even choose to use them.

I guess that's my ultimate point – make sure that you can ride a bike first and then look to use equipment and technology to potentially enhance your progress. You need to know how to apply good, functional movement to the bike and that means being able to do it without being attached to your bike.

If I had my way everyone would start out on a hard tail bike with flat pedals and graduate to more technology once they've learned to ride without it.

It isn't really about clipless pedals and being attached to your bike, it is about an industry wide misuse of the technology. Using that attachment point to feed into dysfunctions is one of the main reasons cycling has such an insane overuse injury rate.

Learn to pedal without the aid of technology and then you'll be healthier and more powerful with it.

For a lot of riders, finding out that you can pedal up anything with flats that you can with clipless and that you can learn to keep your feet planted has been a revelation. They are realizing that most of the advantages given to clipless pedals are not really in the system itself, it is in the power given to it in the mind of riders told from day one that it is a vastly superior system and a must for all serious riders.

To draw this to a close, I'm not saying that flats are "better". I am saying that they are not the inferior choice they are made out to be by the mountain biking industry.

You can "connect" with your bike on either system, but from a movement and technique perspective you should be able to ride flats without a serious performance drop off. Using them as a crutch and using them as a true performance enhancer are two different things and recognizing this can help make you a much better overall rider.

Part 3: Maximizing Your Performance on Flat Pedals

5 Tips for Learning to Ride Flat Pedals

When learning to ride flat pedals you may suffer what is called "The Dip". This is where you suffer a short term decrease in performance while you work on something new that will lead to substantial increases in performance when you get it down. It is very common in sports and **one of the things that separate great performers in any category from everyone else is the desire to find better ways to do stuff and suffer through The Dip** so they can continue to improve.

With that in mind here are some tips for helping you to minimize the dip and get to where you are able to ride flat pedals with more speed and confidence as quickly as possible.

1) Stick with them for at least 12 rides. You want to commit to riding flat pedals, and only flat pedal, for several rides in row as this will force you to learn how to use them. This is especially important if you have ridden clipless pedals in the past because the temptation will be to give up too soon and go back to them or to switch back and forth between clipless and flat pedals. Use the tips in the this manual and by your 12th ride you'll probably be riding up and down stuff you've never cleaned before thanks to the kind of rider flats force you to become.

2) Stand up more. I am a huge fan of standing up more to pedal for several reasons, not the least of them is because it easier to keeps your feet "heavy" on the pedals. When you sit down you un-weight your feet and this makes it much more likely that your feet will fly off the pedals when you hit a rock or bump in the trail. This doesn't mean that you need to stand up all the time but you should try to stand up when descending or laying down power to the pedals, which are the two most common times that most riders lose their feet on the pedals.

As an added bonus, standing up is much easier on the knees and lower back than being hunched over in the seated position. It also forces a co-contraction of the hamstrings and quads at the knee joint to stabilize it at the bottom position, which is something that doesn't happen as effectively when you are sitting down. You should be able to go out on a 2 hour trail ride and stand up during all descents and most powerful pedaling efforts, using the seated efforts for when you can spin it out and recover for your next standing effort.

3) Get some shin pads. Keeping your feet planted on your pedals will require you to stand more and to actively “ground” your feet into the pedals, two skills that will take time to develop. Another skill you will pick up as you ride flat pedals is how to slip a pedal and get your shin out of the way. In the meantime, just get some bright yellow shin pads and freak people out on the trail…oh wait, that’s what I did. You don’t have to go with yellow but you will freak some people out when you blast by them on a climb with your flats and shin pads. Eventually you will get comfortable enough to ride without them but just be realistic about the fact that you will try to blow your shins up more than once.

4) Use running to "reset" you pedal stroke. This sounds a bit strange but one of the best drills I use at clinics to instantly improve a rider's pedal stroke plus make it more flat pedal friendly is to get them off their bike and run a few sprints. Several lab tests have shown that the vast majority of your power is produced on the downstroke and that the upstroke is primarily to get the trail leg back into position to drive down again, not to add power to the pedal stroke.

This is exactly how you run and by engaging the running mechanics you groove the lower body movement you need to pedal more effectively, especially when standing. Try sprinting 15-20 yards, repeating 4 times, and then jump on your bike and make your standing pedaling "feel" the same way - just be ready for an instant increase pedaling power and foot stability.

5) Get a good pair of shoes and flat pedals. This cannot be stressed enough - most riders who say that they don't like to ride flat pedals have never tried riding with a good pair of flat pedals and shoes made specifically for flat pedals. You should spend about $100 on a good pair of riding shoes with a sticky rubber sole (like those found on 5.10 brand riding shoes) and $50-$100 on a decent pair of flats. Once you have the right equipment you'll be amazed at how much easier it is to keep your feet planted on the pedals.

Shoe, Pedal and Foot Placement Tips for Flat Pedals

I get a lot of questions from mountain bikers about how to keep their feet planted on their flat pedals and I have found that it usually boils down to 3 things – Shoes, Pedal Selection and Foot Placement. If even one of these things is wrong you will struggle to feel comfortable on your flats or really maximize their performance.

1) Shoe Selection: The #1 thing to know about riding flat pedals is that a good pair of flat pedal specific shoes is a must. If you are trying to ride flat pedals with your tennis shoes then you'll never feel confident on the trail. You need shoes that are made specifically for riding flat pedals, preferably with a sticky rubber compound like that found on the soles of 5.10 brand shoes.

2) Pedal Selection: If you have a good pair of riding shoes then you can get a mid-level pedal and be just fine. While some pedals are definitely nicer and hold up longer than others no one has really cornered the market on the "best" pedal so I prefer to go with a couple of guidelines when recommending pedals.

- *Make sure it has a relatively thin profile*. A thinner profile pedal lowers your center of gravity on the bike and improves your power transfer into the crank arms.

- *Make sure that it is wide enough to comfortably get the majority of your foot on it*. If more than ½ inch of your foot is hanging over the edge of the pedal then it is not wide enough and can result in a numb pinkie toe.

3) Foot Placement: The first thing that you will notice on flat pedals is that your feet naturally *go to a mid-foot position where the ball of the foot is placed in front of the pedal axle*. This is much different than the foot position where most clipless pedals want to put you, which is with the ball of the foot directly over the axle. However, having the ball of the foot in front of the axle is actually a more natural and, one could argue, better position for your foot.

From a functional movement point of view, trying to place the ball of your foot directly on top of the pedal axle is not the best position for your foot to be whether you are on flats or clipless pedals. Driving through the ball of the foot is what you want to do when you are propelling your center of gravity forward - like when running or jumping - but this is not what is happening when we pedal out bikes.

When pedaling you are driving the pedals away from you, much like when you squat or deadlift, and that type of leg drive is much better delivered from a more mid-foot position. This more mid-foot position also allows improved recruitment of the hips during the pedal stroke, especially when standing.

You'll also find that this mid-foot position will also allow you to better *drop your heels when standing up in your "attack position"* to flow through rock gardens or other trail features. By dropping your heels you will sit back into your hips more, getting your center of gravity lower and further back, and also keep your feet pressing into your pedals when you hit rocks and bumps in the trail instead of getting pushed off the top of them.

Below you'll find a link to a video in which I go over each of these 3 tips. If you feel like your feet are bouncing off your pedals more than you want – especially if you've spent a lot of time on clipless pedals before trying flats – then this is the video you've been waiting for. Watch as I reveal what you need to know about shoes, pedals and foot placement to get the most out of riding flat pedals.

http://www.youtube.com/watch?feature=player_embedded&v=Y31azZdx1gI

Part 4: More Fuel for Thought…

In his own words – One rider's experience with trying flat pedals.

Sometimes the best person to tell you the story about how flats can change your perspective and improve your mountain biking isn't me. I realize that I've become a bit of a controversial figure in this debate and some people think I have an agenda against clipless pedals and so nothing I say can really be trusted.

That's why I love to get and share feedback from other riders about their experience with trying flat pedals. While some people will always be sceptical, I like to think that when other riders use terms like "funnest ride ever" and "rode stuff I've always walked" to describe their first few rides on flats it motivates someone else out there to give them a shot.

And while I have gotten a lot of great feedback like this over the years I've never gotten quite the detailed feedback that has showed up on my blog over the last few weeks. A long time clipless pedal rider decided to not only take the plunge but also to document his experience in comments section of one of my blog posts, something that hadn't happened before. I get a lot of one-off comments from riders but rarely do I hear back from them more than once so this was pretty cool to see.

As great as it was for me to see, though, I also realized that not a lot of other people would come across his story. So I decided to put his comments together into this newsletter so that other riders who were curious about the process could get an unbiased look his struggles and progression with flat pedals and the lessons he has taken away from them so far.

I've been riding clipless for over twenty years now….. but at some point, out of curiosity, I decided to try platforms.

I got the goods, set them aside, and being a little lazy and not motivated enough I forgot ….. and then, out of blue, on one of the rides I shredded my clipless shoe – so off the pair went for the warranty repair (Fizik). Not wanting to idle, I suddenly remembered the platforms and the shoes sitting on my shelf – installed, went on to try the set up – one ride so far, Today.

I'm sure I will get used to it after a while, but going flats after clipless was probably as weird as going clipless after the years of platforms. Honestly, I was worrying about slipping a lot (which did not materialize) but I was never worrying about not being able to unclip before.
Here is my two cents to the discussion, as objective as I can do after only one ride on proper platform pedals:

I agree, that most of the power comes from the rider's strength and technique, so it felt really OK. Pulling up (clipless) in a seated position is an illusion and complete BS, however once you get up of your seat, the initial pull gives a lot of exploding force…. the time will show if I can substitute for it on flats. Platforms kept me "on my toes" most of the time, leaving no room for sloppiness. Climbing steep stuff while seated was at equal if not slightly better due to the fact that I had to force my feet more to the pedals to keep a non slipping contact with them. On the downhill they were definitely more comfortable but again, required more attentiveness to stay put. At least for a newbie.

One thing about clipless that has not been mentioned here – your foot is always in the correct position as in the case of the flats it needed numerous adjustments at times, but this will most likely improve with time.

For easy XC it is difficult to beat clipless, since you can't slip from the pedals and you can toss the bike any way you want during the furious climbs, and the unclipping is never an issue.

The advantage decreases the second you need to take your foot down and brake the slide a little or when you come to a standstill on an extremely steep technical rocky climb when the combination of forces makes uclipping virtually impossible (these are the only times – not many – I ended making a contacts with terra firma)

Will come back in a while with my further impressions. So far – I can agree on a draw in the battle of the pedals, with a personal preference of clipless due to the life long experience.

Maciek

Update - 6 days passed, 5 more rides.

On the second day my feet went numb from all the tension and effort during my routine ride. This could not be right, I was thinking, so after getting back, I looked again at my post here and realized, that in fact, contrary to what I wrote, I was not a newbie to the flat pedals, whereas I was a newcomer to the world of clipless 27 years ago.

Like every one else, I started on a single speed and the issue of foot to pedal contact never even appeared as a possible problem. So when I went to bed I accessed my "Time Machine" and overrode all of the habits of being hard wired to the pedals.

Next day (day three) I went out totally relaxed and it all came together – I was able to ride hard like before. I also found some extra stickiness in my Canadian rubber (Sombrios) and I can report with all honesty, that like with any glue, I simply needed a little more time for the strong bond to develop. Now, after almost a week (6 rides) I do not think about the pedals anymore – no slipping of any kind or adhesion drama – toes down while climbing off the seat, and a little down when descending.

In the meantime my replacement clipless shoes are on the way back, (newer and improved model,) but I already decided to extend the lease on my flats. Next week I will be trying the technical single tracks to see how I will do in the sections I typically walk due to the steepness and rock obstacles.

Clipless pedals are faster.

Platforms are fun and liberating, you ride your bike without any suspenders and your technique does not go down the sewer. And you grin like a child again!

I will return one more time with a final personal verdict. Still a tie, but the preferences are shifting. (which wasn't really expected.)

Maciek

Update 2

(possibly not the last one ….)

The clipless shoes came back – beautiful, and I couldn't be any happier, I swapped the pedals back to my XTR Race clipless and went on my regular training ride (out and back: 7km 6%-10% grade up and then additional 4-5km way more steep, ridiculously at times.) Pure joy of speed, extra torque, smooth cadence, and extra pull….of which I did notice none this time – weird, it felt, like I continued to do exactly what I was doing on platforms and the whole "smoothness" of clipless did not happen. Everything felt – well, meh…… and all of it only after two weeks……

My new shoes therefor went on the shelf in the garage and my "Origin8 Ultim8 Slimline Platform Pedals" (same weight as Shimanos – 310gr) returned to my HT 29-er Titanium all XTR bike. Last week I tried some more technical stuff and felt decisively more in control, a thing three weeks ago I would call a heresy – so it is rather a shocking development.

What happened, is, that the flat pedals injected "freshness" into my mountain biking – after additional week I came within 5 seconds of my best times on clipless and concluded, that short of professional racing I would not need to be attached. Well, I do not race…….

So, cutting the straps liberated me and made me more aware of the bike. My pedaling – contrary to what's being said on the Internet in regards of platforms – is now much smoother.

Yes, clipless set up is faster, and whoever thinks otherwise is in denial, but for a non professional rider the difference is minimal. It is actually so small, that it can be ignored. You loose some, you gain some, and it is all a draw. The fabricated science is bullshit, however the pros prefer clipless, especially on the road.

For now, I'm sticking with my new flats, probably I will keep coming back to clipless to stay relevant, but for everyday fun I choose now to go hand in hand with my bike instead of being handcuffed to it. Long way coming…..

The Luxury of Dirt (not my slogan)

Maciek

So there you have it, a look at what happens for most riders when they give flats a good, honest try. Invest in a good pair of pedals and shoes, commit to 4 weeks of only riding flat pedals and odds are you'll find that not only can you ride much faster on flats than you were led to believe but that you'll be a better rider for it, able to apply an improved pedal stroke and skills to flats or clipless pedals.

If you are really interesting in being a better rider, my only question after reading unbiased feedback like this is *why wouldn't you try flat pedals?*

Applying Functional Movement to a Bike Fit

I want to highlight this groundbreaking interview I did with Greg Choat, co-owner of Las Vegas Sports Performance. Greg is one of the top bike fit professionals in the world - **yes, I said a bike fit guy –** and I ran into him at a Functional Movement Screen Lv. 2 seminar. We started talking and I found out that he actually shares a lot of my feelings on the mis-use of bike fits and how riders should be looking at applying functional movement to the bike.

After hearing more about how he uses the FMS to enhance his bike fits I knew that I had to get him on the podcast to talk more about it. In this interview we talk about how the FMS has changed how he views and uses bike fits, how our everyday lives affect the dysfunctions we bring to bike, how those dysfunctions affect how we perform on the bike and **why the bike industry in general has missed the boat on applying functional movement to the bike in favor of marketing hype.**

We also talk about pedaling technique and why strength training, especially the deadlift and swing, are essential to building a strong, efficient pedal stroke. Grip strength and neck pain come up as well - **in short, we cover a lot of ground and this is a "must hear" podcast from one of the top cycling coaches in the industry.**

Click Here to Download This Podcast Interview (right click and save)

Clipless pedals are NOT the problem, the lies told to sell them are…

We're all born being "cursed" in certain ways. While I know that you can make significant changes with some focused effort it still seems like some things are more of a struggle than others.

For me, well, among other things I can't dance, I'm terrible at remembering names and I have this compulsion to call bull shit when I see it.

And it is this last "curse" that has landed me in so much trouble over the years.

I know this may shock some of you but I've actually been fired from jobs because I said something that was true but not politically correct.

I'll just never understand why you wouldn't want to just be honest about how things are.

Pretending that things aren't what they are doesn't change them so why not just admit that things are what they are and move on?

For example, why do we keep pretending that new riders actually have freedom of choice when it comes to deciding between flats and clipless pedals?

Whenever I bring up flat pedals and how a lot of riders would benefit from some time on them I often hear from a clipless pedal backer with the "you just need to let people ride what they want to ride" argument.

And honestly, that would be fine with me…if the clipless pedal media wasn't selling their wares based on myths and lies about the pedal stroke.

Therein lies the heart of my issue with clipless pedals – clipless pedals are NOT the problem as much as the lies being told to sell clipless pedals to mountain bikers who don't really need them.

Think about it - if you're told that you need clipless pedals so that you can pedal more efficiently by pulling up on the backstroke/ spinning circles/ keep even tension on the pedals and that this pedal stroke isn't possible with flats then do you really have a choice but to use clipless pedals?

I mean, according to this argument it is literally impossible to pedal properly without clipless pedals.

How can this not give them a decided advantage in the decision making process for riders who trying to decide if flats or clipless pedals are best for them?

But the problem is that this picture of the pedal stroke is outdated and flat out wrong. You can not only pedal in the most efficient and powerful manner possible with flats but trying to pull up on the backstroke/ spin circles/ keep even tension on the pedals is a less powerful and efficient way to pedal.

In other words, there is no "magical" pedal stroke that is only available with clipless pedals.

And this makes it a lie.

The point is that I just find it incredibly unfair to continue to push clipless pedals on riders based on something that doesn't exist. And if you ride clipless pedals for pedal stroke purposes then you need to reassess why you ride them because that reason simply isn't valid.

And this leads me to the $25,000 question…

If you took that magical pedal stroke off the table and you knew from your first day of mountain biking that you could pedal, bunny hop and maneuver your bike just as well on flats as you could on clipless pedals would you really feel as compelled to use them?

I think that if a lot of riders were honest with themselves they would either say no or they wouldn't have made the switch nearly as soon.

And there again is the problem – how can we say that we should just let riders choose for themselves when most riders are making that choice under the influence of a lie?

And on another level this lie is keeping new riders from trying or sport and driving riders away each year, making it harmful in a lot of different ways.

Again, clipless pedals have a place, it is just not on a new rider's bike for the first 1-2 years or any rider's bike 100% of the time. They are a piece of performance equipment that artificially strengthens the weak links in the foot – namely keeping your foot planted and the ability to pedal with less focus on pedaling under fatigue and stress.

This can result in improved performance but it comes from enhancing already good technique built and maintained on flats, not from giving you anything that flat pedals can't from a pedal stroke perspective.

So the truth is that learning to ride for the first year or two on flats will build a solid technique foundation so if you do decide to use clipless pedals you'll get more out of them. And while clipless pedals can increase performance in certain racing applications it isn't a monumental improvement and they should never become a crutch for bad pedaling and skill technique.

All of this also means that if you started to ride clipless pedals based on that magical pedal stroke then you were fooled by the lie. You may still like to ride clipless pedals and there is a time and place for them but it has nothing to do with your pedal stroke.

Now, admitting that you were fooled isn't easy for most people and this is where I'll lose a lot of clipless pedal riders. Everyone has this image of themselves and being fooled by a lie usually isn't part of it.

And when presented with info that contradicts this image the ego gets busy constructing excuses to either dismiss this new info or to find reasons to attack the messenger.

But we've all been fooled and making mistakes is actually a way to find the path towards improvement. Hell, I've been fooled so many times I've lost count.

From crappy training advice I found in muscle magazines to countless supplements, I've wasted so much time and money on these mistakes it makes me sick to think about it.

But I've also learned very valuable lessons about what not to do and that has led me to better, more productive ways to train and become a better rider.

If I didn't admit that I had been fooled and moved on I'd still be blitzing and bombing my muscles and popping boron supplements. This mindset has also helped me avoid being stuck in a bad relationship, job and countless other things but that is getting a bit off subject.

My point is that the truth doesn't sell clipless pedals and the lie is more profitable. This puts the truth at odds with the cycling industry as a whole.

And so here we are, with an elephant in the room that is going to have to be dealt with eventually. I'd love to let riders choose for themselves what they wanted to ride but the truth is that until we can get past these myths and half-truths about the pedal stroke that simply won't be possible.

Hopefully as more and more riders are exposed to the truth about flat pedals and more studies come out disproving the need to create power on the upstroke we'll be able to simply let riders choose for themselves. But until clipless pedals aren't sold based on myths about the pedal stroke it will be up to riders like us to help educate our fellow riders about the truth so that they really can choose for themselves.

Are Clipless Pedals Enhancing Your Performance or Covering Up Your Dysfunctions?

Better is a relative term, especially when talking about artificial means of performance enhancement. The mistake people make is assuming that because something improves performance it must be better and therefore you want to use it all of the time. The fact is that equipment can either enhance good technique and fitness or cover up technique and fitness gaps and there is a huge difference between the two. The first will let you tap into your own abilities even more and the second will lead to plateaus and overuse injuries.

In mountain biking this is seen in the rampant use of clipless pedals but ours is not the only sport that has this problem and we can learn something by looking at the parallels between our situations. In fact, the best analogy to explain this concept is the use of a weight belt when squatting or deadlifting.

Using a weight belt will help you lift more weight, which technically makes it "better" from a performance point of view. However, anyone who knows anything about strength training knows that you don't use a weight belt all of the time. You save it for when you need it but, on average, 80-90% of your lifts should be without it.

Why is this? If a weight belt is "better" then why do the strongest guys in the world not use it all of the time? The answer is because they know that you must build your technique without it so that you keep yourself honest and do not start to use the belt to cover up technique flaws. Watch someone who really knows how to squat and his technique will look the same with or without the belt and his best raw squat (using no belt) won't be too far behind his squat while using a belt.

Compare this with the average gym rat who uses a weight belt for everything. It doesn't take a highly trained strength coach to see that they their technique sucks and if you took the belt away and exposed their pathetic core strength they wouldn't be able to squat nearly as much. Most of us would agree that in this case you are better off building your technique and fitness "raw" and using the equipment to enhance that base.

In fact, most sports have specialized equipment that is "better" than normal training equipment but they only use it to get used to it and for competitions. Track has racing shoes, swimming has special suits and I believe that clipless pedals belong in the same category - equipment that does enhance your performance but not something you should be using all of the time since they can be used to cover up technique flaws.

The truth is that you should be able to ride a bike relatively well with some good flat pedals and shoes. In one study (Mornieux et al. Int J Sports Med 2008; 29:817-822) it was found that the pedal stroke of elite cyclists looked the same on flats and clipless pedals. Another study (Korff et al. Med Sci Sports Exerc 2007; 39:991-995) showed that pedaling in circles or pulling through the top of the pedal stroke resulted in a less powerful and efficient pedal stroke - in other words, **there is no "magical" pedal stroke that is only available by attaching your foot to the pedals.**

If you can't pedal half as well without being attached to your pedals then that is a sure sign that you would benefit greatly from some time spent riding "raw", so to speak, and building your technique and fitness base without the aid of being attached to your bike. Once you can ride almost as well on flats as you did on clipless go back and try clipless pedals again and I'll bet you see a big difference in how effectively you can use them.

It is always a good idea to go back from time to time and spend some time on flats, just to keep you honest. During the off season make sure you do your indoor intervals with them since you can't really practice clipping in and out anyways. During the riding season at least spend a couple rides each month on flats as a way to check your technique and make sure that you aren't developing any bad habits along the way.

The dirty little secret is that the best riders are already in this category - take away their clipless pedals and they would still be the best in the world. **They are using clipless pedals to enhance their already great technique, not make up for the fact that if their feet weren't attached to the pedals they would fly off on every climb or rock garden.** Training "raw" is a lesson that every sport has learned and we would benefit from not trying be at "100%" all the time and developing our technique and fitness base without the help of artificial enhancements. Clipless pedals are "better" in some regards but with that knowledge needs to come the perspective on how to best use them.

Is the lie that you need clipless pedals driving away thousands of riders every year?

Before I start in on my rant let me share a real life conversation I had a few months back with one of the guys I do Brazilian Jiu Jitsu with…

Him - "Hey man, nice bike."

Me - "Thanks, do your ride?"

Him – "I bought a bike last summer but I only rode it 3 or 4 times."

Me – "You planning on riding more this year?"

Him – "I don't know. I didn't have much fun on the rides I went on and I fell over a lot. I can't afford to get hurt so I kind of stopped riding."

Me – "Let me guess, you were on clipless pedals."

Him (puzzled look on his face) – "Of course. The guys at the bike shop said that I would need them so I might as well get used to them right away."

Me – "Well, that's not really true. You see… (at this point I went into the TRUTH about clipless vs. flats)."

Him (look of relief on his face) – "You mean I don't need those things? Well, that sounds a lot more fun. I'll have to get some flats and get out there again."

So, what is the point of this story?

We were going to lose this guy as a rider because as a new rider he was (rightly) scared of trying to learn to ride on clipless pedals.

And this isn't an isolated incident by any stretch of the imagination.

I've gotten dozens and dozens of emails from riders around the world with similar stories. They were getting ready to *quit mountain biking* because they were tired of feeling scared and timid on the trail and they didn't want to get hurt. Or they had gotten hurt as a direct result of not being able to unclip and had begun to question if it was really worth it.

Worse yet, they had been coerced into getting clipless pedals in the first place based on lies and half-truths.

They had been told early on that they "needed" clipless pedals to "spin circles/ pull up on the backstroke/ keep even tension on the pedals" and that "serious riders use them" so they needed to get on them ASAP.

As a not-so-funny side note – the guys who sold my brother-in-law his first mountain bike told him the same thing. He told me that if he didn't know what I had told him about flats he probably would have just gotten clipless pedals.

My brother-in-law hasn't ridden a bike of any kind for a decade and he's getting pressured into clipless pedals before he's even test ridden a bike in the parking lot – stories like that just make me wonder what the hell is going on with our sport.

Besides affecting new riders, this idea that you need clipless pedals is keeping countless people from even trying our sport. I've had numerous conversations with people who said they could never "do what I do" when I tell them I ride mountain bikes.

A lot of them had a totally different outlook when they were told they could just ride flat pedals like they did when they were a kid on a BMX bike ripping around the neighborhood.

I've even gotten a few of these people out onto the trail for the first time, converting some to becoming mountain bikers…**new riders our sport never would have had if they were left to the conventional wisdom about mountain biking**.

Because these riders/ potential new riders had never heard about the benefits of learning to ride on flat pedals and the truth about which muscles are used during the pedal stroke they never even thought that flats were a viable option. They had been told or were under the impression that flats were vastly inferior to clipless.

And based on this logic, quitting or not even trying mountain biking is a more viable option to most people than using flat pedals.

This is absolutely nuts when you think about it. I've thought this for a while but I think it is time to say it and see what other people think –

This insane stance taken by the mountain biking industry at large about the "need" to ride clipless pedals is driving away thousands of new riders every year between people quitting and others simply not even trying our sport.

And here is where I have to insert my obligatory Just because I'm Pro-Flats doesn't mean I'm Anti-Clipless link for those who think I "hate clipless pedals" or some other nonsense. Clipless pedals have a time and place, it just isn't on a new rider's bike for at least the first year or on any mountain bike 100% of the time.

Also, just because it hasn't happened to you or isn't as prevalent in your area doesn't mean that it isn't an issue in most places. I'm stoked that some riding communities – especially in areas that don't let you get away with just being a "dirt roadie" – are more progressive about this but in most areas you still get a lot of the usual clipless pedal propaganda.

So, enough of my rant, what do you think?

Is the industry wide accepted lie that you need clipless pedals to be a serious mountain biker good or bad for our sport?

Yes, it is a loaded question but I'm not really sure how else to put it…

Two ways that misusing clipless pedals can screw up your pedal stroke.

Improving your pedal stroke should be a major goal of every mountain biker. The better your pedal stroke is the more power you can produce and the less energy you'll burn doing it. In other words, a better pedal stroke will help you go faster and further.

This makes it a priority for any mountain bike training program.

But what if I told you that two of the most popular methods used to improve your pedal stroke may actually be making things worse for you? What if you found out that the key to improving your pedal stroke wasn't in trying to control and change it but instead in trying to let your body naturally acquire what works best for it?

Well, if you buy into the idea that you need to pull up on the backstroke and/ or carefully control the foot position while pedaling to create a pedal stroke with little to no variation in it then this could be the most important thing you ever read as a mountain biker.

Last week I picked up the book 80/20 Running by Matt Fitzgerald. Matt is the same guy who wrote the book Run – The Mind-Body Method of Running by Feel which I've wrote about before. Matt is really into the new science of how the brain affects performance and I really enjoy his holistic look on what it really takes to improve as an endurance athlete.

While the book itself deals with a specific type of training protocol (more on it when I finish the book) I read a chapter on the skill of running that I thought had a lot of carryover for us as mountain bikers. As a former runner I see a lot of parallels between the skill acquisition of the running stride and the pedal stroke and Matt talked about some really fascinating studies that tell us a lot about how to better approach training the pedal stroke.

The first set of studies looked at the effects of trying to purposefully change a runner's stride. Like cyclists, a lot of runners are under the impression that there is "proper" and "technically correct" running form. From stride rate to where the foot strikes the ground and how much they bounce up and down, sports scientists have identified the "best" way to apply it all and if you can just change your running stride to emulate that then you will be a better runner.

But what they've found is the exact opposite.

When you try to get a runner to purposefully change a runner's stride it results in a decrease in efficiency even though they improve their form from an outside perspective. In fact, they've found that any conscious manipulation of the running stride will reduce efficiency.

The theory for why this happens is because the body will settle on what works best for it based on where it is currently at. It assesses its physical capacities and experience and self-selects the best running stride for it. That stride will change over time to become more efficient as the runner gains fitness and experience but the important thing is that those changes happen unconsciously rather than being a result of conscious change.

I see this as relevant to us as mountain bikers because we're told by the cycling experts that, even though we made it around just fine as kids, we don't *really* know how to pedal a bike. We're told that we need to fix our pedal stroke by focusing on creating a brand new pedal stroke, namely by pulling up on the backstroke.

We're also told that this is a major reason why you "need" to ride clipless pedals and a top reason given by riders for why they use them. They're told they need to start trying to pull up on the backstroke or keep even tension on the pedals or something else that *isn't what they would naturally do unless someone told them to do it*.

But the science would seem to say that we instinctively find the best pedal stroke with time and experience and trying to consciously change it results in a decrease in efficiency. If you didn't naturally try to pull up on the backstroke until someone told you to do it then the truth is it probably isn't the right pedal stroke for you. Trying to force yourself to consciously learn it and use it while riding can actually reduce your efficiency.

As an interesting example of this I point you to this video where a rider who had years of experience using a "proper" pedal stroke tried to prove that pulling up was superior to not being able to pull up. But instead he found that when he rode flat pedals and was forced to pedal naturally he was actually more efficient.

Remember that this rider had much more experience trying to pull up. He had years to adapt to this "better" pedal stroke and yet his body was still more efficient with a less familiar but more natural pedal stroke that occurred when he stopped thinking and just pedaled.

All of this reinforces what I have been saying for years – you can and should pedal the same way on clipless pedals that you do on flats. Trying to change your pedal stroke just because you are on clipless pedals results in a less powerful and less efficient pedal stroke. There is no magical pedal stroke that is only available when you have your feet attached to the pedals no matter how badly someone wants to believe there is and not a bit of science exists to prove otherwise.

The second thing brought up in the book was that more experienced runners actually have *more* variability in their running stride, not less. It seems the theory that you want a perfect and repeatable running stride proved to be just that - another theory with no real basis in the real world.

The reason for this was the acquisition of what he called a "relaxed, smooth ease" that came from running more on reflex than conscious thought. What science has found was that as a runner gained experience their brain activity changed and what once took a lot of the brain being engaged started to use less of the brain.

As the brain stopped trying to micro-manage every movement, the body was able to relax and let the reflex sensors the body has in the limbs allow it to adapt and change the running stride to best retain efficiency. Tied to the first point I mentioned earlier, trying to change the pedal stroke or use an un-natural pedal stroke requires *more* thought while it looks like a major goal of training is to *decrease* conscious thought.

There were some pretty interesting studies and examples he brought up but one of the best was how this applied to walking robots. The first attempts at creating a walking robot centered on have the

computer control for everything. They were programmed with as many scenarios as possible and could calculate which one to use almost immediately.

But the results was something that didn't move anything like a human and it still ran into problems it couldn't solve because it didn't have a specific program for it. Eventually the scientists realized that the answer wasn't more central control, it was less. They started using sensors in the limbs to give feedback to the computer, which had a much simpler program to help it use that data to pick the right way "solution" to the movement problem it was presented with.

All of this was based on applying how the human body monitors and creates movement. Suddenly, robots that weren't programmed to deal with external problems like inclines could navigate them with ease. Plus their movement looked smoother and more natural.

The conclusion was that trying to tightly control how we move might result in some short term improvements compared to someone who is figuring things out with much less control but that over the long run that tight control will actually hinder their development.

This is exactly what you see when you put a new rider on clipless pedals right away. Sure, their choppy pedal stroke smooths out and they see some increase in pedaling power but at what cost? By trying to tightly control the pedal stroke right away they take away from their body's ability to develop a better, more efficient pedal stroke in the long run.

The same goes for riders who never use flat pedals. They are taking away from the "noise" their body needs to help it choose and develop the best, most efficient pedal stroke.

As Matt put it in the book, gaining a good running stride – or pedal stroke in our case – is more like growing a beard than chopping wood. It is something that you allow to happen, you can't make it happen. Trying to "make it happen" by tightly controlling the pedal stroke and/ or changing the pedal stroke itself simply is not the right way to go about it.

So, you may ask, what is the best way? Good question, glad you asked…

The best way to improve your pedal stroke is to make sure you have the physical tools you need and then apply them frequently. In other words, do your mobility and strength training and then ride your mountain bike.

You see, even though you don't want to try and change your natural pedal stroke, you do need to make sure that you can actually apply your natural pedal stroke. You can't do that if you have a glaring mobility and/ or strength deficit. You end up compensating for that deficit, which isn't the same as being able to apply your natural pedal stroke.

A lot of riders have bad pedal strokes but not because they need to fix them with pedals, bike fits or changing their technique. When they fix the real strength and mobility issues causing the problem they will see a change in their pedal stroke but not because they thought about or practiced anything. It happens because their body created more efficient movement patterns based on the new and improved "tools" it has access to.

Coupled with making sure you have the mobility and strength to get into the most efficient positions and allow for you true natural pedal stroke is applying it on the bike. Just spending time on the bike is a

vital part of giving your body the environment it needs to learn better efficiency. This is also why I'm such a big advocate for spending as much time as possible on your mountain bike since that will help your body develop the specific efficiency it needs better than a road bike.

This is also why I'm an advocate for doing some of your training with flat pedals. Flats have much less control over your pedal stroke and give your body the sensory rich environment it needs to develop improved, more efficient movements during the pedal stroke. Simply put, just riding flats will do more for your pedal stroke than all the single leg pedaling or crazy cranks or whatever else you're told can improve your pedal stroke.

Now, because this is the internet and someone out there will twist all of this to mean that I hate clipless pedals and road riding I have to insert my usual "that's not what I said" statement.

I think that clipless pedals have an important part in mountain biking, particularly for certain racing applications. I just don't feel that new riders need to worry about them for at least a year or two and riders that do choose to switch should spend some time on flats each year to help them improve their skills and pedal stroke.

I also think that riding on the road is a good training tool, I just don't think you need to do it on a road bike. Since the efficiency you gain is very specific to the movements and postures you use in training it only makes sense to keep those things as close as possible to what you will use on the trail. Using a mountain bike to ride on the road helps you do this much better than riding a road bike, which is much lighter and puts you in a different position.

With that out of the way I'll wrap this up. Once again, all I am trying to do is help free my fellow riders from the lies and myths surrounding the value of clipless pedals so they can unleash their own natural pedal stroke. You will be a better rider if you learn to ride on flats and you continue to use them to improve your pedal stroke and skills. This approach will also improve your clipless pedal skills as well should you choose to use them.

When you look at the pedal stroke from a natural movement and brain training perspective you see some major problems with the current views on improving the pedal stroke through tight control of the foot and conscious effort to change the pedal stroke. Give your body the tools it needs to unleash its own natural pedal stroke and then focus on giving your body a chance to learn and improve. This will help you improve your riding more than anything else you can possibly do.

How Flat Pedals Improve Your Riding - Interview with MTB Star Ryan Leech

One of my most popular podcasts interviews over the last few months was with trials rider and over all mountain biking stud Ryan Leech. At the end of our conversation I mentioned something off hand about flat pedals the tragedy of seeing new riders forced into the so quickly and Ryan was in both total agreement as to the need to learn how to ride on flats and surprised to hear that clipless pedals were being pushed so hard onto new riders.

Ryan was nice enough to join me for another podcast and in this one we dive into the use of flat pedals and how they enhance your balance, pedal stroke and skills as a rider. More importantly they enhance the FUN factor, which sometimes riders forget about. Ryan also gives us his advice for riders looking to make the switch from clipless to flat pedals and what you need to look for in a pedal and shoe to make it work.

All in all, Ryan does a great job of dispelling a lot of myths surrounding clipless pedals and reminds us that if trials riders - the most technically proficient riders in the world - don't need to be attached to the pedals then few of us really do.

Download this episode (right click and save)

Can clipless pedals interfere with balance, reaction time and the efficiency of muscular contractions?

While most people don't think about them in the same way, your feet are just as important to your body as your hands. They are a main contact point with the ground and having strong, healthy feet is important for performance and health.

In this episode of the MTB Strength Coach Podcast I interview Andy Clower, an athletic trainer and strength coach based out of Berkley CA. Andy is a true expert on the mechanics of the foot and made some interesting points in an article he wrote concerning the difference between true barefoot training and minimalist shoe training. After seeing it I knew I had to get him on the podcast to share his insights into what really happens when you restrict natural foot movement.

In this interview we discuss the impact that natural foot movement can have on balance, reaction time and the efficiency of muscular contractions in the legs. These are things most mountain bikers have never thought about but make a huge impact on the trail.

During the discussion he makes a great case for spending some training time off the bike completely barefoot. He shares some ideas on how he integrates barefoot training into new client programs so they don't get hurt by getting into it too fast.

I think that Barefoot Training and applying its lessons to the bike – something I call Barefoot Pedaling – is an essential element for every rider. The best way to do this is to spend some time on flats. It will help you pedal with more power and endurance while also inflicting less wear and tear on your body. Plus, as you'll find out in this interview, it can impact a lot of other things you never knew existed as well.

Download this episode (right click and save)

Again, this isn't me saying this, this is a university trained athletic trainer who doesn't even ride bikes. He is simply sharing what he knows about the foot, how it functions and what happens when you mess with it too much.

Is your bike shop "over-prescribing" bike technologies?

This morning I was reading the book Anti-Fragile by Nassim Nicholas Taleb, which is by far the best book I've read in a long time. I think that everyone should check it out as it does a great job of dispelling a lot of myths about our modern lives and our overreliance on linear (straight line) models to drive our decisions and our blindness to the real effects of randomness on our lives.

One of the things I read this morning was about the history of medicine and how modern doctors are often blind to the non-linearity of their interventions like drugs and surgery. For example, if your blood pressure readings are marginally higher than normal then there is only a 5.6 percent chance of you benefitting from a certain blood pressure drug. However, if you are in the "high" to "severe" range the chances of benefitting go up to 26-72%.

However, both people are exposed to the same risk of side effects. **This is a non-linear response, meaning that the benefits derived aren't the same for everyone taking it but the risks remain the same.**

But if this isn't explained to the patient – and doctors – then there is a knee jerk reaction to prescribe blood pressure drugs for anyone who is hypertensive. The data usually shows an "average" result of the drug but, as you can see, that number paints a very incomplete picture.

Nassim suggests, and I would agree, that the best approach is to know those benefit-risk ratios and make decisions based on them, not just the "data". This would prevent a lot of people from being exposed to the side effects of taking drugs or having surgeries that realistically have a very low chance of benefitting them.

Behind this mindset are several factors, including interventionism (the desire to intervene in some way instead of letting nature take its course), neomania (the love of things new and modern because they are "better") and the misrepresentation of data to drive sales by those who could profit from the widespread use of drugs and surgeries.

Now, what does this have to do with mountain biking? **As I was reading this I realized that this is the exact same thing happening in the mountain bike industry to sell every rider on the "benefits" of technology like clipless pedals, bike fits and bigger wheels.**

We're often quoted numbers like "an average increase in power of X", "decreased rolling resistance of Y" and told that the pros use these technologies without being given any perspective on the situation. The truth is that the benefits from those technologies isn't linear and they all have some potential negative side effects that do tend to remain constant.

It is this lack of perspective that has led to the over-prescription of bike technologies to riders who don't really benefit from them as much as they are led to believe. The story we often hear in the bike shops and at the trail head is that since the top people use a certain technology then we need to use it ASAP as well.

But the truth is that a beginning rider (someone with less than 2 years of experience) isn't going to benefit the same as someone who has several years of hard core riding experience and is looking for ways to get an edge while trying to continue their improvements.

Without recognizing that intervening to soon in an attempt to make things "easier" or "more efficient" has different risk-benefit ratios for everyone you can forget that sometimes nature simply needs to take its course. Your body will often figure things out if you give it enough time and the best thing you can really do is make sure you have the strength and mobility to move well so you don't miss out on some key things in your development as a rider.

The real take home message here is that the ultimate power lies in you, not some piece of bike technology being sold as what "everyone" needs. By understanding that the benefits of bike technology are not linear we can make smarter decisions about what is really the best option for us.

The Evolution of the Flat Pedal

A little over a year ago I was sitting on the trail pissed off at the lack of support I was getting from my shoes and pedals.

Like a lot of you, I constantly had to deal with the compromises that came between a stiff soled shoe for performance and a pliable soled shoe for comfort. As a flat pedal rider I also dealt with the constant adjustments I felt like I had to make to get my foot *just right* on the pedal and how easily it could get knocked out of that position.

While I sat there I wondered to myself *why don't I need a stiff soled shoe to squat or deadlift in the gym*? As a strength coach I often worked out barefoot or with minimalist shoes and encouraged clients to train the same way.

I had lifted hundreds of pounds in bare feet – putting them under far more stress than they ever saw on the bike – so I knew that the foot was a naturally strong and stable platform. But for some reason my feet turned into an unstable, unbalanced mess on the bike.

And suddenly it hit me – when lifting in the gym the ground supports both ends of the arch of my foot. The arch is one of the strongest forms in nature but *only if it is supported on both ends*.

Once you support both ends of the arch the foot is strong, stable and balanced. This is why you don't need stiff soled shoes in the gym and good coaches will actually tell you not to come up on your toes. Pushing through the ball of the foot in the gym destabilizes the arch of the foot and make it harder to recruit the hips, which are the strongest muscles in the lower body.

An idea is born…

At that moment I knew I had to see if I was on to something. I realized that every pedal ever designed has been made from the assumption that you need to push through the ball of the foot.

However, this is an outdated view of the pedal stroke.

The foot and lower leg act very differently depending on one thing…does your foot break contact with the ground (or whatever it is on)?

You see, you only want to push through the ball of the foot when you want your foot to break contact with what it is on. So if I was walking, running, trying to jump over a car speeding at me or trying to jump off of my bike then yes, in those instances I would want to push through the ball of the foot.

But I'm not doing any of those things when riding my bike and *since my foot stays in contact with the pedal throughout the pedal stroke, it wants to act much differently*. In this case it is more like the squat or deadlift in the gym, where I want to have both ends of the arch of my foot supported so I can drive through a strong, stable foot.

And just in case you think you might lose some power from not being able to use your ankle and calf muscles to push and pull, this study (*J.R. Van Sickle Jr, M.L Hull/ Journal of Biomechanics 2007*) showed no difference in power or economy between the ball of the foot and the mid-foot

position…which means that the ball of the foot isn't "better" or it would have won. At worst you won't lose anything by using the mid-foot position.

However, it did show an important difference in *how* that power was produced. They found that driving through the ball of the foot placed more stress on the calf muscles and Achilles tendon, while the mid-foot placement took that stress and put it on the hips.

This is interesting when you consider that the hips – and not the quads – have been shown to be the major drivers of the pedal stroke (*ELMER, S. J., P. R. BARRATT, T. KORFF, and J. C. MARTIN. Medicine & Science in Sports & Exercise 2011*). Taken together, all of this points to a pedaling platform that optimizes the mid-foot placement to best recruit the hips, which are the main muscles used to power the pedal stroke.

Which is exactly what I did with the Catalyst Pedal. By providing a platform that lets you support both ends of the arch of your foot, the Catalyst Pedal supports your foot the same way the ground would, allowing for a more balanced, stable foot position and increased power transfer into the drivetrain.

How it works…

To accomplish this the Catalyst Pedal features a full 5 inches/ 128 mm of contact space for your foot. This allows the pedal body to support both the ball of the foot and the heel while also resulting in a true mid-foot placement of the axle.

However, the Catalyst Pedal isn't any wider than a normal flat pedal – 3.75 inches/ 95 mm to be exact. This means that it disappears under your foot and doesn't expose any extra pedal body to rock strikes. This also means that the Catalyst Pedal is actually smaller underfoot than any other "oversized" flat pedal.

In order to get the most out of your Catalyst Pedals you just need to do one simple thing…

Make sure that your big toe knuckle is on the front inside pins.

On the Catalyst Pedal this foot position will make sure that you are able to support both ends of your arch. No other pedal on the market is long enough to accomplish this, which is what makes the Catalyst Pedal so effective.

This also means that you will probably need to consciously place your foot further forward than you are used to. *In fact, you do not want the ball of the foot completely on the pedal* – if it is then your foot is too far back to make full use of this new and improved platform for your foot.

With the ball of the foot on the pedal you are forced to push forward – literally trying to kick your foot off of the pedal as you pedal. This is why most pedals run a lot of pins in the middle of the pedal body and/ or put a concave design into the pedal to cradle the ball of the foot – you have to fight that forward push to keep your feet on the pedals.

A REGULAR PEDAL CREATING A FORWARD PUSH INTO THE PEDAL.

But when you move the foot forward it balances the forces going into the pedal. Now you can drive down into a strong, stable platform without having to fight those forward forces, which is why the Catalyst Pedal doesn't need an excessive amount of pins in the middle of the pedal body or a concave design.

THE CATALYST PEDAL CREATING A BALANCED PUSH INTO THE PEDALS.

This foot placement improves your pedaling in 3 ways:

1) POWER – By supporting both ends of the arch of the foot you naturally support the arch itself, which gets rid of flex in the arch. An arch that is only supported on one side is weak and flexible while one that is supported on both sides is strong and stable. By supporting the arch with the pedal body itself you get rid of the foot flex you usually need stiff soled shoes for. This improves power transfer since the pedal body itself is far stiffer than even the stiffest soled shoes, which means every bit of power your legs produce go straight into the crank arms.

2) EFFICIENCY – The mid-foot placement of the axle balances the foot, which takes stress off of the ankle joint and allows for better recruitment of the hips. The hips have also been shown to be the major muscles used when pedaling, not your quads (ELMER, S. J., P. R. BARRATT, T. KORFF, and J. C. MARTIN. Medicine & Science in Sports & Exercise 2011). The mid-foot position has also been shown to shift the stress from the ankles to the hips (J.R. Van Sickle Jr, M.L Hull/ Journal of Biomechanics 2007). This means the mid-foot position allows your body to better recruit the main muscles powering the pedal stroke.

3) COMFORT & STABILITY – The more balanced foot position achieved from this pedal design will result in a more balanced application of force into the pedals. Instead of pushing forward into the pedal through the ball of the foot you will push straight down through the entire foot. This will result in less stress on the feet since you aren't pushing them into the toe box of your shoes with every pedal stroke, plus your feet won't push over the top and come off during hard sprints on the trail.

Now you can let your foot move naturally on the pedal with the same type of articulation and support it was designed to thrive on. The Catalyst Pedal is the only pedal in the world that looks first at how the foot and lower leg optimally move and then applies that insight to the bike.

So if you are looking for a better way to pedal your bike…one that works with your body's natural ways of moving instead of forcing old, outdated theories about the pedal stroke on us…then start your journey to a better ride by visiting www.pedalinginnovations.com and learning more about the one and only Catalyst Pedal.