Third Edition

MASTERING MOUNTAIN BIKE SKILLS

BRIAN LOPES • LEE MCCORMACK

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Third Edition

MASTERING MOUNTAIN BIKE SKILLS

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INTRODUCTION

Welcome to the third edition of *Mastering Mountain Bike Skills.* With time comes change. The MTB world is forever changing, so get ready to improve with the times! If you've read the first two editions, we're sure you've learned a lot and come away with some great tips to improve your riding.

Well, this third edition is going to give you even more to learn, practice, and understand. We're here to help you become a better all-around mountain biker.

Mountain biking is awesome! Even when you do it wrong—afraid, tense, and tired, like most beginners—it's the greatest sport ever.

Well, guess what: When you learn to do it right—confident, fluid, and powerful—it's even more awesome. You can explore beautiful places with like-minded people, get in great shape, and most important, access very high states of Flow (with a capital *F*).

In his skills classes, in which he has met thousands of riders of all levels, from first-timers to world champions, Lee has discovered some essential truths:

1. No one has it mastered. The best riders stay the best because they keep growing.
2. Everyone can get better—first-timers, timid beginners, seasoned enthusiasts, and top pros.
3. The better you get, the more fun you have.

And with over 40 years of experience on a bike as a professional cyclist, Brian has acquired the knowledge to help you achieve all three.

The following are our goals for this book. We want you to:

Have more fun on your bike. More confidence. More safety. More air. More speed. However you define fun, we want you to have it. Remember: As long as you're learning, you're having fun.

Apply the 80/20 principle. Eighty percent of your results are from a core 20 percent of the skills you learn. Rather than describing a random assortment of tricks, this book focuses on the core skills that help real people ride

better: the essential movement patterns that you can improve, combine, and apply almost everywhere you ride. You'll be amazed at how simple great riding can be.

Use this medium to its full benefit. This being a print book or an e-book, we can't interact the way we can in person or online, so it's harder to help you with your specific issues. This book describes the techniques and learning methods that can be conveyed in this format. The great thing about a book is that it can provide context, and it's permanent. We encourage you to come back to this book often. Read a short section; then take your new awareness to the trail.

Develop a solid skills base. All great riding is built from the bottom up. This book focuses on the essential, universal skills that help all kinds of riders on all kinds of terrain. We start at the bottom of the skills tree and work our way into the branches.

Follow the path to mastery. To our knowledge, there are no magic tricks at the top of the skills tree. As you improve your core skills, you learn to execute them with more precision and power, and to combine them in interesting ways. In this sense, riding is like painting. Once you master the primary colors (aka movements), you can make any color you want.

Have fun!

LEARN TO LEARN

As much as you already love mountain biking, just wait: It's about to get way better, especially if you follow these tips about learning:

One thing at a time. Whenever you're out riding, concentrate on one skill or one component of a skill. Always start inside your own body: drop your heels, hinge your hips, and relax your elbows. Once your body is working well, shift your focus to the trail: look ahead in the corners, stay low over the jumps, and press into holes. Think about executing the move as perfectly as you can. Soon, you'll be doing it without thought, and then you can move on to the next thing.

Don't let bad habits ruin your life. If you're a normal person, the first time you encounter a gnarly descent, you'll subconsciously push your head up and back (away from danger). This is the worst thing you can do in terms of bike control! But, you'll probably survive. Your brain is simple. All it wants to do is (1) not die and (2) make babies. If you ride improperly a couple times, *Bam!* you've created a habit. Keep in mind:

- Once a habit is burned into your brain, it's there forever. It's like having a "discussion" with your wife. At some point, your brain reverts to 11 years old, and you can't stop yourself from saying stupid things. The same thing happens when you reach your next gnarly descent. You know you should be low and balanced, but you can't stop yourself from pushing your head up and back. Do this enough, and you will get hurt.

Schooled By Brian

With this new edition comes both new techniques and a new kind of sidebar called Schooled by Brian. Brian is one of the best (if not the best) mountain bikers ever. Because he is so phenomenally strong, skilled, and confident—and he processes so much data so quickly—he perceives riding differently from the way we do. These Schooled by Brian sidebars give you his elite perspective.

- You can learn a new behavior that works better. That's where this book comes in. Focus on newer and better skills. Ride mellower trails so you can build newer and better habits.
- Anytime you push beyond your comfort zone, you will revert to the old habit. That's why you *must* ride within your comfort zone!

Think about what you want to do rather than what you're trying to avoid. If you think, "Don't stare into the hole," where do you think you'll stare? Many coaches recommend repeating a positive mantra: "I will fly over there. I will fly over there."

Rather than watch out for things that you're afraid to ride, look for things that you want to ride. Rather than stare at a boulder, scan around that turn you're going to carve.

Never, ever push through fear. You're standing above a big drop that scares you to death, and your buddies are telling you to stop being a wimp and just go for it. That advice is ignorant and can be dangerous! If you're afraid, there's a reason. The most common reason is that you don't know how to ride that drop. Pushing through your fear into the void is like rolling the dice. Chances are good that an old habit will come up. You might make it. You might not.

Precision now, speed later. Don't make yourself a human missile and hope you learn something before you explode. When you're working on a new skill, do it slowly on easy terrain. We want to train effective habits here. Going too fast will introduce errors and greatly increase the danger. Stick this to the refrigerator in your Sprinter van: *Smoothness first. Speed later.*

In his work with pro enduro racers, Lee often sees them clock their fastest training times when they relax and focus on flowy execution. Going as fast as you possibly can is often slower.

Schooled By Brian

Before you head out on any kind of ride, be prepared. Think about the number of hours in the saddle, the time of day, the forecasted weather, the terrain or type of obstacles you will encounter, and the company you're riding with. If you're smart, all of these factors will determine how much food and water to bring, the clothes and equipment to pack, the type of bike to ride, your suspension amount and setup, your tire selection, your tire pressures, and so on.

It sucks to be cold toward the end of your ride because the sun has set or because it's started to rain and you aren't prepared. Running out of water or food is always a recipe for putting yourself in the hurt locker. Having to stop every 10 minutes to fix another flat because you thought your single-ply tires would be fine through all the sharp rock gardens will surely piss off your friends as much as it pisses you off. And riding your hardtail with no dropper post while all your mates are ripping their 6-inch-travel (15 cm) all-mountain bikes down some aggressive trails is a sure way to either get hurt or end up riding alone because you simply can't conquer the terrain your friends are looking for.

The bottom line is that you want to have fun, you want to finish your ride with no issues, and you don't want to feel like dying. The odds of reminiscing about the good ride with your friends are much higher if everyone is well prepared.

Lee teaches a class on the Porcupine Rim Trail in Moab, UT, but only after covering the core skills.

CONSIDER GETTING SOME COACHING

You will learn a lot from this book, but there's no substitute for a qualified skills instructor. By having a coach, you will be able to:

- Learn in your own style. A good instructor reaches you using words, demonstrations, and on-bike doing.
- Get immediate feedback. It might feel perfect the first time, but it rarely is. A good coach zeroes in on what you're doing well, and what you can do better.
- Improve much faster. Avoid wasting time on bad habits. Build perfect new skills and the confidence that goes with them.

Time and money spent on skills gets you higher performance—and more fun—than any equipment upgrade. We encourage you to learn at least the basics from a qualified instructor.

In a Box: Six Ways to Challenge Perceptions and Change Results on the Bike and on the Trail of Life

By Dr. Jason Richardson

1. **What do *you* want?**

Be specific (e.g., look, color, feel, time, date). Get reacquainted with why you work so hard—why you do what you do. If you are hard pressed to find any meaning or reasons as to why—then you may have found the answer as to why you are not moving forward. Better climbing? Turning? Sprinting? Whipping? Seeing yourself do these things is way more important than doing it like you see someone else do it. Don't be the next Aaron Gwin. Be the next you!

2. **Rule in rather than rule out.**

Many times we give ourselves only one way to win—one way to get up or down the hill. The odds do not dictate the outcome. When drawing your blueprint for success, leave room for the unexplained, the unplanned, and downright silly dumb-luck. Being open to such anomalies allows you to capitalize on them. Sometimes the track, trail, or course changes as you ride it. Ruling out ways to meet your goal might get you from point A to point B. Ruling in other possibilities can get you from point A to point Z. It's not like you even need a chain anymore to place in the top 5 in World Cup DH! (Aaron Gwin famously won a World Cup downhill without a chain.)

3. **Recalibrate with language.**

Apple's "Think Different" campaign of the late 1990s was powerful, not because it changed the public's image of Apple (though it did). It was powerful because it changed Apple's image of Apple. It enhanced Apple's image of itself at a time they needed it most. Grammatically, "Think Different" is fringe territory. From a belief system standpoint, it was "Think Perfect."

- Words have weight. Using phrases such as “have to,” “got to,” and “need to” is like adding weights to the already heavy loads you lift in the gym or at work. Referring to our past with words like “woulda,” “coulda,” and “shoulda” shackles us to our past failures. The words “will” and “going to” both beg the question, “When?”
- Rules are already in place for every game we play and for every facet of life. If you choose to play, it’s because you want to, like to, and can rather than would, could, or should. There is a big difference between your kid saying, “I will take out the trash” and “I am taking out the trash.” In other words, saying “I am getting faster” is more accurate (from a brain standpoint) than “I will get faster.” The first tells your brain it is happening, the latter tells your brain you are not yet fast. I prefer you, and your brain, to operate from the former rather than the latter!

4. **Slow down to go faster and farther.**

What do athletes do before game time? What do stage actors do before curtain call? They pause, sometimes closing their eyes, and take deep breaths. They slow themselves down. It only takes a few seconds. Why don’t we do this when switching tasks, pulling in our driveways, getting to our offices, or talking to our children? The milliseconds we save rushing and reacting are like empty calories. The seconds it takes to breathe and see ourselves doing what we set out to do is time added. In other words, the way to self-medicate is to meditate. See yourself be yourself. This is something racers do not only before a run but within it!

5. **Gamify the mundane.**

Drive a different way home. Brush your teeth with the opposite hand. Ask for feedback from your worst critics! Write down three things you want to get done today—and do them! Join a group. Commit to a 30-, 60-, or 90-day challenge with people who will hold you accountable. Go veggie. Go vegan. Go Paleo. Go high carb, slow carb, no carb— just go get in a game!

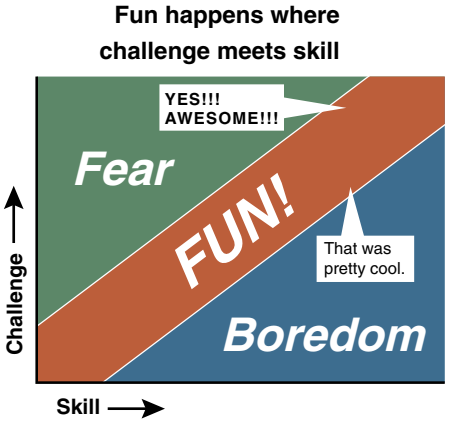
6. **Hire your boss.**

The best have someone in their corner looking out for their best interests. It may take some time to find this person. It might make sense to have several “bosses” in your work, play, and life. It’s not about ego because you are doing the hiring! Having someone (who cares) keep you sharp is good for you and your endeavors. Working with a coach or trainer who has done what you are working to do is a great investment in your overall success.

Bottom line:
It is easier for your brain to work toward what it sees or knows rather than what it does not see or know. In many cases, we get lost in our habits. Yet, the power is in the creation of habits. What if you were in the habit of creating powerful habits? The challenge is yours!

Dr. Jason Richardson (www.drjasonrichardson.com) is a speaker, author, and psychologist who is no stranger to danger or high-pressure situations. Dr.JRich is a World Champion and PanAm Games Gold Medalist BMX racer who takes the extreme lessons learned on the pro circuit and translates them into the psychological principles we all can use for success in business, sport, and life. People leave his talks inspired, motivated, and equipped to take action immediately.

STEP UP TO A HIGHER LEVEL



When you become a mountain biker, you begin a never-ending journey of self-improvement and good times. You have the most fun when your skills match the current challenge. When you step up your skills, you step up the challenge, and vice versa. Beginners and experts enjoy the same stoke. When you nail your first little double jump, you'll be just as stoked as Brian was when he won his umpteenth world championship.

As your skills evolve, so does your relationship with terrain. You get more confident, and you learn to work a trail the way a surfer works a wave. Although your kung fu changes with the situation (you might be a confident trail rider but a sissy jumper), you probably spend most of your time at one of the following three levels.

Level 1: The Trail Works You

Your bike feels new and strange, and you have little faith in your ability to survive a trail. You keep all of your muscles tense, all the time. You drag your brakes whenever your bike points downhill.

You creep slowly over obstacles and frequently stop dead or flop over your handlebars. You don't lean enough in turns, and your constant braking keeps your bike from cornering smoothly.

Riding at level 1 is herky-jerky and, to be honest, not all that fun. You hear experienced riders talk about flow and groove and flying over stuff, but you have no idea what they're talking about. Heck, you might even think they're crazy.

Unfortunately, most people who own mountain bikes never get out of this stage. They either wallow in beginnerdom forever, or they just plain give up and stick to the road. If you're at level 1, don't give up. This isn't what mountain biking is about. The real fun is still to come.

LEAP FROM LEVEL 1 TO LEVEL 2

1. Relax. This is so important, we'll keep beating you over the head with it. If you find yourself tensing up, stop what you're doing and return with a fresh mind—while focusing on what, specifically, you want to do well. If the tension remains, go work on something that doesn't scare you. Fear and tension make riding unproductive and unfun.
2. If you're going to brake, brake like you mean it. Slow way down; then get back to rolling. Dragging brakes is unfun and dangerous.
3. Try carrying (a little) more speed into rough sections. Get light on your bike to get through more smoothly.
4. Have faith in your bike's ability to roll. That's what bikes do. They roll.
5. Dial in your attack position. This is key!

Level 2: You Survive the Trail

Now mountain biking becomes fun. You've learned to relax a bit. You coast between turns. You roll, clatter, and fly straight over obstacles. In corners you lay off the brakes, lean, and carve like a butcher.

You've become a competent rider. On a smooth, curvy trail, you enjoy the sensations of speed and flow. When things get gnarly, you tend to tense up. You bog down in rough terrain, and you get bucked out of control when you hit obstacles at speed. You have trouble making corners when traction is iffy.

The majority of satisfied mountain bikers ride happily somewhere in level 2, blissfully unaware of the next level. When they see pros whiz by with utmost speed and control, they just shake their heads and assume their bikes are way better.

LEAP FROM LEVEL 2 TO LEVEL 3

1. Relax. Yes, even more than ever. The best way to relax isn't to try to do nothing; it's to focus on doing whatever you need to do in the moment. Get heavy. Get light. Lean your bike. Look farther ahead. Do something!
2. Commit. The ups and downs of porpoiseful riding require snap.
3. Scrutinize the trail. Not just any line will do. Look for banks to turn on and downslopes to pump.
4. Don't bash into stuff. It's no longer good enough to point your wheel downhill and let it run into whatever is in the way. Instead, try to unweight, wheelie, hop, or jump over the obstacles. When you stop crashing into things, you'll immediately increase your speed and control.
5. Pump backsides. Anytime the trail turns downward, press down for some free speed. We're talking any surface here: rocks, stumps, mounds, washing machines, anything. Pumping is the key to that flowy world you've been hearing about.
6. Develop your own style. Experiment to learn what works best for your skills, body type, and equipment. For example, if you can't muscle your bike through rough sections but you rail corners, you might tend to ride around gnarly rocks, which is fine. What isn't fine is thinking you rule at rocks but actually sucking, then bashing into the business end of a boulder. Know yourself.
7. Dial in your attack position. Yes, even more. More automatic. More fluid.

Level 3: You Work the Trail

This is the ultimate. You ride with relaxed aggression. You never let your front wheel hit a rock, and you never let a backside go by unpumped. The trail is a piece of clay, and you sculpt it to suit your fancy. Your line is as vertical as it is horizontal. You unweight or fly over obstacles, and you press hard into corners. You porpoise through rough sections, gaining speed and control the whole time.

When you reach level 3, be proud—you're in small company. But just because you can hop a boulder's face and pump its backside doesn't mean you're finished learning. As you get stronger and better at reading terrain, you'll learn to manipulate trails in even better ways.

You're Only as Good as Your Habits

When you're under stress—in a race, on a new trail, with a potential mate—you'll always revert to your old habits. Do you usually ride stiff and upright? If so, you'll do the same under pressure. So take the time to build good habits!

MIX AND MATCH YOUR SKILLS

Here's another way to look at your progression on the bike. The thinking goes like this: **Each skill is composed of subskills.** For example, the subskills for braking are a low, balanced attack position; gradual and powerful pressure on the brake levers; gradual rotation of your body backward to match the angle of the net force; and finally, driving the net force into your feet. Oh yeah, and you also have to manage the steepness of the trail, plus bumps. The simple act of braking is pretty complex. The better you get at each subskill, the better you get at the main skill.

The better you get at each main skill (e.g., hopping, turning), the more quickly you can transition between them, and ultimately, the better you can combine them. In the beginning, you'll be stoked to hop, then turn. Later on, you'll hop and turn at the same time.

For every trail and speed, you have to execute a series of skills to keep you safe and happy. The more technical the trail is, the closer the moves are to each other, and the less time you spend doing nothing (we sure love technical trails!). When you increase speed, there's even less time between moves. At very high speeds, all moves bleed into each other.

At low speed. the rhythm might go something like this:

I'm going over the rock . . . now I'm braking . . . now I'm turning.

Every move is deliberate, with a pause in between to collect yourself. If you execute each move properly, it's fun. But, you have to be on a moderate trail, and you have to go slow enough to manage one thing at a time.

At higher speed, the rhythm might feel like this:

Rock! Slow down! Turn!

At this speed, the moves start to connect with each other. You're acting the whole time, with no rest between moves. This feels way better. You can find flow on moderate trails at moderate speeds. To ride at this level, you have to start overlapping skills—for example, braking as you roll down the back of the rock.

At even higher speeds, you're hopping the rock, then using the heaviness of the landing to pump the turn. The whole section becomes a simple wave of energy. No need to brake. No need to worry.

Find Your Style

Although the core riding skills shown in this book are pretty constant, the way you apply them is up to you. Definitely practice the key moves, but, as you master them, relax and rock them in your style. Are you compact like a road racer or upright like a motocrosser? Do you stay low or go for the big air? Do you turn around boulders or pump over them? It's all good. Just find the style that works best for you.

BRAAAP!

Or, at an even higher level:

OHMMM . . . .

At this point, all skills converge. On a technical climb, you can pedal while riding up ledges. On a technical descent, you can corner while pumping boulders. Riding becomes profoundly awesome.

When Lee teaches skills, he starts with the subskills, which build into skills. As the skills become automatic, he overlaps them; then, he combines them.

One Skill at a Time

In the beginning, when you're still wrangling all the subskills, it's best to focus on executing one skill at a time, such as these:

- Braking
- Turning
- Pedaling
- Riding up a steep slope
- Coasting down a ledge
- Pumping over a rock

At this level, it's smart to pick mellow trails and a pace that's slow enough for you to do one thing at a time. See the rock. Slow down. Go over the rock. See the turn. Slow down. Ride through the turn. And so on.

You know you're stepping into level 2 when you feel the skills start to overlap. When you are learning how to ride down a rock ledge, the moment you start looking at the next turn while you're still on the ledge, *Bam!,* that's the moment you have the ledge nailed.

Two Skills at a Time

As your basic skills soak into your lizard brain, you'll notice them starting to overlap and ultimately happen at the same time. Here are some examples of double skills:

- Braking while rolling down a steep rock face
- Pedaling while lunging over a root
- Carving a flat turn while pumping through a rut
- Transferring (turning) from one jump line to another in the air

At this level you're ready for more technical trails and higher speeds. You'll find yourself flowing smoothly between moves. You'll carry more speed, and it'll feel easier.

As all of your skills improve even more deeply (mastery is a never-ending process), you'll learn to combine even more of them.

Three or More Skills at a Time

It seems as though the very best riders are always turning and pumping. That's because, at the highest level, everything becomes one convoluted, beautiful cycle that uses the entire body and mind. The most technical trails and the coolest moments require three or more skills to be unleashed at the same time—perfectly. Here are some triple-skill moves:

- Turning a tight switchback while coasting down a steep pitch and dropping off a ledge
- Hopping up a vertical rock face while sprinting and cornering

Three skills at a time: 1) riding downhill, 2) turning, and 3) rolling off a ledge. This is where big fun happens.

It's interesting that so many cross-country riders are afraid to drop and jump. When you look at riding this way, drops are simple! A steep, rocky switchback, which many cross-country riders handle without a thought, is way more technically challenging.

As you work your way through this book, take the time to learn the subskills, then the basic skills. As you gain mastery in the basic skills, play with overlapping them and, ultimately, doing them at the same time. Your riding will get faster, easier, and even more fun.

While Lee was cowriting the first edition of *Mastering Mountain Bike Skills* more than 10 years ago, he was striving to discover the subskills and struggling to communicate them in a way that makes sense. During that time his riding became hyper self-aware, methodical, and less flowy.

Over a year or so, Lee's brain and body integrated the new knowledge, and his riding became faster and smoother than ever. Since the second edition was published in 2010, he has been exploring the fundamentals even more deeply while also working to integrate everything at the highest level he can.

As a result of constant learning, Lee is riding better than ever. This is more than 25 years into his riding life and more than 10 years into riding and teaching as a profession. As long as he is learning, he's having fun.

We encourage you to take the same journey.

DISCLAIMER

Mountain biking is dangerous. You can break your equipment, and you can hurt yourself. That's what makes it so exciting. Ride within your abilities, and always wear the proper protective gear for the type of riding you're doing. Always wear a helmet and gloves. If you're anyplace you expect to crash, consider elbow and knee pads, body armor, and a full-face helmet. We also suggest eye protection.

The best technique and gear will not prevent all crashes or injuries. If you go out and hurt yourself, it's your own fault. Ride hard and take chances, but don't be an idiot.

Welcome to the exciting, gratifying world of high-level mountain biking. Remember that becoming a great rider is a long-term process. Be patient, take it one step at a time, and have fun! But before you go out and rip, let's make sure your bike is up to the task.

1

Choose Your Weapon

When you Ride (with a capital *R*), your bike should work as an extension of your body. The lines between you, your bike, and the trail start to blur, and that's when Flow happens. In order to have the most fun (and Flow) in your riding, it's smart to pick a bike that fits your body and riding style, and then to dial it in specifically for you.

Equipment is a huge factor in the growth of our sport. Better equipment allows you to go faster, achieve better grip, and ride terrain and obstacles that in the past may have been either very difficult or above your skill level. No matter what kind of terrain you ride regularly or what you like to do on a bike, we're sure that the latest technological improvements will make your ride more enjoyable. Now, it's up to you to understand the multitude of equipment options so you can make the right setup choices—and plug in your new skills to take full advantage of all the terrain you love to encounter.

Schooled by Brian

With so many choices out there, it's easy to understand how a new rider or even a seasoned veteran can be confused about which bike is best for his or her needs.

Talking to people who spend countless hours riding, reading articles, going to demo days, and test riding bikes is a great way to help you make your decision. With so many companies offering a wide variety of choices, don't expect to make this decision overnight.

Even after you decide on a style of bike, your dream build, and the amount you want to spend, it's not a slam dunk. Do you want to buy a bike because of the customer service, the proximity of a shop that carries the brand, the bang for the buck, a certain suspension system, or maybe some specific angles? Regardless of where you get your bike, find a local shop that can service the parts on it, because at some point you will need a fix.

BUY THE RIGHT BIKE

Bikes keep getting better: lighter, more efficient, more durable, more fun, and most of all, more finely tuned for a specific style of riding.

If you're serious about riding, you realize your bike choice says a lot about you (are you a Specialized racerhead, an Ellsworth classic, a Yeti soul rider, or a REEB beer lover?), and it's a statement about how you choose to experience the world, or at least the singletrack parts of the world.

Get the best. Top-level frames and components work better, feel better, and last longer than low-end ones. Lee has been riding the same Shimano XTR parts for so many years that they've seen several bikes. Some of his Shimano pedals have seen several decades. The same goes for his FOX forks and shocks. As long as you maintain top-level parts, they last forever. Riding a top-level, spare-no-expense bike, like an Ellsworth Rogue 60 XTR build or a Specialized S Works, removes all equipment-related excuses. Shut up and learn to ride that thing!

Unless you can't afford the best. Unless you're sponsored (thank goodness!) or have so much money it doesn't matter, a $10,000 bike is like a Ford Raptor: Awesome! But, it's probably more than you need.

As long as you buy a bike from a reputable brand from a reputable retailer (not a department store!), you'll get a great bike for your money. If you want the highest performance without paying a crazy amount, check out the second-best option. In the Specialized lineup, that's usually the Expert model. For Ellsworth, that would be an Ellsworth Epuphany Alloy Shimano SXL build. For a great value, look at the middle option which, for Specialized, is usually the Comp model.

Buy from your local bike shop. You can find great deals online, especially on accessories, but a local bike shop will help you select the right bike, get you fitted, and keep your rig dialed. If you find a shop with knowledgeable staff and the parts you need, establish a relationship with the staff. You might pay a bit more than you would online, but the experience and the convenience will more than make up for the difference. Try bringing your mail-order bike to a shop for a night-before-the-ride repair and see how it goes, bro.

Well, unless you'd rather buy online. We've been supporting the same local bike shops for decades. As much as we value our local shops, it's time to get practical about online bike buying.

The fact is, the bike business is tough, with high competition and low margins. Few bike shops can afford to pay experienced professionals. For this reason, it's harder and harder to find shops that add real value to your bike purchase, especially if you live in a smaller bike market.

Meanwhile, over the past few years, direct-to-consumer brands such as Canyon, Commencal, and YT Industries have proven their ability to deliver great products, with great support, at great prices. Small companies such as Guerrilla Gravity can enter the market without taking on sales overhead, and they can build and deliver bikes exactly the way riders want them.

Even mega brands such as Trek and Giant are starting hybrid programs in which riders order their bikes online and pick them up at local stores. The Internet certainly has a big future in the bike world.

If buying online helps you get a great bike at a price you can afford, that's great. If you're smart, you'll also develop a relationship with your local shop for two good reasons: (1) You're supporting someone in your neighborhood who, like you, has to feed his family, and (2) your local shop is there to help you. What if you need a brake bleed the day before you head to Moab?

Take it easy on the upgrades. Don't sweat the components on your bike. Just ride the thing. Here are the most important upgrades:

- **A shorter stem.** For most bikes, a shorter stem dramatically improves handling, confidence, and safety. If your mountain bike comes with a stem longer than 90 mm, change it before you leave the shop (or get a longer frame). For more details, see the Stem section later in this chapter.
- **Proper-length handlebars.** Your bars should fit your body. See the Handlebars section for more details.
- **Seatpost.** If you don't have a dropper post, get one. Seriously.
- **Saddle.** It's hard to have fun sitting on a plastic anvil.
- **Tires.** Choose ones that match your riding conditions.

You might be able to swap stem and bars before you pick up your bike. Ask the person you're buying from. Run everything else stock until it breaks or wears out.

HARDTAIL OR FULL SUSPENSION?

Back in the day, there was no choice because everything was rigid. When suspension forks first came out, downhillers gobbled them up, but the weight weenies stayed rigid in their ways. Now, almost every mountain bike comes with a suspension fork. In the same way, when rear suspension first became available, only downhillers went for it. As the designs got better and lighter, rear suspension appeared on all bikes from the high end on down—for hard-core downhilling and for epic cross-country (XC).

Hardtails are still lighter and cheaper than suspension bikes with the same components, and they can perform better in two particular conditions: cross-country riding on smooth trails and dirt jumping and pump tracking on smooth tracks. The lighter, stiffer bikes transmit more power to the ground. That's why some racers almost always race on a hardtail.

In almost all other off-road situations, full suspension lets you ride faster and on rougher terrain with more comfort and more control. Riding is simply more fun—despite a little extra weight and, perhaps, a skosh of lost energy. For most mountain bikers, full suspension is the way to go.

Although suspension bikes have become the norm for serious trail riding, many hard-core riders have become even more committed to riding fully rigid—with nonsuspended rears *and* fronts. Fully rigid bikes are extra light and extra efficient (on smooth ground), and they promote a purity of flow you can't achieve with suspension. Everything is glorious as long as you're in phase with the terrain; if you get out of phase, beware the punishment!

The Ellsworth Rogue 60 that Brian is currently using would serve most riders in most areas well.

In a Box: Suspension Pros and Cons

What's Great About Suspension

Mountain bike suspension has become the norm for a simple reason: It works. But what, exactly, does it do? (Hint: It does more than let you ride poorly without being properly punished.)

- It smooths the ride.
- It improves control.
- It improves braking.
- It allows you to absorb greater impacts.
- It helps you cultivate a Sine Wave of Love.
- And, of course, it looks super cool on top of your car.

Potential Drawbacks of Suspension

On the bike, as in life, nothing comes for free. Suspension is most certainly awesome, but what is the cost?

- Increased weight
- Increased complexity
- Lost energy
- Impaired performance (in certain situations)
- Increased purchase and maintenance costs

Tires count as suspension. Now that we have plus bikes, with 2.7- to 3.2-inch (7 to 8 cm) tires and fatbikes, with 4.0- to 4.8-inch (10 to 12 cm) tires, hardtails and rigid bikes are more tolerable (and more fun!) than ever. Most fatbikers are happy with rigid frames and forks, and plus hardtails are incredibly fun.

Know Your Suspension Designs

Today's long-travel trail bikes out-descend yesterday's downhill bikes, and they out-climb older XC bikes. Although bike designers are always innovating, bicycle suspension designs have converged on a few basic ideas, each with its benefits and potential costs.

FSR Link (aka Horst Link)

What it is: This four-bar design has a pivot at the end of the chainstay. The rear axle pivots with the seat stay. This keeps the chain length pretty constant throughout the shock stroke.

Pro: Reduces the amount of chain and brake feedback. Since Specialized's patent has expired, other companies are now offering this design.

Con: This neutrality can encourage the rear suspension to bob with pedaling. Damped shocks are required to maintain a bob-free ride.

Best terrain: Mixed up and down when suspension must work perfectly while pedaling and braking on rough ground.

Examples: Ellsworth, Transition, YT Industries, Specialized

Single Pivot

What it is: This is the simplest design. A large swingarm pivots on a single point, which is typically mounted in line with the middle or large chainring.

Pro: Simplicity. Light weight. Strategic pivot placement gives the bike any characteristics the designer wants.

Con: Considerable chain and brake interference, especially when the chain is not in line with the pivot.

Best terrain: Smooth trails or downhill-specific riding.

Examples: Orange, Mountain Cycles. Very few current bikes use single pivots.

Multibar Single Pivot

What it is: A frame design with multiple bars and links, but the axle is attached to the chainstay. The main pivot is usually low, near the small ring.

Pro: Can be made light and stiff. Lots of tuning possibilities and shock ratios.

Con: Despite the extra bars, it still behaves like a single-pivot bike. When the chain is not in line with the pivot, the bike may display chain and brake feedback.

Best terrain: Mixed up and down, smooth and rough.

Examples: Trek, Kona, Guerrilla Gravity

VPP

What it is: This design uses multiple links to move the rear axle in an S-shaped curve. The belly of the S is in the natural sag position, and that's where the chain tends to pull the suspension.

Pro: Because the chain pulls the suspension to the neutral sag position and tends to hold it there, VPP bikes—even long-travel models—are bikes that don't tend to bob while you are pedaling.

Con: There is a lot of chain growth and pedal feedback that affects the suspension. The suspension curve has a falling rate in the ending stroke, which causes it to bottom out easy at the end of the stroke.

Best terrain: Mixed up and down, smooth and rough, when pedaling efficiency is a priority.

Examples: Santa Cruz, Intense

DW Link

What it is: This antisquat design keeps the suspension from compressing as the rider rocks backward with each pedal stroke.

Pro: Reduced pedal bob while maintaining plushness.

Con: Slight pedal feedback.

Best terrain: Mixed up and down, smooth and rough, when pedaling efficiency is a priority.

Examples: Ibis, Turner, Pivot

Schooled by Brian

With the progression of full-suspension bikes, there are only a few reasons to pick a hardtail over a full suspension.

If you're riding pump tracks or rhythm-style dirt jumps, a hardtail is the ideal choice hands down.

If you're primarily riding smooth trails and fire roads, or you're on a budget that doesn't allow a full-suspension bike, a hardtail could be the right choice for you.

In the race world you see only hardtails in some XC races, some dual slalom races, and some 4X races, but often these days, full-suspension bikes are picked for these disciplines because they're just that good.

In the past, the increased weight and loss of pedaling power made full-suspension bikes just not worth it. Nowadays, with minimal weight gains and pedaling platforms that transfer your pedal strokes into forward momentum, it's hard to find many benefits to riding a hardtail.

Brian's Ellsworth Rogue 40.

Which Is Best?

Although we all have our favorites (Brian: Ellsworth AEES (Active Energy Suspension) Lee: Specialized FSR!), the fact is that all modern bikes work pretty well. Test-ride bikes at your local bike shop. Pick a design that suits your terrain and riding style. Get the best model you can afford. Get your suspension tuned for you. And learn to ride it.

WHICH WHEEL SIZE IS BEST FOR YOU?

When the second edition of this book was published in 2010, if you were a mountain biker, you rode 26-inch (66 cm) wheels. The only exceptions were visionary XC racers on awkwardly handling 29ers (74 cm).

Fast forward to the third edition. Today, 26ers are almost dead, 29ers are common, and a new size, 27.5 (70 cm), has taken over much of the market. Right now, for adult bikes, we have three rim sizes:

Rim size	Bead seat diameter	Total diameter (2.3 in., or 5.8 cm, tire*)
26 in.	559 mm	26.8 in.
27.5 in.	584 mm	27.8 in.
29 in.	622 mm	29.3 in.

Data from Joe Buckley, Specialized Bicycle Components.

While rim diameters have gotten larger, so have tire widths. Right now we have these basic tire width ranges:

Regular: 2.5 inches (6.4 cm) or less, with most in the 2.0- to 2.3-inch (5 to 5.8 cm) range.

Plus: 2.8 to about 3.2 inches (7 to 8 cm). This is the newest niche, and it promises to be a great option for a lot of riders.

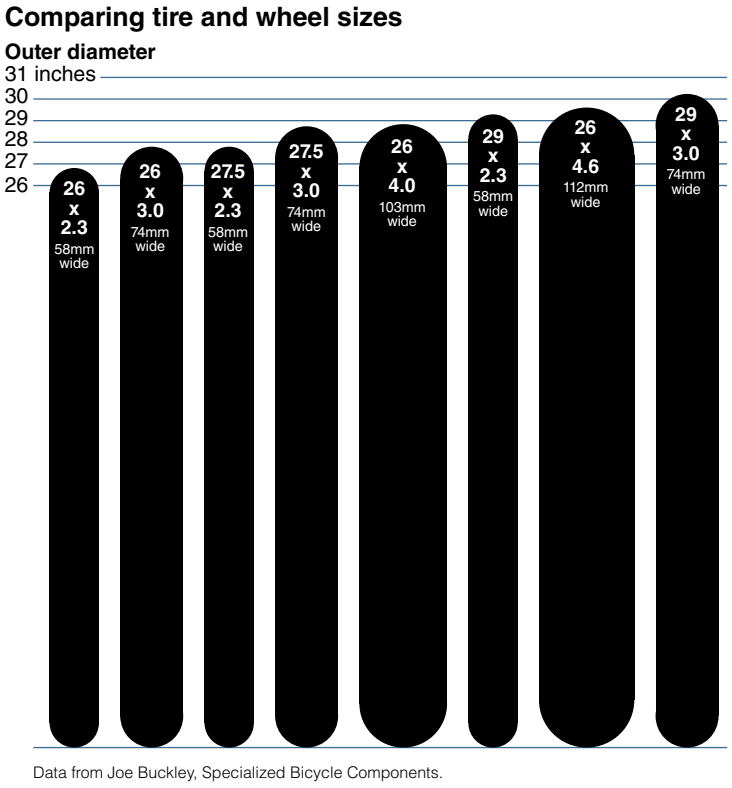
Fat: 3.5 inches (8.9 cm) or more. Four inches (10 cm) is common for dirt and packed snow; hardcore winter and sand riders are using up to 4.8-inch (12 cm) tires.

The various rim diameters and tire widths give us lots of options. Technology is changing all the time, but here are the current popular options for wheels and tires on adult mountain bikes:

- 26 regular
- 26 plus
- 26 fat
- 27.5 regular
- 27.5 plus
- 29 regular
- 29 plus

Data from Joe Buckley, Specialized Bicycle Components.

Both tire widths and diameters vary wildly among manufacturers and slightly within models from the same manufacturer. This chart reveals a continuum of diameters with various width options along the way. Where is the sweet spot for you?



Data from Joe Buckley, Specialized Bicycle Components.

Effects of Outer Diameter

A larger wheel rolls over bumps more easily than a smaller one does. From an engineering standpoint, a bigger wheel is a simpler solution than complicated suspension. When you change from 26 to 29, with the same suspension travel, it feels like someone ironed out your local trails. On small, chattery bumps, the bigger wheel feels like you have at least an inch (2.5 cm) more suspension.

A larger wheel tends to be heavier. It accelerates more slowly, but it carries speed more easily. Call it the freight train effect.

A smaller wheel tends to be lighter. It accelerates more quickly, but it has less freight train effect.

A light, strong wheel costs less when it's smaller. Carbon 29er wheels can be strong and light, but they're usually expensive.

A bigger rear wheel reduces the size of the cockpit. If you're riding very steep terrain, your rear tire's knobs are more likely to grab your butt. That's why Lee fancies a rear 29er tire with small knobs!

As a man who's more skilled than tall, LLB coach Kevin Stiffler often runs out of room between his crotch and his 27.5 plus rear tire. He doesn't seem to mind, though.

A bigger wheel has a longer contact patch, and given the same tire and riding style, can outcarve a smaller wheel in corners.

Big people should ride big wheels. If you're tall, look for a bike with 29-inch (74 cm) wheels. The frame will be proportional to the wheels, and it's more likely to fit you than a frame made for smaller wheels. If you're *really* tall, check out a 36er (91 cm; this is a real option!) from dirtysixer.com.

Little people should ride little wheels. If you're a shorter person, it can be hard to fit a bike with bigger wheels. This is a real issue with 29ers and with longer-travel 27.5ers. If you're really small, check out older 26-inch bikes (66 cm) and even 24-inch (61 cm) mountain bikes that are made for kids. Some of them are super sweet.

Heavier people should ride smaller wheels. Given the same construction and cost, a smaller wheel is stronger than a bigger wheel. If you're a heavy person trying to meet a low to middle price point, consider a smaller wheel size. Can a heavy person ride a 29er? Yes! But you'd better spend the money on premium wheels.

Effects of Tire Width

Wider tires allow lower air pressure, which means more cushion in bumps and more traction on most surfaces.

A wider, softer tire absorbs bumps more easily than suspension. Your tire is the first thing that hits a bump, and it deforms very readily—before your suspension can start moving. This makes rigid and short-travel bikes tolerably comfortable, and it makes long-travel bikes such as Lee's Stumpjumper 6Fattie feel like magic carpets.

34C, 2.3-inch and 3-inch. Each tire size is awesome in its own way.

Wider tires are heavier, which makes them more sluggish than narrower ones. A big tire can make your wheel significantly heavier. Because wheels are rotating weight, and tires are at the outside of the rotating mass, you really feel the extra uuuggg of heavy tires.

To keep tire weights low, most plus and fatbike tires have thin casings. This is fine for snow, sand, and moderate trail riding, but aggressive riders in rocky terrain need more durable meats. The current lack of strong plus tires is keeping enduro and downhill riders on regular width—but that will change as soon as someone sells a tire that is wide, light, and strong (but probably not cheap!).

In certain types of mud and slush, a wide tire floats and slides uncontrollably. You UK riders might prefer a narrower tire that cuts through the surface.

29 Minus

During the winter, Lee rides a hardtail with the stock 29er carbon rims and a set of 34C cyclocross tires. This bike is super fast on the road, on smooth trails, and on pump tracks, and it absolutely carves corners. Would it be fun in the rocks? Lee doesn't want to find out.

On a perfectly smooth trail, a wide tire has a slower roll and more surefooted grip that you can call either confidence inspiring or boring. A narrow tire has a quicker roll and more tenuous grip that you can call either fun or scary. Which is best? That's up to you. For reasons of fun and safety, Lee wants his wife and daughters on plus tires.

Picking your compromise. When you pick a wheel style, you're making a compromise: easier rolling over bumps for more size and weight; more traction for more weight (and possibly less durability).

What Are Different Wheels Good For?

All modern, high-quality mountain bikes are fantastic, and they all deliver the kind of ride experience they're designed for. Light and efficient, burly and playful—whatever you want, you can get it. If you're in a position to worry about which size rim and tire you should be riding, consider yourself fortunate in this life.

That said, each wheel style has its particular benefits, and the bike industry is coalescing around the idea that certain types of wheels perform best on certain types of bikes. The following table compares common wheel sizes.

MEASURED DIAMETERS OF VARIOUS WHEEL SIZES

Wheel size (in.)	Diameter (mm)	Diameter (in.)
26 × 2.3	681	26.8
26 × 3.0	705	27.8
26 × 4.0	734	28.9
26 × 4.6	752	29.6
27.5 × 2.3	706	27.8
27.5 × 3.0	730	28.7
29 × 2.3	744	29.3
29 × 3.0	768	30.2

Data from Joe Buckley, Specialized Bicycle Components.

26 Regular

Within a few years, the original mountain bike tire size went from dominant to almost dead. For most riders, a bigger wheel makes riding easier and more fun.

Although 27.5 seems like it should be 1.5 inches taller than 26, it's actually only about 1 inch taller. All this fuss for an inch!

The main 26-inch holdouts are dirt-jump, pump track, slopestyle, and slalom bikes. These styles of riding reward the quickness, strength, and increased pump of the smaller wheel.