Motorcycle Safety and Dynamics

How to Survive the Experience Throughout Your Riding Career
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Fifteen years ago the two authors of this book, Cash and Jim, were part of a three-motorcycle group, touring along a country road on a crisp fall day in Texas in perfect riding weather. Jim was riding a Honda Gold Wing and carrying a passenger, Judy, at the time. Cash was on a cruiser, a Honda Magna, leading the group. Our third rider, a friend named Karen Miller, was riding a Honda Shadow 500 that we had assisted her to purchase some months before.

Not long after a stop for lunch, we were coming out of a sweeping, gentle curve to the right, traveling at the posted speed limit. The only other vehicle on the road was a pickup truck approaching us in the oncoming lane traveling at somewhat below that speed limit, preparing to turn right onto a dirt road.

Riding lead, Cash passed the truck without incident. Immediately behind her, Karen’s bike crossed the double yellow line in the road and hit the truck’s left front quarter panel. Her bike then bounced off the truck and headed all the way across the lane, right in front of Jim, before ending up on its side on top of her. Karen was critically injured and was taken by Life Flight to a major trauma center in Houston.

She nearly lost her left leg from impact with the truck, and she had multiple injuries to the left side of her body. She was in intensive care for weeks. Sixteen years later, she has undergone more than 30 surgeries on her left leg in her efforts to recover from this disaster. The crash affected Karen’s health, career, finances, psychological outlook, relationships, and all of her future. It also affected the other people who were there, riders, neighbors, first responders, and law enforcement personnel, as well as Karen’s family.

Karen was not new to riding. She had been formally trained and had demonstrated to us that she was competent enough to handle mountain passes as well as freeway riding without any difficulty. There was no mechanical problem with her motorcycle.

The problem was that she target-fixated on the oncoming truck and literally drove into it.

When it was clear to her that she was going to collide with the pickup, she turned into the truck instead of away from it. We knew this couldn’t have been intentional. As two experienced motorcyclists, it meant to us that she had forgotten everything she had ever learned about counter-steering.

Given that Jim had been riding for almost 40 years at the time, attaining nearly half a million miles of experience, without any accidents or even a ticket, he came to believe that he could have a significant impact about the subject of motorcycle safety. He could explain “target-fixation” and “counter-steering” in an understandable manner, for example. Cash had confidence that this was so, for he had been her first motorcycle riding instructor, before either of us were exposed to formal training.

Jim decided to become actively involved in teaching riders how to avoid a similar disaster and became a certified Motorcycle Safety Foundation instructor soon thereafter, with Cash working as his Range Aide. Eventually he realized that he could reach only 12 students per week teaching for the MSF. He decided he wanted to reach a million riders, not a few hundred.
To do so, he created a web site, Motorcycle Tips & Techniques, (www.msgroup.org) with a discussion forum called All Things Motorcycle where he could write and publish detailed articles exploring motorcycle safety and dynamics. In the years the site has been active, it has reached over 20 million visitors with over 60 million hits. As of the writing of this book, now with over 50 years of riding experience, Jim’s mileage has increased to well over half a million miles, while he remains accident-and ticket-free. Cash has joined him for most of the last 23 years of those miles.

Over the years, the number of articles and the material Jim published on his website grew so voluminous that it would take a new visitor literally days to read it all. We received many requests to publish the articles in an organized manner in book form. Riders wanted a ready reference that they could read and consult off-line. That was the genesis of this book.

The ultimate objective for us in teaching and writing about motorcycling is to help motorcyclists survive their experiences by minimizing the risks of injury and death, and making the experience enjoyable for many miles.

Riding a motorcycle is undeniably fraught with risk. Given today’s transportation system and the huge variety of vehicles and drivers on the public roads, inevitably motorcycle casualties result; but in most cases these are neither necessary nor certain.

It’s true that you can be extremely safety-conscious, well educated, well-defended with the best safety gear, and riding well maintained equipment—and still become a casualty of the road. Despite your best efforts, you’ll encounter drivers who are distracted by chatting on their phones, or drivers who are drunk or under the influence of illegal drugs or prescription medications, or deer or stray pets that jump into the roadway ahead of you, or drivers who attempt a sudden U-turn, and much, much more.

But the reality is that these are minor causes of motorcycle accidents compared to the number of accidents that are caused, or not avoided, by the motorcyclist. Most motorcycle casualties are primarily the result of rider error.

This material is designed to help you avoid becoming a casualty not by teaching you how to ride, but by discussing how to ride intelligently, and with understanding; and how to deal with the unexpected incidents that really shouldn’t be unexpected at all. Along the way, we debunk a number of myths, and readers will have a chance to learn the how’s and why’s of motorcycle and rider behaviors (dynamics) in all kinds of situations and environments. And while we recognize that entertainment value can be important, we’re primarily interested in conveying practical and useful facts that you can assimilate into a safety mindset that will serve you every time you put a leg over your saddle.

We ask that you have patience and make a commitment to learn from this material. There’s more here than most readers can absorb in one reading. Indeed, we invite you to go through this book at a pace that satisfies your curiosity—the first time—and then to come back and read closely each and every “lesson” presented here.

Depending on your experience level, you might already know as much as 95% of what you read here; but it is the other 5% that can save your life. For example, you’ll discover that when you slow down while moving in a turn at speeds in excess of about 10 MPH, your motorcycle will try to “fall up” instead of “fall down”. And you’ll understand why.

There are three phases in the riding career of most motorcyclists. These will be referred to as Phases 1 through 3. They are essentially characterized in terms of risk categories, not competence or skill levels.

Phase 1 is when the rider is known as a newbie. He is usually hurt or killed as a result of mistakes he makes that are the result of lack of experience or knowledge.

Phase 2 is when the rider has gained enough experience that he has become a competent rider. He thinks he is able to deal with almost any “unexpected incident” that presents itself. He is usually hurt or killed as a result of doing something stupid because he has become over-confident. In other words, he takes chances that he thinks he can handle instead of knowing that he can, or he simply fails to pay attention to what he is doing and to his environment. Why? Because he’s been there, done that and cannot conceive of the fact that his experience so far, and the good habits he’s adopted, still do not protect him from reality.

Phase 3 is when a rider has amassed a substantial number of miles of riding experience. He or she has an established “safety mindset” and behaves abnormally. This rider understands that in order to “beat the odds,” he must not behave like the rest of the riding population. He does not
occasionally drink and drive, he always wears his safety gear, he avoids risks instead of “testing limits,” and he never loses control of his bike or himself! He is usually hurt or killed as a result of exposure—to normal unavoidable risks.

For the reality is, there’s a limit on how competent a rider can be! A rider in Phase 3 is that competent—almost always. But he keeps riding and exposing himself to those who are not so competent in their driving/riding skills, and those unexpected events that take their toll. In other words, a rider in Phase 3 has reduced the odds of having a self-caused accident to almost zero, but he continues to expose himself to vehicles driven by people holding a cell phone to their ear, or to that deer that simply must cross the roadway in front of him. But he is better prepared for such incidents and as a result, he almost always turns those experiences into near misses—but not always.

There is actually one more phase—Phase 0—which describes the risks confronting a person who is not yet riding but has made the decision that he or she wants to ride and join the family of motorcyclists. This is a person who, failing to approach the hobby intelligently can get hurt or killed within only minutes of putting a leg over a motorcycle saddle. This person simply has no idea what he or she is doing, what protection is necessary, nor how to gain the experience and education needed to survive.

A careful reader will recognize that these phases are fluid in nature. Riders who have attained Phase 2 in their motorcycling lives might step away from riding for a dozen years as they focus, instead, on a new family or career and then return to the hobby—once again in Phase 1. Indeed, the simple act of beginning to ride a new, larger or faster motorcycle from the one a rider has developed a high level of competence on means that a rider immediately reverts from Phase 3 back to Phase 1. The learning curves are much shorter with these reversions, but they happen, nonetheless.

What you read here will not teach you how to ride. It won’t justify your decision to enter the world of motorcycling. Instead, it will attempt to provide you information and perspectives that will allow you to survive the motorcycle riding experience for many years undamaged. If you have any preconceived notion that riding motorcycles can be ever considered safe or made safe, you should reconsider wanting to ride—because you are absolutely wrong. Even as a very experienced rider, you cannot reduce the risk of having an accident to near zero. What you can do is reduce risks to a point where an accident, if it should happen to you, is not your fault.

The vast majority of motorcycle accident-related injuries or deaths result primarily from the motorcyclist’s mistakes. This material can help you avoid making those rider errors, so that your motorcycle riding is as safe as it can be.

Safety is the theme throughout this material. The writing style, however, may sometimes sound like a couple of curmudgeons. We talk straight, just as we don’t allow our behavior or that of anyone around us in the motorcycle world to be less than as safe and controlled as possible.

Another characteristic of this material is that the conclusions can usually be defended with math and science. Occasionally riders will say that the scientific reasoning here is "all very well" or "just theory," but they prefer to deal with "the real world of riding."

We wonder what other reality they think science, engineering, and mathematics describe? You don’t have to know all the equations, but you should be able to understand that when a statement says proof, it means proof. The equations in this material are drawn from standard math and engineering texts, the tips have been peer-reviewed, and the drawings, while not always to scale, illustrate mathematically correct conclusions.

We are much more concerned with a rider’s demonstrated level of maturity than we are chronological age: when we meet a 23-year-old new father who has decided it’s time to begin riding a motorcycle, he gets our scrutiny faster than a 16-year-old who wants to ride dirt bikes with the rest of his family on the farm.

Writing this material has absorbed thousands of hours of intense research and study, as well as practical observation. Many fine authors write about various aspects of motorcycling, including Pat Hahn, David L. Hough, Ken Condon, and Keith Code, who write about riding; and Vittole Cossalter and Gaetano Cocco, who write about the very technical aspects of motorcycle dynamics. We acknowledge their contributions with gratitude. However, Cash and Jim are responsible for this material, and any mistakes are entirely our own.

James R. Davis
Cash Anthony
Phase 0

There is one “rule” that, if followed faithfully, makes the riding of a motorcycle relatively less risky for you: never lose control of your motorcycle—or yourself!

With this rule as a foundation, this section is intended to help the person who's interested in motorcycling but who has not taken action to become a rider yet. We will explore aspects of motorcycling that may seem off-point, or biased, or stereotypical, or for any number of reasons just not relevant to your particular situation.

For example, you may already be wondering if that “rule” makes sense for a person who hasn’t even begun to ride a motorcycle. It does, but if you’re a wannabe you can’t know that yet, because you probably don’t know very much, if anything, about riding motorcycles.

I. Wannabe

You want to ride motorcycles. That makes you a “wannabe”. It’s possible that you have already taken exception to that description, feeling it is somehow demeaning or disrespectful. Get your head on straight!

A wannabe is merely a person who wants to ride motorcycles. The vast majority of motorcyclists can relate to you and will welcome and encourage you to join their ranks. We were all, before we began riding, wannabes. We remember the excitement and wonder and uncertainty and doubts. If you become a motorcyclist, “the family” grows.

But there are subtleties associated with that word, and some are distinctly pejorative. For example, if your desire is to become a world-class motorcycle racer or stunt rider before you’ve ever ridden a motorcycle, you can be sure that most of us will think you are immature and likely destined to get hurt or killed on a motorcycle.

If this describes your approach, then when other riders describe you as a wannabe, they do so with disdain.

If, on the other hand, your desire is to travel the country on two wheels, exploring new sights and interacting with local culture, they might still think of you as a wannabe, but they would do so with warmth.

Being a wannabe merely means you want to do something you haven’t done before. The material in Phase 0 is meant to help the wannabe make smart choices about how to start.

II. Motivation

There are a million different reasons you might have for becoming a motorcyclist. A few are listed below, along with some comments about what these motivations suggest in terms of a rider’s survival.

A. You just want to see for yourself if you can do it

This is an extremely common reason for signing up for motorcycle training. Note, it’s a perfectly reasonable rationale for getting trained. It’s a dumb reason, on the other hand, for going out and buying a motorcycle—or riding it on the street—before getting trained.

B. You want to prove to others that you have the “cojones” to be like them

This is one of the poorest “excuses” for wanting to ride. One of the most important riding lessons you will ever receive is “Ride your own ride.” This means that you don’t let the behavior of others (or their opinions) control how or what you ride.

Just because someone rides through a turn at 30 MPH over the posted advisory speed limit does not excuse or justify your doing so. Peer pressure, as a motivation for riding a motorcycle, amounts to a guarantee that you are going to get hurt or die in the effort.

C. You want to save on gasoline

This may be a good intention, but it turns out not to be a good motivation. If you do it right, motorcycle riding is expensive, at least at first.

A helmet will cost you hundreds of dollars, good safety gear will cost hundreds more, insurance will cost you nearly as much as the purchase price for some bikes, maintenance is not cheap, you will eat tires over just a few thousand miles which are not inexpensive to replace, and your first bike is
invariably going to be replaced in the not-too-distant future with a larger, more powerful, more personally appropriate machine. Once you find the “right” motorcycle and purchase the gear you need, your costs will stabilize somewhat; but you will still have ongoing expenses to maintain your ride and keep it insured.

D. You want to experience the freedom of travel and clear your mind from other stresses with a hobby
Sweet words and good thoughts. Note, however, that clearing your mind of the day’s stresses while riding a motorcycle is not at all the same as saying that you can avoid stress while you’re out for ride.

Unlike the experience of driving a car, where you can usually, if you’re lucky, survive a moment of inattention while you’re thinking of something else without crashing into another vehicle or a hard object, you can’t casually ride a motorcycle—you don’t just go along for the ride.

You must remain actively diligent, fully aware of your situation at all times, adjusting and reacting to unexpected events, and dodging drivers who claim not to see you. You must totally forget your work-related stress. If you’re angry or tired, riding a motorcycle doesn’t solve the problem and may make things worse.

Riding is dangerous and becomes increasingly so when your emotions are out of bounds, to the point that you should think about bowling instead. If you’re running late, take the car instead.

E. You want to benefit from the image of joining a group (or gang) of riders all riding a particular brand
Though you probably picked up on the word “gang” as being the key to this motivation, you would have missed the real point here. “Image”—wanting to look like some ideal you have in mind—is the key.

A huge number of riders are into “image”. At least one motorcycle manufacturer plays to that motivation and earns about as much in profits in the sale of their clothing and accessories as they do on the sale of their bikes.

If image is what’s really behind your desire to ride, just buy the clothes.

F. You want to race—on a track or the public roadways
We are, most of us, competitive by nature. Track racing is a thrill, and some people make a pretty good living doing it. There are many schools and books and coaches available for track racers, and it’s a growing professional sport in the U.S., inviting sponsors and media coverage.

But if you engage in any form of racing on public roadways, you are inviting jail time and the injury or death of others, as well as yourself. If racing on the roads is your motivation, stop reading this book.

We have nothing to offer in the form of encouragement or techniques that will satisfy road racers. And, by the way, don’t bother trying to join us for a ride—road racers will not be welcome.

Everything in this book is designed, ultimately, to improve our safety. “The safer you are, the safer I am.” If you learn anything from this material, it should be that everything you do should be towards making you safer on the road.

Racing on public roads does not fit into that concept.

G. You want to experience the fun and excitement of doing something a bit more dangerous than others
Bravo! Not that you embrace danger, but that you recognize that motorcycling is dangerous, as well as being fun and exciting.

H. You want to be able to outrun the police if it gets dicey for some reason
You cannot outrun a policeman’s radio or camera. You might be able to outrun his patrol car, and maybe even his motorcycle, but this motivation for wanting to ride motorcycles puts you into the “one-percenter” category (a gangsta, in other words). A wannabe street hood.

I. You want to ride because others, notably your parents, don’t want you to ride
Okay, so you’re a rebel. It’s normal at some stage of life. The problem comes when it’s the reason for getting into this sport. It suggests you will find speed limits or empty stretches of road or blood alcohol restrictions to be “tests”
or “minimums”, instead of “maximums”, offering an opportunity to challenge authority. You are very likely to get hurt or killed riding motorcycles.

J. You want to join some friends or family members who ride dirt-bikes on the farm or out in the woods

Even if you actually want to ride on the streets for the same reason, if your motivation is to share time and experiences with others instead of to be seen by others as “belonging” in a group that dictates what and how you ride, this motivation can be happily satisfied.

K. You have no idea why, you just want to ride

You’re not very strategic in your thinking yet, but you’re just curious about riding. This is only slightly different from the first motivation. In that case, a person only wants to see if he can. In your case, you want to ride, but you don’t know why. You just do. It’s an itch.

III. Some people should not be riding motorcycles

Despite the fact that this material is intended for people who have decided that they want to ride motorcycles, or who have just begun riding them, some people should not do so. Some of the obvious reasons are listed below, but in the end only you can make a decision to ride or not.

A. Lack of maturity

When we say that people (males and females) under the age of 30 should not be allowed to get within 30 feet of a motorcycle, this is really a statement about maturity, and that’s an arbitrary age. But those who aren’t past certain attributes and issues common to youth shouldn’t ride a motorcycle. These include

- a sense of being immortal—which leads to extremes of risk-taking behavior
- a tendency to prioritize “fun” ahead of “responsibility”—which prioritizes “going for the thrill” without looking ahead to the consequences
- an inability to set aside normal “hormonal imperatives”—which seriously distracts from or discounts “survival imperatives”
- a lack of worldly experiences—which would make it obvious that in a dangerous sport, the unexpected should be expected
- an exaggerated sense of knowledge—which suggests to the rider that he or she has, innately, all the answers needed and that thus renders unnecessary and usually unwelcome the advice of others with more experience
- a lack of self-esteem—which leaves the rider undefended against peer pressures and low appreciation of paths to success
- a natural rebelliousness—which invites the rider to ignore authority in the form of speed limits or laws prohibiting drinking (or drugs) and driving.

Any one of these, and certainly any combination of them, earmarks youth—that is, the immature—as poor candidates to survive riding motorcycles intact. Unfortunately, any of these characteristics describes a person who is almost certain to ignore our advice to abandon riding motorcycles at this time. It does not matter that these people might be Honor Roll students, choirboys, war vets, doctors, lawyers, or Indian Chiefs. Such immaturity exists. And if it exists for a wannabe, this person should stay away from motorcycles until immaturity is a thing of the past for them.

On the other hand, if a wannabe who is less than 30 years old has learned to behave and deal with realities in a mature way, that rider will be welcomed by “the family” and encouraged to participate.

B. Naturally uncoordinated or clumsy people and those who are unusually timid

If you are a klutz, meaning that you are accident-prone, you should not have the slightest interest in riding a motorcycle. You do not simply and casually ride a motorcycle. Riding requires an impressive and constant amount of involvement, coordination and situational awareness, always. It’s a serious enterprise, and an uncoordinated person who tends to have trouble managing the clutch lever, gear shift lever, and front-brake lever in a synchronized manner is not likely to maintain an awareness of danger or develop adequate skills.

Clumsy people are prone to drop their bikes when they come to a complete stop after riding. These people do not make smooth turns as they tend to make constant shifts in their steering inputs. These are typically non-threatening, not very...
serious problems in themselves, but when actual threats present themselves, the rider’s focus is on the wrong issues, or their coordination is off.

In response to threats or the earlier mentioned “unexpected” incidents (which are actually very common when riding), you must be able immediately to respond / react appropriately while maintaining control of your motorcycle. “Freezing” when confronted with a threat is **not an option** available to you, nor is making a panicky, reactive move. You, as the rider of the motorcycle, must control it at all times, and if you ride on the streets, you will have to make decisions in a flash that can determine if you will live or die. This will certainly occur at some point in your riding life, if not many times. Relative to your motorcycle, **you are the boss**. You control it, it does not control you. You control it by using its controls. When you are in control, the motorcycle does not surprise you, nor does it “fight” you. You know that when you tell your bike to do something, that it will do exactly what you expect. Your controlling inputs to your motorcycle must be done with authority and with smoothness, not indecision.

C. Under the influence of alcohol or drugs

**One** beer in your body is one too many, if you plan to ride a motorcycle. So, too, may be the presence of one prescription pain killer. If you have any drug the effect of which is to slow your perception or reaction time, or any alcohol in your system, don’t ride.

If you are a drug or alcohol abuser, or if you’re required routinely to take pain suppressants or any other medication that might affect your mental clarity, your judgment, or your physical coordination or reaction time, then motorcycling is not for you. The odds are good you will die on a motorcycle, and you may take others with you along the way. Motorcycling **requires** you to be alert and immediately responsive.

Furthermore, you should not be (and no one should permit you to be) a passenger on a motorcycle in this condition. The rider has enough to do to maintain control of the motorcycle with the addition of a sober passenger on the back, which changes how the bike handles and how the rider approaches his job. A passenger who is unpredictable can be deadly.

Later, we will discuss how to handle the situation when you’re part of a group that must deal with an incapacitated rider; but you can be sure that you don’t take his keys away and then put him on the back of another rider’s bike, to take him home!

D. A newly married or a new parent

These people cannot be counted upon to have their head “in the moment” while riding. They are risking far more than themselves—they are risking the future well-being of others, of innocents. This is such a compelling argument that many sufficiently mature and responsible adults will postpone engaging in motorcycling activity for decades. Indeed, by far the biggest reason that existing motorcyclists hang-up their involvement with motorcycles, even if they have years of riding experience, is because they have married or become a new parent. The result is that many older motorcyclists come back to the sport after a decade or two of hiatus. They have waited to get back to the sport until their other personal obligations were taken care of.

Many of these returning motorcyclists took a similar sabbatical from riding to allow them time to develop their careers and reach many of their professional goals.

E. A person who has failed his or her Basic Rider Course

If at first a person fails to pass a Basic Rider Course (BRC or its equivalent), he or she can always sign up and try it a second time. But until that person passes the course, he or she simply isn’t ready or prepared to ride motorcycles. Often a person who fails is quick to find an excuse. “It was a bad day.” They “don’t do well under pressure.” They “can’t handle tests.” There was “too much information to learn all at one time.” Regardless of the reason or excuse, failing to pass that class **demonstrates** a lack of competence that should not be ignored.

F. A person who has passed his or her Basic Rider Course, but should not have

Too often a BRC or RE RiderCoach fails the test instead of the students. They fail to assess their student’s incompetence fairly, or they are inappropriately encouraged to pass as many students as possible, instead of only those who demonstrate competence. Then, too, the tests, like the curriculum itself, have been dumbed down—made easier to pass—from previous versions. While this leads to more motorcycle sales than if student competence were to be fairly assessed, it also leads to a false sense of competence on the part of some students. Many RiderCoaches insist that
they will not irresponsibly pass a student, or that they have never felt pressured to do so; and most people are keen judges of their own capabilities. Students usually know if they were “allowed to pass” when their capabilities are inadequate. But here, again, is where peer pressure or ego can over-ride a wannabe's common sense.

If, for any reason whatsoever, a person believes that he or she should not ride motorcycles, that person is absolutely right. To ignore that particular inner-voice is foolish in the extreme.

**G. A person who is terrified, or who has no fear at all**

A terrified person makes mistakes or simply freezes and does nothing in response to a threat. When you are presented with a threat on a motorcycle, you must react immediately. Time cannot be lost in clearing your mind and body of the effects of rushing adrenalin. Fear that has become terror gets in the way.

But fear is natural and healthy, generally. It keeps you from doing things that are unnecessarily dangerous. It demands that you justify to yourself when proceeding on a course of action that the probable rewards are greater than the probable costs. Appropriate fear, a little bit of fear, tells you to protect yourself in advance, practice for emergencies, and learn when your instinctive reaction on a motorcycle will get you maimed or killed.

Being terrified is not the same as having fear. Being terrified robs you of intellectual discourse when confronted with a problem. It shuts you down and invites ostrich-like reactions, such as denying that a problem exists, following an instinctive impulse that you have not trained yourself to ignore, or doing nothing in response to the threat—that is, freezing. If you are terrified of riding, don’t.

If you are merely fearful, learn to understand everything you can about motorcycling and turn that fear into respect. Respect for consequences will, like fear, tend to keep you from doing what is unnecessarily dangerous. But what you learn about this sport adds informed understanding and alternative ways of dealing with threats. That’s very healthy, indeed.

A fearless person can rightly be said to lack common sense, but he is not necessarily stupid. This kind of person knows full well not to pull the trigger on his revolver six times when playing Russian roulette, but he might be willing to pull it as many as five times. He’s easily bored and accepts more risks than most people would, to get an adrenaline high that’s sufficiently satisfying. Though every moment of riding a motorcycle is hugely stimulating and never safe, normal street riding, within the limits of the law isn’t enough for this person. Riding motorcycles is not like playing Russian roulette, but it is dangerous and can have the same consequences. A fearless rider is not likely to go undamaged for long.

**H. A person who cannot afford the costs of insurance, quality safety gear, and proper motorcycle maintenance**

Some people seem to think that riding motorcycles is a cheaper form of transportation than driving a car. These people think that better gas mileage saves enough money to more than cover the added costs of riding. They are sorely mistaken. Insurance costs, alone, can easily overwhelm any savings from better gas mileage. Later on in this material we will discuss the costs of safety equipment and maintenance, but suffice it now to say that if you cannot afford these costs, the alternative is not for you to decide to ride anyway and take your chances. Postpone your purchase, or if you have access to a bike, park it for now. Your safety gear can keep you alive and minimize physical damage in the event of an accident. Insurance can protect your financial future at the same time. And maintaining a reliable, “healthy” motorcycle can prevent those accidents to start with.

**I. A person who has never ridden a bicycle**

The only time a motorcycle rider is required to have a good sense of balance in order to control his bike is when that rider is doing slow-speed maneuvers. Once a motorcycle is moving at speeds in excess of about 10 MPH, the rider’s sense of balance merely keeps him from falling off the bike; but the bike will, of its own accord, try to remain moving in a straight line, standing upright.

Without any prior bicycle riding experience, a wannabe has not the slightest appreciation for how a single-track vehicle behaves and certainly has no concept of how to react to such a vehicle when it is moving at slow speeds and begins to fall down—that is, how to “save it” from that outcome. Believe it or not, the BRC and RE classes do not teach those fundamentals. They expect their students, indeed require
them, to have previous bicycle riding experience as a prerequisite to being allowed to attend their classes. These fundamentals are not even mentioned. If you don't know how to ride a bicycle, learn before you attempt to ride what could be considered a motorized bicycle on public streets with a rocket engine between your legs.

IV. Taking the first step—Training

Your first decision is whether or not to buy a motorcycle before you get formally trained. That should be a no-brainer! You have no idea what to buy, how to buy, where to buy, or how much to pay for a motorcycle yet, and you have no real idea if you can even ride a motorcycle. Buying a motorcycle is what you do after you get formally trained. Period.

A. Where to find rider training

Every state in the United States offers a class for beginning riders that is recognized as being “adequate” by that state to meet part or all of its licensing requirements. Insurance companies usually recognize these classes in terms of rating your risk of loss.

In all but two states, the MSF provides a standard class curriculum for beginners. At this time that class is called the Basic Rider Course, or BRC. In Oregon the curriculum used is better than the BRC and is called Basic Rider Training, or BRT. It was developed by Team Oregon using the BRC as a baseline, enhanced to meet their more stringent safety requirements. In Idaho, they use the STAR program, which is more or less the same as Oregon’s BRT. To find the organizations that deliver riding training in your state, call your state’s Department of Public Safety. Expect to have to wait for several weeks before a class is available for you; and register early. Many of the Motorcycle Safety Foundation classes are offered at community colleges and are scheduled to permit you to finish the whole class in one long weekend or, in shorter sessions, over two weekends.

The MSF has a website that gives contact information for their BRC classes, state by state.

In almost all (perhaps all) states, training is also made available through Harley-Davidson dealers. This program is known as the Rider’s Edge class, or RE.

There are some nice enhancements to the standard MSF BRC curriculum provided in a Rider’s Edge class, such as increased classroom time. However, the most significant differences between the Rider’s Edge classes and all the others is that the RE classes use larger, more powerful motorcycles, and there is a good deal of marketing material presented during the class. By some measurements\(^1\) they are also about 35 times more dangerous for their students.

Finally, you can elect to be trained like most wannabes get trained, by having one of your friends or family members show you how to ride. This particular decision, while potentially costing you nothing, is also likely to make you dead a few minutes after you mount the bike he lends to you to use during his “class.”

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\(^1\) As of near the end of 2007, the state-sponsored MSF classes had taught about 1.4 million students since they began using the BRC curriculum. During that time there were two deaths.

During that same time, also using the BRC curriculum, Rider’s Edge had taught about 100,000 students. There were five deaths (or near fatalities) during those classes.

In other words, there had been 1 death per 700,000 state-sponsored BRC students and 1 death (or near fatality) per 20,000 students in Rider’s Edge classes. That argues that the Rider’s Edge BRC class is about thirty-five times more dangerous than the state-sponsored BRC classes.
The state-approved classes have a great deal going for them. They let you use their bikes instead of your own, they require that all students wear protective gear, they will provide a helmet if you don’t have your own, the bikes are relatively well maintained, the RiderCoaches are pretty well trained themselves, the range on which you will ride has no cross traffic or pedestrians running around on it, and you will never be allowed to go faster than about 20 MPH. Finally, they will certainly teach you all you need to know to pass your licensing exam. By the way, if it is raining when the class is held, it will not be cancelled unless there is lightning nearby or the standing water level is substantial. This is a good thing. Once you pass that class, you will know that you can ride in the rain, while other new riders will be frightened to the point of panic at first if it should rain on them while out riding.

If all that makes it sound to you like it’s a safe way to learn to ride, you didn’t absorb what we stated in the beginning of this book: riding motorcycles is not safe, and neither is rider training! There have been at least 10 deaths during MSF and RE beginner training classes over the past decade. And in many ways worse, there have been several near-fatal accidents during those classes. In some cases, they have left students to live the rest of their lives as para- or quadriplegic invalids. Get it? Motorcycle riding is not safe!

Furthermore, none of these state-approved beginner riding classes teaches you how to ride on the streets! When you graduate one of these classes, you will be adequately trained to get a motorcycle endorsement on your license and to be able to ride a motorcycle at less than 25 MPH on a parking lot—but that’s all! None of them provide you training on a public roadway, certainly not on a highway or freeway. None of them teach you how to handle starting or stopping on a hill. None of them teach you how to handle the traffic at an intersection. All they teach you are the fundamentals of how a motorcycle works and how to use its controls. The fundamentals.

We will discuss how to advance from “just trained” to become an accomplished and competent street rider later in this book, but for now it is sufficient that you understand that formal training is extremely important—but also that when you graduate one of these formal classes, you are not yet ready to ride on the public streets. You will, however, be in a much better position to decide whether to buy a motorcycle and what kind of bike you should buy, as well as whether you should even consider riding motorcycles at all.

B. Training is dangerous

While formal training classes for new riders are in most ways safer than riding on the streets, you should be under no illusion that they are safe. Students are hurt with some regularity and some are even killed during these classes. The Motorcycle Safety Foundation has done everything it can to prevent the public from learning this truth.

Fortunately, a highly respected researcher in the field of rider training issues, Wendy Moon, managed to assemble and disseminate the following evidence that rider education deaths are actually on the rise:
Table 1: Rider Training Deaths

<table>
<thead>
<tr>
<th>Year</th>
<th>Place</th>
<th>Curriculum</th>
<th>Incident</th>
<th>Consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>Valley Forge, PA</td>
<td>Pennsylvania MSP</td>
<td>Student fails to make turn. Runs off the range, slices open chest and aorta on the Armco barrier off the range</td>
<td>Death</td>
</tr>
<tr>
<td>2002 May 18</td>
<td>Festus, MO</td>
<td>Rider’s Edge RSS</td>
<td>Student fails to make a turn. Runs off the range, hits building</td>
<td>Death</td>
</tr>
<tr>
<td>2002 June 6</td>
<td>Laconia, NH</td>
<td>Rider’s Edge RSS</td>
<td>Student fails to make a turn. Runs off the range, hits building</td>
<td>Death</td>
</tr>
<tr>
<td>2003 May</td>
<td>Colorado Springs, CO</td>
<td>Colorado MSP</td>
<td>Student fails to make a turn. Runs off the range, hits curb, lands on her head</td>
<td>Death</td>
</tr>
<tr>
<td>2004</td>
<td>WV</td>
<td>Rider’s Edge</td>
<td>Student fails to make a turn. Runs off the range, hits building</td>
<td>Near-fatal</td>
</tr>
<tr>
<td>2005</td>
<td>FL</td>
<td>Rider’s Edge</td>
<td>Student fails to make a turn. Hits fence. Multiple AIS 4+ injuries</td>
<td>Near-fatal</td>
</tr>
<tr>
<td>2006</td>
<td>CA</td>
<td>California MSP</td>
<td>Instructor is hit by out-of-control student. Falls backwards and hits head on curb</td>
<td>Death</td>
</tr>
<tr>
<td>2006</td>
<td>Kenosha, WI</td>
<td>Rider’s Edge</td>
<td>Student fails to make a turn. Runs off the range, hits building</td>
<td>Death</td>
</tr>
<tr>
<td>2007</td>
<td>Honesdale, PA</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Death</td>
</tr>
<tr>
<td>2007</td>
<td>Sugar Notch, PA</td>
<td>BRC</td>
<td>Woman MSF student loses control, rides up and over berm which becomes a launch ramp. She falls 44 feet over cliff and becomes a paraplegic</td>
<td>Near-fatal</td>
</tr>
<tr>
<td>2008</td>
<td>Unknown</td>
<td>Unknown</td>
<td>MSF reported without details</td>
<td>Death</td>
</tr>
<tr>
<td>2008</td>
<td>Unknown</td>
<td>Unknown</td>
<td>MSF reported without details</td>
<td>Death</td>
</tr>
<tr>
<td>2008</td>
<td>Unknown</td>
<td>Unknown</td>
<td>MSF reported without details</td>
<td>Death</td>
</tr>
<tr>
<td>2010</td>
<td>Florence, SC</td>
<td>BRC</td>
<td>55-year-old man lost control and was thrown to the ground</td>
<td>Death</td>
</tr>
</tbody>
</table>

It’s certainly possible that there were more of these “incidents” in the time frame shown.

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2If any reader is able to provide information about the tragedies listed above, or if you know of other grievous training incidents, we would be extremely grateful if you would forward that information to James R. Davis (even anonymously) using the e-mail address: jim@msgroup.org.
Notice that the accident in 1998 stands out as if it was not related to the others that clumped into a pattern between 2002 and 2010.

What is breath-taking about these numbers is that, by contrast, in the preceding 20+ years, there were no known incidents of death or near-fatal accidents during rider training classes.

Might there be some factors in these incidents to raise caution-warning-danger flags? Consider these observations concerning those that preceded 2008 (a year for which the MSF mysteriously released information about “three more deaths”, without any details whatsoever):

- In 100% of these accidents, the student had lost control of his/her motorcycle. In fact, in 100% of these accidents the student had a wide open throttle (full roll-on, in other words).
- In 75% of the cases, the students, failed to negotiate a turn—not at 60 MPH, but at something like 20 MPH.
- In over 60% of the cases, the student was riding a Buell Blast. This means that they were in a Rider’s Edge (RE) class instead of an MSF class.
- All but three of the incidents involved the MSF’s BRC (Basic Rider Course) curriculum.
- At least one credible estimate of the number of deaths / near-fatal incidents for MSF classes during that time frame is 1 in something like 250,000 students. A similar estimate for H-D’s Rider’s Edge classes is closer to 1 death / near-fatality for every 20,000 students. That’s an order of magnitude difference, reflecting an over-representation of Rider’s Edge class incidents.

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So what is it that the MSF’s BRC curriculum is doing, or not doing, that can reasonably be shown as causative? Is there anything that can be done, immediately, to reverse this trend and make these courses safer for those who attend?

The MSF curriculum is designed to teach the fundamental skills and knowledge required to obtain control and maintain control of a motorcycle. That design misses one extremely important component: it fails to teach students how to regain control if they lose it.

Specifically, one additional instruction needs to be conveyed to students on their first day on the range, and it needs to be done at a specific time—when those students first put their bikes in gear with their engines running. Not only should it be added for all students to hear, but it should be provided to each student, one at a time.

With the students mounted on their bikes, engine running, the Instructor / RiderCoach should walk to the left side of each student, grasp the student’s left hand in such a manner as to prevent the clutch lever from being released, and then have that student “put it into first gear”. There will be a clunk as that happens. The student will feel and hear the bike’s transmission engaging. It is perfectly normal and expected. The Instructor is then to say: ”Wait! Do nothing but listen to what I’m saying. Notice that you are in complete control of your motorcycle now. Because you are squeezing both the clutch and brake levers, it doesn’t matter how fast the engine turns, or how loud it gets. You
are in control. If you ever lose control of this motorcycle, for any reason, you can regain control of it by immediately squeezing both levers. Do you understand why?

The Instructor reacts to whatever the student’s response is appropriately—perhaps by restating the purpose of the clutch—then has that student put the bike into neutral and wait as he moves to the next student to repeat that lifesaving instruction. Following this simple, but essential, addition to the BRC curriculum, the class should continue as it was originally designed. The BRC will have just addressed the issue of regaining control in a meaningful way.

Although we have suggested this addition, the MSF has not put it into the curriculum yet. You, however, now know how to regain control of your motorcycle. It works.

C. Additional BRC issues

Two more issues arise with respect to changes the MSF made within the BRC as it abandoned the RSS: “Instructors” have been renamed “RiderCoaches”, and the method of teaching has become “learner-based”.

“Instructors” teach fundamentals to students who are new to an activity, while “coaches” teach experienced students how to improve their performance. Newbies should be taught by Instructors! Shortly after the retitling, some RiderCoaches began to think of and talk about the Instructors who taught the RSS as “dinosaurs”—with disdain. Those dinosaurs, however, had a virtually unblemished safety record while teaching millions of students.

The “learner-based” method of teaching is also suspect in that it emphasizes that students should be allowed to “learn from their mistakes,” and that the RiderCoaches are not to be critical unless the mistakes are “serious”. Students now drop their motorcycles during training, often more than once, without negative feedback. One has to wonder why mistakes should be ignored, since it is not possible to know in advance whether those mistakes will be minor or serious, until they happen. Dropping a bike during training can result in nothing more than a bruised ego, but it can also result in broken bones, or worse. (Imagine, if you can, a military Drill Instructor ignoring a recruit’s dropping his rifle on a target range, unless that rifle happens to fire a bullet.)

The current method also sets up rules that are appropriate on the range, for complete novices, but which are not best practices on the street—without making that distinction.

The BRC and RE curriculum advises riders that they should not swerve and brake at the same time. This blanket prohibition is an exaggeration of concern that misinforms those students. Why would a training program tell that to students who will never be given an exercise where they could possibly exceed traction by using normal (not aggressive) braking and swerving at the same time?

During the class you will not be told that you must never apply your brakes while you are in a turn. You will be told, however, that your tires can provide only a fixed amount of traction, and that if you are in a turn and need to stop, you must straighten the bike up first, then apply your brakes, so that you do not lose traction and fall. While much of that reasoning is true, it relates only to the instance where you are leaned very far over into a turn (close to 45 degrees). In the real world, of course you can apply your brakes to slow down when you are in a turn. You must straighten the bike up before you come to a complete stop, or if you aggressively use your brakes, but you do not, normally, have to straighten the bike before you apply your brakes, because at normal lean angles, a great deal of traction remains for your use. (The technical details will be presented later on in this book.) Again, while you will not be told that you must not brake while in a turn, for some reason many graduates of the class come away with that belief.

Obviously the RiderCoaches know that you can swerve and brake at the same time, and that at times it is the right thing to do. They leave the student misinformed.

RiderCoaches also refuse to allow students to cover their front-brake lever. They announce this rule, but they typically don’t usually explain that their rule is not a blanket challenge of the practice of covering the brake lever in traffic; instead, it’s to be observed only while the students are on the training range. Interestingly, some RiderCoaches will allow experienced riders taking their classes to cover their front-brake lever, but most do not.

It takes approximately one-tenth of a second for a rider to move his fingers from the right grip to the front-brake lever. Covering that lever saves that much time in an emergency. When a motorcycle is traveling 60 MPH, it moves 88 feet in one second. Clearly, then, when traveling at 60 MPH, covering the front-brake lever allows the rider to stop his bike in nearly nine feet less distance than if he does not cover that lever. Said differently, covering your front-brake lever can change a collision into a near miss.
In some of your training classes, you may hear that you must stop with your left foot on the ground and your right foot on the rear-brake pedal. Others will tell you that you should always put both feet on the ground. In the real world, the heavier your bike is, the more sense it makes to always put both feet down when you stop. That keeps the bike vertical with its weight on the tires instead of your ankle.

Withholding information from new riders “for their own good” is anything but educating them. While the MSF no longer tells its students that they are not to turn and brake at the same time because of limited traction, they imply it in discussions, and there are literally millions of previous course graduates who have heard that they should “Brake, then turn” or “turn, then brake”.

Indeed, an experienced RiderCoach continued to use that phraseology quite recently, suggesting that it has become ingrained as a teaching tool. Instead of implying that students should not turn and brake at the same time because of traction concerns, perhaps they should tell students not to do it on the range, because it's a complex maneuver. That's the real reason.

Misdirecting or withholding information results in students’ regarding much of what they’re taught in basic rider training as suspect, when they find out the truth, and may deny them survivability tactics they need.

Contrary to a maintaining policy of “playing it safe” by withholding information about simultaneous braking and turning, the MSF should be proactive in providing quality, factual information and perspectives that a new rider can’t have yet.

Covering the front-brake lever to save time and distance, and knowing that you can simultaneously turn and brake, are two practices that can save your life; but not if you believe in error that they cannot, or should not, ever be done.

Nevertheless, RiderCoaches have been led to believe that they are “professional educators”. They are not. They deliver a lock-step curriculum that teaches the fundamentals, and they usually do so with concern and accuracy; but many...
cannot answer a student’s question, "Why?" about motorcycle dynamics and will refuse to discuss any nuances of their rules on the range.

To be sure, there are exceptional RiderCoaches in the system that can answer any question a student asks, but many cannot; and those who can are not allowed to do that if the class timeline is already running long.

D. Overrepresentation by the Rider’s Edge classes

Now let’s deal with the overrepresentation of deaths and near-fatal accidents in the Rider’s Edge classes.

As a primary factor, using a 500cc motorcycle in a BRC or RE class (designed for beginners) is simply inappropriate.

No 500cc bikes were allowed in MSF classes prior to 2000, when Harley-Davidson’s lobbying succeeded in persuading the MSF (after H-D returned as a sponsor of the program) to change the RE equipment requirements to permit the use of such powerful bikes by complete novices.

Perhaps coincidentally, no deaths or near-fatal accidents occurred prior to this change, either.

Nonetheless, the fact remains that 500cc motorcycles are allowed to be used in RE classes now. Indeed, until 2010 the Buell Blast, a Harley-Davidson motorcycle, has been the only motorcycle used in the Rider’s Edge classes and is also used in some BRC classes.

As of 2010, the Buell Blast is no longer being made, but existing units are still being used in the Rider’s Edge classes, and many students still have no option but to take their training course on that model. Recent evidence suggests that the Buell Blast will continue to be used in RE classes, but not by that name.

Engine power is not the only issue regarding the use of these machines in an MSF class. Secondary concerns include the fact that Buell Blasts are top-heavy, they have an extremely narrow friction zone, and some are unnecessarily loud.

A new rider has difficulty starting to move his Buell Blast from a dead stop without stalling its engine because of that almost non-existent friction zone. When a student freezes at his or her controls on a Buell Blast, that high-torque-at-low-speed engine can immediately rocket them up to dangerously high speeds, especially for a newbie.

Another significant difference between an MSF BRC class and a Rider’s Edge BRC class can be the level of noise the students must deal with while learning to control their motorcycles.

Excessive noise levels lead to some students becoming “saturated,” “overwhelmed,” or “shut down,” to the point that they cannot mentally deal with the demands of controlling a motorcycle.

They freeze, instead of reacting to threats. For example, an engine running at a high rpm or a student’s popping his or her clutch lever (releasing it too quickly) immediately causes the student to become confused (even panicked); and instead of reacting appropriately, they simply “hang on’ as the motorcycle speeds out of control—and as a result, some of them die.

Realistically, the dealerships that offer Rider’s Edge classes cannot be expected to change what make of motorcycles they use in their classes. Harley-Davidson is in business to sell Harley-Davidson motorcycles, after all.

So what can you do about this?

First, before you sign up for your rider training class, ask the registrar what model of motorcycles the class will use. If only Buell Blasts or 500cc models are available, consider calling another center in your area to see if you have any options.

Second, many training centers have a hodge-podge of older motorcycles which have been used for some number of years. They probably have a few dings and they aren’t pretty, but they have been maintained for beginner training. The first time you go to the range to be assigned a motorcycle, look around and see if one of these “classics” is offered. If it is, take it rather than a Buell Blast or any other Sportbike-configured model. You may have the choice of a dirt bike at some training centers. If you’re tall enough to handle the additional saddle height on these bikes, you might enjoy learning to ride on one. Unless you can’t physically ride a dirt bike safely because of your short stature, you should choose in favor of this model over a Blast.

What else can you do, especially about the high noise levels in your class? At minimum, students should be advised to wear ear plugs on the course range, especially if you take an RE. It’s good practice in general (if you value your hearing), and it may be the difference between having an accident in rider training class and completing it without injury.
All training ranges must have a certain minimum “run-off” area at all sides of that range. That’s about 20 feet of unimpeded space that is not to be used by riders during their training, but it’s available for an emergency. Notice that on the range in the photograph, much of that run-off area is blocked or is being used. If a student actually does run out of space, such as by losing control and taking off at full throttle, he or she will run into the wall of a building (just off camera to the right), or into the rock-and-concrete base of the wooden support beam. During the class, customers’ motorcycles were ridden into and out of the dealer’s service area, crossing the path of travel of students on the range.

1. If you find that all reasonably scheduled classes are full and you can’t get in, pay in advance and get on stand-by status. When one of those classes is about to start, if it is raining, just show up. Odds are very good that another student will decide not to take the class in the rain. Taking the class in the rain is a decided advantage to your future riding capability and confidence. Some MSF class locations do not have a “stand-by” status, but will allow “walk-ins” to attend, if their classes are not full. That implies that these locations will accept payment for the class after it starts.

2. If you do not have a helmet, the MSF or RE class will usually provide one for you. (You cannot take the class without a helmet.) RiderCoaches do not typically check any of their loaner helmets for lice or other problems that you probably want to avoid, and helmets are not cleaned except upon first being introduced to the loaner program. You should buy a skull cap (also called a headskin) or wear a bandana on your head before you put those helmets to use. Skull caps can be washed much more easily than can the inside of your own helmet. You will want to do that from time to time if you continue to ride.

3. Do not be timid when it comes to your safety. If you observe unsafe behavior by any of the students (or RiderCoaches), announce your concerns loudly and clearly so that the behavior can be corrected. If it is not, walk out of the class. Life is short.

4. If the motorcycle you are provided is in any way not working properly, or if the controls seem awkward and there may be a way to adjust them for your needs, either refuse to use that bike until it is fixed; or insure that the necessary adjustment is provided before you begin riding. If you cannot reach the brake lever because it is maladjusted, you can’t stop that bike in a hurry should you need to do so.

5. If a RiderCoach does not accept “why” questions during the class, ask them again during a break. If he still will not answer your question, consider writing a formal complaint to the MSF. Also consider walk-
ing off the range. It could be that the RiderCoach doesn’t know the answer to your questions, but he **must**, at least, tell you that he doesn’t know the answer and that, in his opinion, it is not necessary for you to know that answer, either, or he is not doing his job.

6. Be well rested and free of both alcohol and drugs (of any kind, including prescription) any time you are going to be around or riding motorcycles.

7. If you carry inhalants or drugs such as nitroglycerin to be used in the event of a health problem that might manifest while riding, be sure to have them on your person while riding, and be sure to advise at least one RiderCoach of that fact.

8. If you are planning to take the class with a family member (in any combination of husband / wife, mother / father, or sibling students), **don’t**. They are distractions that are unnecessary and potentially dangerous, and not just to you. If something happens to you while riding, all students are instructed to stop and stay where they are, so that they do not get in the way of the RiderCoach’s efforts to help you. But your family member will **not** honor that request. They are distractions, and they are also unnecessarily intimidating because they invite you to “do better” than you might. At this stage of your involvement with motorcycles, “not letting them down” is too much for you to deal with. You are learning a dangerous activity. And familial competition is absolutely crazy on a training range.

9. Drink lots of water—throughout the day. Drink far more water than you think you need. If you don’t have to visit the restroom every couple of hours, you are not drinking enough. On a hot day, having insufficient water intake can lead to heat stroke and even death. This is not a trivial bit of advice.

10. Fear is healthy, especially for a beginner. Ignore anything anyone has ever told you or that you read on a biker’s shirt that praises “No Fear!” Fear stops you from doing something obviously dangerous, and inhibits you from testing limits when you have no idea how dangerous something can be. The objective of your training is to learn the fundamentals. One objective of your subsequent experience, and the lessons we have included here, is to convert fear into respect. You’ll get there, if you allow fear to keep you healthy along the way.

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**F. It will be difficult to understand all that they teach you**

Not because you are not intelligent enough or are incapable of understanding the fundamentals that you will be taught, you will still leave this class with questions.

Some of what the MSF teaches during the beginner’s class will be meaningful only during the class; and you are also likely to complete the class with some misunderstandings about what you are told.

Whatever you are told to do in your class, that’s how you should behave in class. The discrepancies between riding in a BRC class and riding on public roads have been identified here so that you do not misunderstand what you are told, not to make you a rebel in class, and not to encourage you to challenge what your RiderCoaches tell you.

Traditionally, they have been **required** to teach the class material exactly the way their range cards tell them to. Recently, the MSF has allowed RiderCoaches to make slight changes to the way they teach their classes so long as those changes are safe and the objectives of the training are met. Your individual RiderCoach may or may not be open to this.

You may find that you absorb what you are taught on the range slowly. The experience is new, the environment is loud, and the pressure is high, especially for some students.

Usually after a night’s rest, the concepts and skills will seem much more natural the second day and subsequently.

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**G. Skill Test Range Layout**

The skill tests administered by the MSF all use the same range layout.

These were developed as a cooperative effort between the MSF and the National Public Service Research Institute, now called the PSRI for Public Service Research Institute, to be used to test Alt-MOST test elements.

Alt-MOST is an acronym that stands for **Alternate Motorcycle Operator Skill Test** and is used by at least 29 states to determine if an applicant for a motorcycle endorsement on his or her driver’s license is minimally capable of handling a motorcycle on public roads.

The required range layout for a rider’s skill tests is shown in the diagram on the next page.
V. Buying your first bike

You have many decisions to make when you are about to purchase your first bike.

Fortunately, part of your beginner rider class was a discussion about the various types of bikes available to you.

What the class doesn’t tell you, however, is whether to buy new or used, how big an engine you can handle, how much weight you can handle, where to get that bike serviced, or even what kind of service you will require for the bike. Your class cannot tell you what a good price is for a bike like the one you want or whether you should buy a beginner bike or the one of your dreams.

Leaving out the case where you got your training in a Rider’s Edge class, the bike you learned to ride on was relatively small in terms of engine displacement (usually 125 or 250cc’s). It was relatively light in weight, tame or gentle in response to your control inputs, and forgiving in the extreme of your clumsy misuse of the controls (tending to stall instead of launch you into traffic, for example). If you dropped it during a low speed maneuver, either it didn’t break, or else whatever damage resulted was minor in terms of expense to repair (a mirror or clutch lever, for example).

But for all of those reasons, the training bikes you learned on were not exactly what you had in mind or expected in terms of performance or behaviors to satisfy your desires for your motorcycle. In a few cases, they were actually just right, but you have no way of knowing that, yet.

For example, you may wish to buy a bike that you can use simply to commute back and forth to school. You’ll never attempt to get it up to speed on a highway or freeway. In that case, the kind of bike you learned on may meet your needs, or maybe a scooter would even be better. (Scooters are motorcycles. Maxi-Scooters are totally acceptable vehicles for riding hundreds of miles, even on freeways!)
A. New or used

It is generally good practice to purchase a used bike as your first motorcycle. It is perfectly normal for a newly trained motorcyclist to drop his or her bike during practice sessions. The resulting dings on the bike will be of negligible significance on an older bike as compared to a new one.

Maybe more important is the fact that your first bike is usually not the last motorcycle you will own.

Most motorcyclists will “outgrow” their first bike in only a few months or years. Since a new bike will lose a substantial percentage of its market value when you take possession of it, and a used bike can often be sold for very nearly what you paid for it, for most riders the economics of the matter strongly argue that you buy a used bike for your first bike.

B. Riding posture

The riding posture that your choice of motorcycles requires of you will determine to a very large extent how comfortable you will be when riding, and how long your riding excursions will be.

Designers of motorcycles must take into account where the rider’s weight will be centered, as well as the rider’s reach to hold the grips and use the controls without looking for them.

You can identify the overall function which a designer intended for a motorcycle by looking at the rider’s posture. Before you spend time looking at shiny machines or reading the want-ads, look at pictures of motorcycles and consider how the rider sits on them. This will give you an idea what you’re looking for when you decide to visit a dealership.

C. Motorcycle types

Motorcycle designs vary dramatically based on how they are intended to be used. There are a few well defined types for you to choose from. Six categories of motorcycles are widely recognized: cruiser, sport, touring, standard, dual-purpose, and dirt bike.

A kind of hybrid in terms of purpose, sport touring motorcycles are sometimes recognized separately instead of being grouped with touring bikes.

Whatever type of motorcycle you want to buy, you should consider your state’s restrictions about displacement for riding certain types of streets. For example, in Texas a street-legal motorcycle (no matter the style) with less than a 250cc displacement is not permitted to be ridden on freeways.

Let’s look at them from least expensive to acquire to most expensive. Remember, insurance costs go up as the price of your bike, accessories, and replacement parts rise.

1. Dirt bikes

These motorcycles have high undercarriages, knobby treaded tires, and few cosmetic plastic parts. They’re light-weight and have suspensions and engines specifically designed for off-road use. They’re not street-legal: they lack required lighting and signals for use on the public roads, have not been inspected for street riding, have no mirrors or turn signals, few instruments or none, and no headlights. They carry no license plates. Other parts have often been removed for riding on dirt tracks or trails, such as rear fenders.

Because of the extra clearance sometimes needed on dirt trails, in the bigger cc configurations, these motorcycles
typically stand high and are not built for short riders. You can purchase dirt bikes with displacement from 50cc’s (for mini-motocross) to 500.

Although these bikes are not street-legal as they’re sold, some can be made street-legal with the addition of the appropriate parts and licensing. This can be one way to acquire a street bike at a lower cost, if you want to pay for upgrading it and changing out the tires for a smoother ride. Young riders often upgrade from dirt bikes to bigger street machines and are willing to sell their used dirt bikes for very little money.

These motorcycles are thought by many to provide an ideal platform for a new rider to learn the basic handling skills of a motorcycle. Others are of the opinion that many of the skills and techniques learned on a dirt bike do not transfer well to the riding of motorcycles on public streets. Because dirt bikes do not usually attain significant speeds unless the bikes are purposely enhanced for competition, if they do crash, then any resulting rider injuries are typically minor. However, because they are ridden off-road, this type of motorcycle is expected to crash from time to time; while motorcycles designed for use on public streets are never expected to crash—though they do, of course.

Competition racers on unpaved tracks, such as motocross and enduros, use this kind of motorcycle with modifications. For motocross, they may have smaller gasoline tanks and will have a suspension designed for taking big jumps to allow the rider to “fly” on a track; the issue here is landing and keeping the bike upright. Motocross bikes usually come with 250cc two-stroke (you add oil to the gasoline) or 500cc four-stroke engines (no oil added), depending on the racer’s preference.

Enduro riding involves long distances and requires a bigger fuel tank. Enduro races are often held in desert environments where fuel may be hard to acquire. These bikes tend to have a bigger displacement, as well.

Another highly skilled form of competition that is not racing is known as Trials Riding, an extreme test of handling skills over obstacles such as boulders and stumps. Trials riders also typically use modified dirt bikes. These motorcycles are usually specially made for trials, which require fine balance and precision. Trials riders don’t sit down, so the bikes have no seats. They’re usually smaller bikes, 125 or 250cc’s, they are often two-strokes (meaning their fuel is a mixture of gas and oil), and they have very small gasoline tanks.

2. Dual-purpose bikes
Dual-purpose, or dual-sport, bikes are designed for street riding but may be taken off-road as well. Although they are built on a dirt bike chassis, these bikes come equipped with everything needed for licensing the bike to be ridden on the streets. A windscreen or fairing (a bigger “screen” providing protection for your legs) is not required for a street-legal bike, but dual sportbikes do have a tiny windscreen that helps with the aerodynamics of the ride. Notice that it provides zero protection against wind, bugs, and stones. These bikes are taller than other styles and have a higher center of gravity (a concept explained later). As sold, they offer no long distance comforts or commuter necessities, like storage space for rain gear, a change of shoes, or a briefcase or purse; and they don’t adapt well for such use. They can be fun to ride on the street for short distances or modified into adventure-touring bikes for longer rides with cross-country legs. Dual sportbikes are not intended for pure off-road use, as they tend to be bigger and heavier than dirt bikes. They can be found in displacements higher than 1000cc’s. The tires on these bikes also might not provide as much traction on public roadways as other street-legal types of motorcycle.

3. Standard bikes
These bikes have a traditional design that provides for an erect seating posture with feet riding on pegs that are positioned essentially straight down from the knees. The handlebar and grips don’t require the rider to lean forward nor allow him or her to lean back very far (as a cruiser would). They’re designed to allow the rider a natural, relaxed position with the elbows drooping from the shoulders. The shoulders are also over the hips in a normal sitting posture, which permits longer rides and comfortable handling. This style of motorcycle is designed for general street use and is sold with mirrors, turn signals, headlight(s), instruments and a license plate holder. Standard bikes can sometimes still be found in a 250cc size, which many new riders find a useful displacement for gaining confidence on surface streets. The saddle is not stepped but extends straight back over the rear wheel to accommodate a passenger, well-secured cargo, or even saddlebags. A standard motorcycle usually comes with passenger pegs, but since there is rarely any form of backrest or “sissy bar” provided for a passenger’s protection, They aren’t safe enough for young or inexperienced passengers.

4. Sportbikes
These motorcycles are purpose-built for speed, fast braking, cornering, stunting, and high speed agility on paved roads.
The rider posture is usually canted severely forward with his hands pressing onto the handlebar grips, which are designed to keep him over the gasoline tank, a position not intended to maximize comfort. This posture is aerodynamically efficient at high speeds, when wind assists the rider by supporting his body, but at lower speeds quickly results in rider fatigue and stressed wrists. Note that the rider does not normally “lay down on the tank.”

The sportbike’s center of gravity is high as compared to its short wheelbase. This allows a rider to do a “stoppie” (riding on only the front wheel) or “wheelie” (riding on only the rear wheel) with relative ease, which may be a plus for stunting but often becomes a deadly minus in an emergency. The rider’s pegs are mounted high, allowing the bike to be leaned over much farther than most other types of motorcycles without dragging a peg or other hard part on the ground. Thus the rider can take curves at speeds far in excess of legal speed limits. Curiously, sportbikes tend to have significantly restricted steering angles, which prevents the rider from turning in a circle with a diameter as short as other bikes can.

These bikes can have enormously efficient engines for their size. Fuel economy is not a priority even though their frames are very light. Their resulting high power-to-weight ratios support huge acceleration rates as well as high top speeds.

Sportbikes usually come in displacements greater than 450cc’s, with high performance brake systems and with suspension systems that demonstrate the latest design advances. Most are designed aerodynamically with their engines enclosed in a fairing and with a small windscreen to deflect air at high speeds. Riders often find sportbikes fun to ride within legal limits on twisty roads or through mountains. They offer no conveniences or comforts for the commuter or touring rider, however.

Some owners who ride these bikes on the street make changes that reduce the bike’s weight by removing parts, or that increase their power and speed. These stripped-down motorcycles are called “naked bikes” when parts have been removed, or “bullet bikes,” “muscle bikes,” or in some areas, “streetfighters.” They are rarely seen on race tracks and are intended purely for breaking the law.

Insurance on sportbikes is expensive. Depending on the rider’s age and riding history, as well as the motorcycle’s displacement, the monthly premiums to insure a sportbike may well exceed the cost of payments to buy it.

5. Cruisers
Cruisers reflect the styling popular among American-made motorcycles from the 1930’s to the “60s. The Harley-Davidson brand defined this style until other manufacturers put their own cruisers into their model lines. Similar to a standard in design, these bikes have stepped seats, pullback handlebars, and forward controls. “Forward controls” refers to the gear shift and rear-brake pedals and indicates that these controls are positioned well forward of your knees. This design gives the rider a slightly more relaxed riding posture and, because of the stepped seat, better visibility for a passenger. These bikes usually have a fairly large displacement (500cc’s and up), and a low center of gravity. Short riders often prefer this style, because they can easily touch the ground on both sides; but this lower position also means that the rider has less clearance in a turn, because foot pegs or floorboards are closer to the ground than in other types.

Cruisers, like standards, are often purchased as “starter” bikes and then sold. They can be “dressed” to suit the rider’s purpose (adding a windscreen or even, for big bikes, a fairing; installing a CB radio; adding a tank bag and saddlebags; adding a sissy bar for passengers; installing wind deflectors to protect hands and/or feet). Insurance on cruisers and standards is less expensive than on sportbikes.

6. Touring
Touring bikes are purpose-built for rides at highway speeds of long duration. They are designed with large windscreens and often with fairings for greater wind protection. Touring bikes usually have “hard” luggage built into the bike, which may include saddlebags and a trunk or “top box.” On some sport tourers, the bags are detachable so that you can take them right into your hotel. Some riders will travel thousands of miles on a motorcycle tour lasting multiple weeks as they visit dozens of states along the way, and they appreciate the comfort these bikes afford. Tour bikes are large and very heavy—often weighing in at over 800 ponds without a rider. They have large displacement engines with as many as six cylinders that effortlessly and smoothly perform for hundreds of thousands of miles of use, with proper maintenance. Their gas tanks are over-size to allow for longer rides without interruption. The rider’s body position on a tour bike is similar to the position on most standards: sitting upright with the legs comfortably on the pegs, and the elbows dropped. Most tour bikes are designed to provide “creature comforts” to the rider and passenger which are rare on motorcycles of other styles. For example, some
models provide completely integrated audio systems that include AM/FM as well as CB radio, tape deck or CD players, intercom for communications between rider and passenger, electronic cruise control, fuel injection, ABS, GPS mapping, extremely plush seating, especially for the passenger, heated seats and grips, and even built-in air compressors, as well as a reverse gear. One model of the Honda Gold Wing even comes equipped with an airbag like most cars. As you would expect, they are expensive, sometimes costing more than a good mid-sized automobile. A touring motorcycle is not a good first bike candidate.

7. Scooters

Though they are usually not thought of as motorcycles, scooters and mopeds are just that. They are single track vehicles on wheels, powered by an engine. Because they usually have some built-in storage space, they are ideal for commuting purposes.

Scooters may be found with displacements from 50cc's to 800; they tend to be smaller and lighter than many street bikes, and they're designed with a fairing and a small windscreen. Maxi-Scooters, with engine sizes up to 800cc's, are powerful enough for riding at highway speeds on freeways for hundreds of miles in comfort.

The seat is stepped for carrying a passenger, and the riding position is relaxed and natural, with the legs and feet somewhat protected from wind and weather.

What makes scooters different from what most people consider a motorcycle is that their engines are mounted on their rear-wheel swing arms. This position makes the engine an unsprung weight but provides open legroom for the rider. Scooters also have smaller diameter wheels, and invariably they use automatic instead of standard clutch-operated transmissions.

Having smaller diameter wheels means that they are rough riding on uneven surfaces, like cobblestones. This is exacerbated as a consequence of the high amount of unsprung weight, previously described, which means they are highly susceptible to road shocks and lateral forces.

D. How much bike is enough for you?

The odds are that you will want to buy a more powerful and heavier bike than you learned on.

How much bike is right for you?

That depends on a lot of factors, such as your strength and stamina and how you want to use the bike, but you will need certain information to help you decide.

The first is how long your inseams are. If your legs are relatively short, then many bikes are simply not appropriate for you. Many riders feel that the sure test is to sit on the saddle of the bike and see if you can “flatfoot” both of your feet on the ground at the same time. They would argue that if you can do that, the bike is not too big (tall) for you.

In fact, you actually need to be able to touch the balls of both feet on the ground at the same time while sitting on the saddle. If you can do that, then you can flatfoot with either foot should you need to use just one foot on the ground—for example, when you are stopped on a roadway with a severe camber or slope and only one foot will reach.

Then there is the issue of power and engine displacement. Engines and gearing can be designed such that a 250cc displacement can try to wrench your arms out of their sockets when you roll on your throttle aggressively. A Ninja 250cc motorcycle will never be found as a training bike on an MSF range for that reason. (Besides, it’s expensive to replace the parts that will break when you drop them.) It is becoming rather hard to find any new motorcycles that have engine sizes as small as 250cc's. A reasonable, relatively safe engine size for a newly trained rider is 750cc's or less, preferably less than 600cc’s, depending on your strength and stamina. But that said, some bikes with a displacement of 600cc’s can produce over 100 horsepower and are designed to race in the SuperSport class of motorcycle racing. These motorcycles are capable of achieving speeds in excess of 135 MPH in about 10 seconds on a quarter-mile drag strip.

There is the real problem—you are far from ready to experience what it feels like to see how fast your motorcycle can go, or even to control that bike while it gets up to speed.

Many bikes are purpose-built to be anything but “forgiving” or “gentle” or “tame,” should you try to ride them without much more experience and/or training. Here's the reality: if you buy a sportbike as your first bike, the odds are very high that you are going to get hurt or die on that bike.

The weight of a motorcycle is not at all important for most people, because that weight is always supposed to be carried by its tires, with only a small part of it held up by your legs when it is stopped. Where a large, heavy bike becomes
troublesome for some is if they have limited space in which to park it when they are finished riding and have to back it up; or if the rider must navigate starts and stops in hilly terrain, or make extremely tight turns before he or she can actually ride the bike away from where it’s parked.

The best bike style for a beginner is usually either a cruiser or a standard. Be aware, however, that some cruisers, especially Harley-Davidsons, have a highly restrictive lean angle capability. For the most part Stock Harley-Davidsons cannot lean more than 30 degrees without scraping a peg or floorboard.

Unless you buy a sportbike, you want to be able to grip your handlebar without having to lean forward. Your arms and elbows should be able to droop most of the time. You should be able to reach your clutch and brake levers without having to change the position of your wrists—that is, while your hands are holding the grips, the top of your hands should be in-line with your arms, not pointing up or down. When you reach for your controls, your fingers should be able to reach them without having to rotate your hands. Forget about getting “ape-hangers” or even “baby apes” (a handlebar with grips far above shoulder height, or a bit less so). These give rise to serious problems steering and controlling the bike, as well as to rider fatigue.

Most bikes have some form of windscreen. If the one you want doesn’t have one, that will probably be one of the first things you add to your bike. Besides adding comfort, it also improves your safety. If you think raindrops hitting your arms or legs don’t hurt when traveling at 60 MPH, you have never ridden a motorcycle in the rain; but imagine what happens when a bee or bird hits you in the face at that speed.

You can buy motorcycles that have luggage included, both “hard” and “soft”; but if yours does not, after-market luggage may be available as a strap-on, depending on the type of motorcycle you buy. Sportbikes usually require the rider to wear a backpack if he wants to carry anything.

Some bikes don’t come with a pillion (passenger seat). Obviously you can’t carry a passenger without one. But don’t be fooled—if your pillion doesn’t have a backrest or “sissy bar” attached to it, then that pillion is not a seat, and that bike is not designed to carry a passenger safely. That area is, instead, a soft place onto which you can strap luggage. You are far from ready to carry a passenger, but while buying the bike, this is something to consider.

Many riders contend that the best first bike is a used bike. That’s a bike that probably has minor damage from the previous owner’s mistakes, and possibly it was dropped a few times. The bike won’t change in value much as a result of your dropping it, too. Looking at a new rider’s situation realistically, the odds are overwhelming that you will do just that. Once you have enough experience and skill behind you, you may never drop it again, but new riders often drop their motorcycle while stopping or nearly stopped, without significant injury to the rider, but leaving a ding on the bike. In any event, once you have outgrown this first bike, you can probably sell it for very nearly what you paid for it. A new bike will lose as much as half its value the instant you drive it off the lot. (Few riders are satisfied with their first bike, but it can happen.) But if you want to move to another bike, you’ll be glad you didn’t invest a lot of money in the first one. Your insurance costs for a used bike will be less, as well.

No matter what kind of bike you buy, or from whom, that bike has to somehow get from the place of sale to your storage place for it. It is usually a bad mistake to ride it home! You’re not ready to ride an unfamiliar bike on the public streets, you may not even have received your motorcycle endorsement yet, and while what you buy may look and sound like a bike that is healthy, it may turn out to have some problems that you should not learn about while riding on public roadways, especially as a newbie. Get the dealer to deliver it, or get it towed, or get an experienced rider to ride it home for you!

If it’s a used bike that you purchased from an individual instead of a dealer, it should be delivered to a dealer in order to get it safety inspected, instead of taking it to your home.

E. Features to Avoid

1. Spoked wheels
Older motorcycles and newer bikes those that are “retro” or “classic” in design will have wheels made with spokes. Not only are they a maintenance nightmare, they are decidedly less safe that cast wheels. While it’s possible to buy spoked wheels that are specifically built to use tubeless tires, the majority will require the use of tube-type tires.

2. Tube-type tires
Tube-type tires fail catastrophically. When the tube is punctured, it loses air pressure almost instantly. Tubeless tires can also fail catastrophically, but they rarely do because
they are manufactured to self-seal minor punctures. They are also made with stronger sidewalls.

3. Ape-hanger handlebars
There is nothing “natural” about the handling of a motorcycle with ape-hanger bars. Your hands are well above your shoulders, and steering is awkward and imprecise. They also mark you as a one-percenter, a “poseur”, or a “squid.”

4. Chopper
An exaggerated rake angle resulting in an extended length front-end, like ape-hanger bars, is pure “image” and marks you in the same way. Choppers are difficult to handle, especially at slow speeds. Slow-speed maneuvering is the most difficult skill to master even on properly configured motorcycles, but a chopper design is almost unmanageable for a beginner.

5. Forward controls
This term refers to your foot controls, meaning your shifter and rear-brake lever. Requiring your feet to be well forward of your knees forces you to lean back on your seat. That means that you must take more time to move those feet in order to put them on the ground when you stop; and while you are stopping, inertia can force you to apply excessive rear-brake pressure on the pedal. It’s also difficult to stand on the pegs in rain or low visibility on most bikes with forward controls, and some people complain of ankle pain.

6. Sportbikes of any kind
A newbie has no business learning to ride on a sportbike. They are extremely sensitive to rider control errors and they are purpose-built, with a relatively high center of gravity compared to length of wheelbase, to be able to do “stoppie” and “wheelie” stunts.

F. Anti-lock Braking Systems (ABS)
Of all the potential styles and capabilities available for your purchase, the hands-down best for a new rider is ABS. Unfortunately, only the more expensive and typically larger motorcycles come equipped with this feature; and it is relatively expensive. Furthermore, ABS cannot be added to a motorcycle that was manufactured without it.

We will discuss braking technique in great detail later in this book. We will discuss how to obtain the quickest possible stopping performance from a motorcycle and the concept of “threshold braking”, which means that a motorcycle is decelerating more quickly than it would if its tires were simply skidding as a result of having locked its brakes.

For now, you should be aware of the fact that ABS automatically insures that you are “threshold braking” when the brakes engage so that you do not lose control of your motorcycle. You should also know that although motorcyclists with expert braking skills can often outperform (stop more quickly) without ABS, they must practice those skills and make several “test runs” before they can do so. But in the real world where a rider must make an emergency stop, he or she does not have a chance to practice that stop; there are no “test runs.” If you can afford ABS and the bike you want comes with it, it’s probably worth your while.

G. Getting it Home – Your Maiden Voyage
When a newbie buys his or her first motorcycle and has no more experience than successfully completing the beginner’s MSF class (if that!)—what should he do to get that scoot home?

First, ask his dealer to deliver it. If that fails?

If the rider has a trusted friend who already rides (and rides carefully), that friend might agree to ride it home for him. That makes a lot of sense and allows the newbie to graduate his riding experience one step at a time, instead of via “immersion therapy”:

Many first-time riders don’t have friends who ride; or the ones they do have are not role models whom they would trust with their new prize. Their only alternative is to ride their newly purchased motorcycle home themselves. So, here are some thoughts for those people to consider.

Think about the route you plan to take. Figure out in advance how to get into the correct lanes for your turns and exits. Keep your route as simple as you can, and try to stay on streets where you generally know what to expect. Get familiar with the instruments and controls while the bike is still in the dealer’s possession—engine off. Sit on the saddle and practice lifting the bike off the side-stand, kicking it back out of the way, balancing the bike (get a feel for heft), and then “find” the side-stand and push it into place, being sure

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3 NHTSA March 30, 2006, “A Comparison of Stopping Distance Performance for Motorcycles Equipped with ABS, CBS and Conventional Hydraulic Brake Systems”, Conclusion pg. 4
it’s locked. Use your eyes to do this! Do not rely on the feel of it—especially before you lean the bike back onto the side-stand. Again, use your eyes to confirm that it is properly in place and locked there before you let the weight of the bike rest on it!

Now squeeze both levers and “work them” (in / out, in / out)—with the engine off—to get a feel for how much pressure your hands have to use (and get used to). By the time you get home from your first ride, your hands (especially the left one) will ache! That will quickly pass as the new demands you put on your muscles condition them.

Then, after insuring the transmission is in neutral and the side-stand is up, start that engine. Again, squeeze both levers and hold them hard. Notice, pay attention, believe that it is because you have both levers squeezed that you are in complete control and not in any danger. Notice, pay attention, believe that no matter what happens out there on the road, if you don't know what to do next, you can always squeeze both levers to get out of trouble (or at the very least, minimize it).

The MSF primarily uses 250-cc bikes. They are tame and easy to maneuver. Your personal scoot will almost certainly be more powerful and heavier. That means that the little “muscle memory” you developed with bikes provided during your class won’t be appropriate or adequate.

You must learn all over again—that is, you need to find out how much braking energy is required to stop this bike without skidding, and you need to know exactly where the friction zone of your clutch starts on this bike.

With your engine running, do the beginner’s MSF exercise: ease the clutch lever out until it just enters that friction zone and the bike tries to move forward.

Allow the bike to move slightly, then squeeze the clutch lever and use your legs to pull the bike back to where it started. Do this again and again until you know where that friction zone is.

Now, remember that you must direct-steer at very slow speeds—such as when you are leaving the dealer’s parking lot—but thereafter, you can only counter-steer.

“Push right, go right” gets stuck into your brain, and that’s how you steer once you’re moving faster than a rapid walking speed, or above about 10 MPH.

If the bike feels like it’s “fighting you”, not “wanting” to make the turn you want to make, it’s time to say “push right, go right” and believe it. You are fighting yourself, not the bike.

Slow-speed control is almost entirely in the left hand (friction zone). While riding in a straight line, the clutch lever should be fully released; but if you are in a slow-speed turn, the odds are good that you will want to be “in the friction zone”, using that to control your speed, not the throttle.

Turn your head and check traffic with your eyes, not your mirrors. (Mirrors only tell you about danger. They do not tell you it is safe.) Keep your eyes up and away from your instruments while riding. Danger is primarily in front of you, not somewhere between the speedometer and tachometer. You will have lots of time to get familiar with your instruments later. This time all you want to do is control the scoot and avoid dangerous situations.

Shift conservatively—do not let your engine “scream at you” or lug because you aren’t going fast enough for its gear.

Don’t enjoy the scenery on your maiden voyage. Pay attention to traffic, signals, how the bike “sounds”, and how it reacts to throttle and brake usage. Before you know it, you’ll put your new bike in your garage, mission accomplished.

H. All The Gear, All The Time

“ATGATT” is an acronym that stands for “All The Gear, All The Time” and it describes which safety gear is worn, and when. Sometimes that acronym is misused. If you hear a rider say something like “I pulled up to some bikers wearing ATGATT, except that one had street shoes on,” he has misused the expression. The rider he was talking about does not wear all the gear, and obviously not all the time. Those of us who believe that safety is not a casual concern always do both.

When you participate in a beginner’s riding class, you are required to wear the following minimum safety gear:

- Helmet - Dept. of Transportation (D.O.T.) approved (At least three-quarter shell)
- Eye protection (face shield or safety glasses)
- Full-fingered gloves
- Long-sleeved shirt or jacket
- Full coverage pants
- Over-the-ankle leather shoes or boots with low heels
If that makes sense to you while riding at less than 25 MPH on a parking lot, it should be absolutely clear that when you are riding on public streets, you should wear no less gear.

For riding on public roads, however, this list of safety gear is inadequate. Let’s discuss what you need, and why.

1. Helmets
   
   a. Styles

   D.O.T. approved helmets come in three major styles:
   
   - Half shell (beanies)
   - Open-face shell (three-quarter)
   - Full-face shell

   We have listed those styles from least effective to most effective, in terms of protection provided. The half shell covers the top of your head, above the ears. The open-face shell also covers your ears and cheeks. The full-face shell additionally covers your jaws, chin, and the top part of your throat area. Since in a collision involving your head, about one-third of the external damage is done to your chin, jaws, teeth, and nose, it makes absolutely no sense to settle for a helmet that fails to protect those areas.

   Some people claim that a full-face helmet obstructs their peripheral vision. This is not true. If you wear glasses, then you should understand what a 90-degree unobstructed field of vision is, as it is defined by the location of your frames. A full-face helmet provides a full 120-degree field of unobstructed vision.

   Some people will not wear a full-face helmet, claiming that they tend to create more neck injuries than the number of head injuries they prevent. Again, this is not true. With or without a helmet, injuries to riders rarely involve neck injuries (less than one percent), and most of those are not critical or serious.

   Some people will not wear a full-face helmet claiming claustrophobia. Most riders get comfortable with a full-face helmet quickly.

   People who make excuses to avoid riding with a full-face helmet, yet who are perfectly prepared to face a life after an accident without teeth, with jaws wired shut, with a tongue bitten off on the first bounce, and/or a nose rubbed off their face as they slid to a stop are not being realistic about the risks involved. Full-face helmets are more expensive but worth the price for the extra protection.

   There is actually a fourth type of helmet that has become increasingly popular, known as a Flip-Up Modular version of the full-face shell. These helmets permit the wearer to pivot the “full-face” portion of the helmet up and out of the way when the rider is not moving. These helmets comply with D.O.T. standards.

   Each type of helmet can be fitted with a microphone and speakers allowing the rider to communicate with others using a CB or Bluetooth communication system.

   Helmets also are designed with air-flow capability within the helmet, often adjustable by the rider. This improves comfort considerably, as it allows warm air to be circulated out of the helmet as you ride.

   b. Chin strap

   All helmets are secured on the head by a set of chin straps. These straps are connected to each other using either a “D-ring” or “quick disconnect” assembly. All racing venues require that riders use D-ring connectors for safety.

   A D-ring has never failed during an accident—not once. Quick disconnects, on the other hand, have been known to “let go” during an accident, though nobody can be sure if they failed or were improperly secured to each other before those accidents. D-ring connects also allow easy adjustment of how tightly the helmet is being held in place, while quick disconnect systems are ridiculously clumsy in that regard.

   c. Fit

   A helmet must be comfortable to wear, or you will not wear it for long. Your head is not perfectly round. In fact, the shape of your head is different from any other head.

   Fortunately, each helmet manufacturer produces designs that fit one general head shape better than others. That means that in addition to style, you must shop for best fit.

   You must not feel any pressure points, such as on your forehead, when you wear a helmet. But that does not mean that you won’t feel some pressure, especially along your cheeks. Indeed, a new helmet will feel almost too tight around the cheeks for comfort. Since the inside of each helmet consists of a compressible Styrofoam-like material, over time that cheek pressure will diminish and become very comfortable for most riders.
When buying a new helmet, you must try it on in order to determine proper fit. Buying a helmet over the Internet makes no sense.

Not only must you try on a helmet you are thinking of buying, you must leave it on for some time (at least 10 minutes) in order to assess whether it will be comfortable enough in the long run. A small hotspot (pressure point) on an otherwise well-fitting helmet can often be removed as simply as taking the back side of a large spoon and smoothly compressing the Styrofoam in the area. Pay particular attention to how the helmet fits on and around the ears, as a helmet that hurts your ears will feel intolerable after enough miles.

d. Helmet laws

Some people will not wear a helmet of any kind unless it is legally required of them in their state. Their arguments invariably are mixed up with the issue of helmet laws themselves. As a protest to the “encroachment of their freedoms” posed by helmet laws, they elect to protest by not wearing a helmet.

Helmet laws are a civil rights issue, whereas the wearing of helmets is a safety issue. If a rider cannot differentiate between the two, he or she may not be mature enough to ride motorcycles safely.

2. Eye protection

You can attend a beginner’s riding class so long as you use a face shield (a visor) or wear safety glasses. Many students ride without a shield of they wear glasses or goggles. Even if you wear safety glasses (tempered or shatter-resistant), you should always use the face shield, too. Your glasses may not stop a rock that hits you at 60 MPH. Your face shield will.

3. Gloves

Leather gloves are essential for protecting your fingers from both temperature extremes and abrasion. Buy gloves that, like jackets, have a built-in set of pads. These cover the fingers and the palm of your hand. Fashion-leather gloves provide no abrasion protection and will shred upon their first encounter with the road. A huge variety of gloves are available to you. If you ride in the rain, you’ll probably want a set that are waterproof. If you ride in the mountains or in other very cold environments, you may well want to wear the longer, gauntlet-style, gloves. Or, like many riders, you may wish to carry different styles and wear the set that’s most appropriate at the time.

4. Jacket and Pants

Your skin is sensitive and easily worn away. No shirt or fashion-leather jacket will protect that skin from road rash when you slide along the roadway. Road rash hurts enormously and can abrade skin tissue all the way down to the bone. On a public street, you need to be wearing a thick leather jacket or one of the very sturdy synthetic fiber jackets that provide built-in “armor” at your elbows and shoulders. If possible, you should also have armored padding on your back, but that is rarely found except in racing gear. Armor comes in two varieties: CE (a soft or “stiff” foamy padding) and GP (“hard” armor, usually plastic). These paddings provide substantial, but short-lived, protection from abrasion and minor impacts, but they do not prevent broken or crushed bones.

In the case of pants, they should also be made of sturdy leather (not fashion grade) and they, too, should have built-in armor pads on your knees and hips.

An alternative to leather pants is leather chaps worn over your regular pants (usually denim). Leather chaps last at least eighteen times longer while sliding along asphalt than denim. Chaps also provide a built-in low-back support when you’re sitting in your saddle. Jackets, pants and chaps are available that are designed specifically for women and large men.

Motorcycle racers and many sportbike riders prefer purpose-built leather riding gear, usually in the form of full leathers. Often these are one-piece suits, but a two-piece variety is available that zips together so that you can wear only the pants when off the bike. Good two-piece leathers have a zipper that runs all the way around the suit, as compared to a little zipper at the back to hold the pieces together.

The legs on this kind of gear sometimes come with an extra thick piece of hard armor outside your knees (a “knee puck”), used to slide on the asphalt as riders “feel for” it while leaned far over in fast turns. They provide no useful purpose except on formal race courses and are never required when you ride on public roads at or below published speed limits. Indeed, they tend to encourage unlawful street riding behavior and, as a result, accidents, injuries, and deaths that would not happen at all except for that behavior.

5. Over-the-ankle footwear

While the MSF classes require over-the-ankle footwear with low heels, they fail to specify that the soles of that footwear should be made of rubber instead of leather.
When you are trying to hold up a motorcycle with one foot and that foot happens to be standing on a slippery surface, you want your soles to grip the pavement instead of sliding out from under you.

Buy rubber soles for street use, or have your leather boots re-soled to add a grip sole.

Further, you should consider getting steel-toed boots for use when riding. They can prevent crushed and/or amputated toes in the event of a collision.

There is a huge variety of footwear available appropriate for motorcycle use. **What is never appropriate is any form of sneakers or sandals.**

When and where must you wear all your gear?

Many motorcyclists believe that they need to put on their safety gear only if they are going out on a long ride, or if the ride involves highway speeds.

Even thirty years ago, however, when Dr. Harry Hurt did his study of motorcycle accidents in the Los Angeles area (a study that is often referred to when talking about safety as “the Hurt report”), it was clear that most motorcycle accidents occur within a short distance of the rider’s home and within only a few minutes of starting the ride.

You should have **all your gear** on before you ever start your bike’s engine, and you should put on your helmet every time you straddle your bike, even if you are moving it only a short distance, for example inside your garage.

Simply falling off the side of your parked motorcycle from a dead stop involves a vertical drop of about five feet for your head. That fall can kill you without a helmet. Don’t take your helmet off until after you’ve dismounted your bike.

Part of controlling yourself, along with your motorcycle, is controlling your desire to “ride free in the wind.”

The reality is that the wind burns your skin and brings debris and insects and air-born pebbles, all of which stings or sticks or smacks you. The sun dehydrates you along with the wind, and today’s “riding free” may mean no sleep tonight from a vicious sunburn and even permanent damage to your skin.

That same wind, combined with cold, results in frostbite to fingers and toes that aren’t protected. Consider where you plan to ride before you leave home and what the weather will be on the way out and on the way back.

Take gear, including gloves and rubber boots, of the right weight and material. You must be able to operate the controls, both the hand and the foot controls, in order to ride. That same wind, combined with rain, drills into unprotected skin.

Hair, especially really long hair, that flows in the wind not only takes a beating that dries it out, but ends in tangled knots that are hard to comb or brush out. Tie it back, braid it, or in winter stuff it under a turtleneck sweater, or cover it with a dickie or a balaclava.

Generally avoid having hair whipping around your face, as it can easily whip into your eyes and sting or make them water, even when you’re wearing a helmet. Watery eyes don’t see the road well.

The items of gear that riders should purchase and wear all the time should provide **appropriate protection** from all kinds of threats, big and little. The big ones can kill you (a bug in your eye that causes you to flinch and lose control), and the little ones can still make you very uncomfortable, especially when you encounter them at highway speed.

If you’re going to enjoy tomorrow’s ride, you have to survive today’s—and you may as well do so in relative comfort. Some experienced riders say, “The only skin you should leave exposed is the skin you can afford to lose.”

Buy the best gear you can afford that makes sense for your kind of riding, wear **all your gear, all the time,** and if you can’t afford protective gear, don’t ride.
Phase 1

This section presents information most valuable to those who have been formally trained, who have a motorcycle endorsement, and who have not yet achieved competence or substantial experience on the public roadways. It is designed to walk you systematically through the learning process so that you make measured progress without rushing beyond your capabilities. Along the way we will discuss many of the topics that will both broaden and deepen your understandings—so that you can truly Ride Smart as you become competent.

I. Newbie

A newbie is a person who has learned the fundamentals, but who has not yet learned the competent riding behaviors needed to survive on public roadways. You have joined “the family”, and now you want to grow within it. That is, you want to earn the respect of your brothers and sisters. You probably also want that to happen as quickly as possible, so that you are no longer thought of as a newbie.

Slow down. Take your time to gather the experiences that hone your skills. You have yet to identify your limits, and you haven’t a clue what limits your bike has. It makes no sense, then, to immediately set about testing those limits. Instead, approach the learning process by putting only your toes over the line, not charging over the side of a cliff. That way, should you make a mistake or if the edge of the cliff gives way, you don’t fall off. You do that by testing and developing only one limit at a time. Every time you test a limit without making a mistake, you raise your skill with it and get closer to being competent at that activity. After you have raised the bar on enough of your limits that you are confident that you can deal with related threats, you will have advanced from Phase 1 to Phase 2—you will be considered competent instead of a newbie. In the meanwhile, pretend that “newbie” means “student”, because it does. The Phase 1 section is designed to keep you from falling off that cliff.

II. Parking your motorcycle

When you’re not riding your motorcycle, it’s parked. Let’s deal with that aspect of your motorcycling career first, because this is where you first affect your riding safety. If, for example, you fail to maintain your motorcycle, or you fail to park it in such a way as to prevent the deterioration of its battery or tires, then you are likely to find that your next ride gets aborted before it starts because the bike itself won’t start, or the ride ends prematurely because a tire does.

The first time you park your motorcycle, find its Motorcycle Owner’s Manual (MOM), take it inside your house, and read it cover to cover. This document contains information about how to operate and care for your motorcycle that is specific to it and is unlikely to be found elsewhere. It contains, in other words, what your motorcycle manufacturer believes you must know.

A. Inside or outside

You probably don’t have a choice in the matter; either you have space in an enclosed garage or shed, or you must park your bike outside, hopefully under at least a protective roof. Obviously, it is best to park your bike in an enclosed environment to protect it from the elements.

Assuming you have a garage, you should virtually always use the bike’s side-stand instead of its center-stand to park it. There are only two good reasons for ever parking your bike on its center-stand, and then only if it’s on flat concrete:

1. You must save all the space you can; or
2. You are displaying the motorcycle at a show or to sell it.

Your side-stand provides a wide tripod that is extremely stable, while your center-stand provides a very narrow tripod that is easily destabilized. A good gust of wind can knock over a bike that is parked on its center-stand, particularly if it’s covered. For that reason you should never park your bike on its center-stand when it is outside.

The most likely time you will drop your motorcycle onto its side is when putting it up onto its center-stand, or when taking it down from that stand.

That can damage the bike, a car that is parked next to it, or you, if the bike falls over on your leg or if your head hits an object. Wear your helmet when taking the bike off the center-stand.
B. Side-stand or center-stand

To put your bike up onto its center-stand, face forward instead of facing the bike’s side; place your right hip against the saddle, left hand on the left grip, and right hand on a grab rail or under the saddle’s edge. Reach for the center-stand extension with your right foot and drag it down until it is touching the ground. Lean against the side of the bike as you smoothly and gently lift the bike off of its side-stand, bringing it to a full vertical position so that the two feet of the center-stand are in contact with the ground. With your right knee bent, simultaneously lift with your right hand as you aggressively push down with your right foot, straightening your knee as the bike rocks up and onto the center-stand. You must use far more leg strength than arm muscle when you do this. The rear wheel of your motorcycle will be lifted off the ground as the center-stand locks into place under the bike.

When the bike is resting steady on its center-stand, use your right foot to move the side-stand into its retracted position. This is important, because later when you take the bike off of its center-stand, if the side-stand is extended, it can literally crack your bike’s frame upon impact with the ground. More often, it will simply jack-knife your bike over onto its right side and into something hard that will damage it. Taking a bike off its center-stand requires that you be straddling its saddle at the time. Some riders try to take a bike off its center-stand while they are standing next to it. This can easily result in the bike falling away from you and ending up on its right side. Hold both grips with your hands, and squeeze at least the front-brake lever, with both feet on the bike’s pegs. Then ease off the brake and rock your bike forward off the center-stand. The rear tire will land on the ground at the same time as you hear the center-stand spring back into its retracted position. Move your feet quickly from the pegs to the ground, to keep the bike standing vertically.

If the bike starts to fall over onto its right side while you are trying to put it up onto its center-stand, let go of it and let it fall. It is impossible to hold it up once it begins to fall. If it begins to fall to the left, you can usually stop it; but if not, get away from the bike as it goes down. Almost all bikes are heavier than you can lift, should they end up on top of you.

If you have children who are able to touch your motorcycle when you are not present, or if they have visitors who might do so, you should not park it using its center-stand.

Whenever you put your bike on its side-stand, you all need to do is find its extension with your left foot, push it down into its fully extended and locked position, then look to confirm that it actually is fully extended and locked into position before leaning the bike to the left, onto it. Your handlebar will automatically turn to the left when you park your bike onto its side-stand.

A motorcycle parked on its side-stand with its front-end turned to the left is very much harder to roll forward because of a slight decline in the roadway or a modest nudge from behind, than it is if the front-end is pointing more or less straight ahead. Nevertheless, it can still roll forward or backward unless you make sure to set its “parking brake”. Always leave your parked motorcycle, if it’s on its side-stand, in first gear. That’s as close to a parking brake as you have. You wouldn’t leave your car parked without setting its parking brake would you? Why would you fail to set your bike’s equivalent when you leave it? Finding neutral is a start-up activity, not a parking activity. Leave the bike in gear.

C. “Foot”

When you park your bike on its side-stand, particularly on asphalt in hot weather, that side-stand will very slowly sink into the surface. The deeper it penetrates, the harder it tries to sink still deeper as more and more weight becomes available. You will probably not notice this happening, until you return to your bike later and find it lying on its left side.

The solution is to put something hard and flat between the asphalt and the side-stand—a “foot”. Many motorcyclists carry a piece of plastic, often shaped like a foot, for that purpose. Others rely on finding a flat rock or piece of wood in the area to use instead of a foot. Still others will stomp on an empty beverage can and use it as the foot.

D. Fuel Valve

Unless your bike is fuel-injected, it has a fuel valve. Most of these are gravity-fed designs and will have an off position. Some newer bikes have vacuum-fed fuel valves which do not have an off position. In an enclosed environment, you should get into the habit of turning gravity-fed valves off before you leave the bike. There are two good reasons for this. The first is that if a carburetor needle valve happens to stick without fully seating, fuel will leak; but with the fuel valve closed, that leak will quickly stop. You, your family, and your house will not burn to the ground because of the tiny effort made...
to shut that valve off. The second is that if you have finished a ride with the valve in its reserve position, failing to turn off that gas valve means that the next time you take the bike out for a ride, the valve will still be in the reserve position. Without any warning, when your bike sputters like it’s out of gas, you will actually be out of gas and stranded at the side of the road.

E. At a curb
It rarely makes sense to park parallel to a curb. Sooner or later, a car is going to back into your bike. The proper way to park at a curbside is with your motorcycle at a significant angle to it, preferably with the bike’s rear tire touching the curb. This makes your bike highly visible, and it takes up less curb space.

F. In a parking space
Should you find yourself parking your bike in a parking space usually occupied by cars, unless there are multiple bikes parked alongside you, you should not pull the bike all the way into the spot until a tire is pressed against a curb. Instead, you should leave about a third of the available space ahead of the bike free, so that the bike is highly visible to other vehicles that might want to pull into your space. If there are several other bikes with you, they should share those parking spaces with two bikes in each. Since a normal motorcycle handlebar is 30 to 33 inches wide, two bikes can park directly next to each other in a parking space without touching each other, though that will often result in one of them extending beyond the space available. (Normal parking spaces are from 8 to 9 feet wide).

Thus, the first bike in should park well forward of the second bike. When more than two bikes park alongside each other in adjacent parking spaces, the normal practice is to back the bikes in at an angle and rest their rear tires against the curb, taking as many spaces as needed with about three bikes per two parking spaces.

III. Customizing your bike to fit your needs
Your motorcycle can be modified to accommodate most of your physical requirements with simple adjustments. For example, the position of the clutch and front-brake levers can be adjusted so that they can be reached comfortably and without having to rotate your hands in the process. Some adjusting can also be done to change the height of your saddle to permit you to touch the ground while straddling the bike with at least the balls of both feet at the same time.

But some modifications cannot be made with simple adjustments. For example, if your arms are relatively short, then your grips may simply be too far forward for you to reach them without having to lean toward the front of the bike. That can be taken care of by changing to a different handlebar or adding a pull-back riser, but this requires considerable mechanical knowledge and takes time to get “the right fit”.

There are four common modifications made to newly acquired motorcycles.

A. Windscreens
By far the most common modification to a motorcycle is the addition of a windscreen or the exchange of an existing windscreen for one that is larger. This is true for any motorcycle except sportbikes, where windscreens are very short and provide adequate wind protection to the rider only when he is lying on his tank.

Many add-on windscreens allow a modest height adjustment after they are installed. The best height for most riders is one where the rider, in a normal sitting position, can just see over the top of the windscreen if he stretches his neck to do so. In other words, the rider will normally be looking through the windscreen for about three or four inches near its top edge, but can look over it should he want to.

Having a windscreen that is substantially taller than one can look over while sitting normally in the saddle, and having it swept toward the back for better aerodynamics, is ideal, according to some touring riders. It also allows rain to drain off quickly. But others consider such a windscreen design unreasonably dangerous in the event of a crash–especially to a passenger.

When a rider finds himself in heavy rain, or if the windscreen fogs up, he must be able to look over his windscreen and might even want to do so while standing on his pegs.

Those extra-large windscreens make that virtually impossible. And should the motorcycle be involved in even a relatively slow-speed collision, the passenger’s face is likely to impact the top edge of that swept-back windscreen, with disastrous results, as she is thrown forward.
Compare the standard windscreen on the Gold Wing in the first picture to the taller swept-back design in the second picture.

![Figure 7: OEM Windscreen](image1)

![Figure 8: Taller Windscreen](image2)

**B. Handlebar reach**

You must be comfortable when riding your motorcycle or fatigue soon develops. One of the easiest ways to improve comfort is to make sure that you do not have to reach too far forward, or too far down, in order to hold your bike’s handlebar grips.

Your handlebar can be raised with the addition of “risers”. “Pull-back risers” not only raise the handlebar, they bring it back toward the rider, an especially nice modification for riders with short arms. Notice how low the handlebar is in the first picture, with stock risers; and then notice the pull-back risers added to it to make the rider’s reach for the grips more comfortable.

![Figure 9: OEM Handlebar Setup](image3)

![Figure 10: Pull-back Riser](image4)

**C. Saddle**

The stock seating on your motorcycle may work just fine for you, most of the time. However, as you begin to take longer rides, you may notice that the saddle doesn’t quite fit you properly or as comfortably as you would like. It may feel too hard or too soft. It might be just fine if only it had a backrest. It lacks style consistent with your taste. Or maybe it is too wide and as result, prevents you from touching the ground with your feet properly.

There are many reasons you might want to change your saddle, and there are many independent manufacturers who are eager to oblige you with their products. You may have a local furniture upholstery shop that can also make adjustments to a stock saddle, for a much lower cost than buying a replacement. Your saddle simply unbolts from the frame of your motorcycle, and a replacement fits into place without any structural changes at all.
D. Height
The most difficult modification frequently made to a motorcycle is a change in its height. “Lowering kits” are manufactured that can reduce the height of the saddle from the ground by more than an inch. This is not a trivial change to your motorcycle, and it causes some potentially serious handling problems. Lowering your bike’s frame from its stock location reduces how far your motorcycle can lean before it drags a hard part (usually a peg).

If the only problem you are having with your bike is that it is too tall for you to comfortably reach the road with your feet, you are usually better off by simply having an upholsterer remove padding from your saddle and narrowing it. That can be as effective in solving your problem as lowering your frame by more than an inch.

You can, of course, do both at the same time. You can install a lowering kit that is not quite as radical and reshape your saddle, so that the combined effect fits your needs perfectly without seriously compromising your ability to lean your bike in turns.

Lowering kits are usually inappropriate “fixes”. It is a far better solution to buy a different bike than to make structural changes to one that doesn’t fit you properly.

IV. Before each ride
Airplane pilots do a “walk-around” before each flight. You should do exactly the same thing before each ride. A few minutes spent insuring that everything “appears” normal and functioning properly can easily save your life.

All motorcycles are different one from another, but there is a great deal that is common to all of them. To help you remember what to check for, the Motorcycle Safety Foundation claims to have created a mnemonic that lists them by category: T-CLOCK. This stands for Tires and wheels, Controls and mirrors, Lights, Oil, Chassis, and Kickstand. Given that you have read your Motorcycle Owner’s Manual, you will know how to do most of this pre-ride walk-around. What follows are some helpful hints and explanations for each category.

A. Tires and wheels
Your life depends on only two tires when riding a motorcycle. Unlike your situation when driving an automobile, if one tire should fail catastrophically, you will almost certainly end up on the ground.

Before each ride, you should inspect the tread and sidewall surfaces for cuts, unusual wear, imbedded foreign objects (nails, for example), and cracks. While inspecting your tires, you should also make sure that there are no cracks where the tire meets your wheel rims, and no dents in the rims themselves. Assuming there are no anomalies found, you then check the tire’s air pressure and inspect its air valve and stem. If your wheel contains spokes, you should check that none of them are loose, broken or missing. Check that there are no cracks or dents in the wheels and that the bearings and seals show no indication of wear of damage.

1. Tube-type or tubeless
Long before tubeless tires came into existence, all tires were tube-type. They contained an air-tight inner tube made of rubber that was inflated to the desired pressure. Unfortunately, when an inner tube is punctured, it fails catastrophically. That is, inner tubes “explode” instead of losing air pressure gradually.

Today’s motorcycles use tubeless tires which become air-tight with the wheel rim as they are inflated with air pressure. When a tubeless tire fails, it usually loses air gradually. Indeed, most tubeless tires are made to automatically seal modest punctures. However, if a tubeless tire’s tread or sidewall areas are ruptured, the tire can fail catastrophically. If a tubeless tire is punctured, it most cases it can be repaired.

Tube-type and tubeless tires are mounted on wheel rims designed to use just that type of tire. That is, for any particular wheel rim, you may only mount the type of tire it was designed for. A tubeless wheel rim has a larger bead area to hold onto and seal with its tire, it has an air stem and valve that are physically attached to the rim instead of the tire, and the rim is air-tight–it has no holes in it, such as those found in some tube-type rims used to mount spokes.

2. Air pressure
Embossed on the sidewall of all motorcycle tires is information about that tire, such as the maximum air pressure that you may safely use it with. Typically, the maximum air pressure indicated is about 41 psi.

The motorcycle manufacturer has specified a recommended air pressure for each tire in its MOM. For a particular model
motorcycle, for example, they might suggest you use 32 pounds per square inch (psi) in the front tire and 38 psi in the rear with normal loads. They also recommend a higher air pressure when the bike is heavily loaded. No matter what the MOM says, you must never put more pressure into a tire than the maximum specified on the tire’s sidewall.

Tires must be cold when you check their air pressure, meaning that the bike has not been ridden for at least one hour. Do not touch a tire right after riding to see how hot it is and whether it’s cool enough to check your pressure.

There is a never-ending argument among motorcyclists about what air pressure they should use in their tires. Some argue that the motorcycle manufacturer designed the bike from the tires up, and thus the company has determined the “best” air pressure to use in the tires from both a handling and safety point of view. Others believe that nobody knows tire safety considerations as well as the tire manufacturer. We argue that you should always maintain close to the maximum tire pressure as specified on the sidewall.

Tires are round only when they are in the air, not bearing any weight. When they are on the ground, there is a flat spot at the bottom known as the tire’s contact patch. To create that flat spot, the tread and sidewall must have flexed (deformed). When the tire rotates while you are riding, that flat spot travels and, thus, there is constant flexing in progress. As the tire’s rubber deforms, energy is transformed into heat, with the result that the tire’s rubber heats up. Heat fatigues the tire’s rubber over time—the rubber molecules crack apart, and the rubber dries out. With sufficient fatigue, a tubeless tire fails.

Three things increase heat build-up:

1. Speed
2. Low air pressure
3. Unusually heavy load

It follows, then, that an under-inflated tire will fail sooner than will a tire with appropriate air pressure. Under-inflation has been found to be the number one reason for premature tire failure.

When a passenger is added to your bike’s load, you should normally increase the tire air pressure. As you can imagine, however, a rider rarely has an air pump at his disposal when he invites a passenger to ride with him. If you maintain your tire’s air pressure at very nearly their maximum as specified on their sidewalls, this is never a problem.

The wider a tire is, the more likely it is that it will hydroplane. Since increasing air pressure in your tire results in narrowing its profile, it makes sense to run with higher air pressure than lower for this reason alone.

Your tires will normally lose a little more than one psi per month. Though you should check your air pressure before every ride, few riders take the time to do so, except sporadically. This is yet another reason why you should use nearly the maximum air pressure in your tires every time you inflate them.

A tire is over-inflated when its air pressure exceeds the maximum specified on the sidewall. It is under-inflated whenever it is more than 25% below that maximum when carrying a normal weight load, or 10% if carrying the maximum weight load allowed. (That weight load maximum is also specified in the embossing on the sidewall.). For example, if the specified maximum is 40 psi, then the tire would be under-inflated if it contained less than 30 psi with a normal weight load, or under 36 psi if carrying the maximum weight load. A tire that is over or under the air pressure recommended by your motorcycle manufacturer is not over- or under-inflated, unless the psi falls outside the range described above. When a tire is over- or under-inflated, it is dangerous to ride on.

3. Valve stem

In the case of tube type tires, their valve stems are part of the inner tube itself. But in the case of tubeless tires, the valve stems are a part of the wheel rim. In either case, the act of adding air to a tire usually results in stressing the rubber parts of that valve stem; and over time they will rupture, usually right where they enter the wheel rim.

When you replace your tires, replace your valve stems. It could be the best $2 you ever spent.

You may find that adding air to your tires using an air chuck at a gas station is almost impossible because of low clearances. A ready solution to that problem, and to the stress-related failures of normal rubber valves stems, is to use 90-degree angled stems made of metal. When you mount them, be sure they point toward the right side of your motorcycle, because when airing a tire, your bike is usually leaning to the left. And make sure they are supported.
Below you will see two pictures of metal 90-degree valve stems. The picture on the left shows one mounted without a support bracket. When your wheel turns quickly, there is substantial centrifugal force trying to press the valve cap part of the stem toward the tire. You will note that the metal stem attaches to the wheel rim with a rubber gasket/seal. The centrifugal force can eventually cause that rubber to crack from stress, leading to a loss of air pressure. You can use a support bracket to mitigate this problem, as shown in the next picture.

**Figure 11: 90-degree Valve Stem**

4. **Tread and sidewalls**
Normal wear and tear can render a motorcycle tire unsafe within a matter of only a few thousand miles of usage. In the case of some tires used on sportbikes, a tire might last no more than 5,000 miles, while tires designed for use on touring motorcycles can last up to 20,000 miles.

The best indicators of the end of a tire’s useful life are the wear indicators built into the tread pattern. When you can see these indicators, it is time to replace the tire.

Another indicator is excessive “cupping” of the tread area. These hollows are sculpted out of the tread by abnormal wear and tend to alternate with higher areas of rubber. They are the result of riding on tires with low air pressure, or of unusually aggressive riding through turns; that is, with high speeds and large lean angles. Even if wear indicators are not visible, if the tire’s tread area demonstrates substantial cupping, you should replace the tire.

5. **Age**
While normal wear and tear is usually what determines a tire’s useful life, it also has a “shelf life”. That is, the mere passage of time renders tires unsafe to use. It is generally agreed that a motorcycle tire’s shelf life is between six and seven years. That means that regardless of how few miles have been clocked on that tire, if it is more than seven years old, it should be replaced.

Stamped on the tire’s sidewall, following the codes that rate its maximum carrying load and maximum speed, is a four-digit indication of when that tire was manufactured.

The first two digits indicate the week and the next two digits indicate the year of manufacture. For example, if those four digits were “1408”, then the tire was made during the 14th week of 2008.

Prior to 2000, the manufactured date was indicated with a stamped three-digit code.

If a dealer attempts to sell you a brand new tire that has a three-digit date code stamped on it, walk away. If the date code indicates the tire is already three years old, even though it is new, walk away.

If you buy an absolutely cherry used bike that has been sitting, unused, in a garage for four years or longer, replace the tires. This is usually one of the first items that must be replaced when you buy any used bike, even if its tires look lightly worn. It is obviously critical to the rider’s safety.
6. Ozone and tire cleaners/brighteners

Tires are manufactured with anti-oxidants and anti-ozone chemicals that slow down the aging process caused by exposure to direct sunlight, to appliances in your garage like hot water heaters, to harsh cleaning agents, and to brighteners for auto tires such as Armor All. Some riders fear products that may brighten tires make them slick and will reduce traction; or that they will leach emollient oils from your tires. Many such products say on the label that they are not for use on motorcycle tires. Use only soap and water to dress up a tire.

The chemicals in tires meant to keep them supple work best if the tire is used on a regular basis, to keep the emollients moving. The flexing of the tire walls discussed above tends to keep them pliable, resistant to “dry rot” and cracking.

When a tire shows excessive sidewall cracking, it’s time to replace the tire.

7. Bearings

Visually inspect the wheel hub looking for signs of damage such as brown stains around the seals. Occasionally, try to rotate each tire from side to side to gauge wear of the bearings. If you notice any movement of the wheel relative to the bearings, or you hear any clicking sounds when you do this, it’s time to have that bearing replaced.

B. Controls and mirrors

Inspect your clutch and front-brake levers for signs of damage or looseness; all cables and hoses associated with those levers for smoothness of movement, fraying, rubber decomposition, and insure unrestricted routing; pivots for excessive wear and proper lubrication. Check that your throttle rotates smoothly and that after rotating it quickly springs back to fully closed when you release it.

1. Clutch lever

This is the most important control your motorcycle provides. It can save your life if used and functioning properly.

The clutch lever is connected by either a cable or a hydraulic line to your clutch. It allows you to control the amount of engine power transmitted to your rear wheel through your transmission. It is not a binary device, on or off; your clutch is not just either fully engaged or disengaged. Rather, it is an infinitely variable and exquisitely precise control, a vernier for “fine tuning”.

The clutch lever must fully disengage the clutch before it is pulled all the way to the grip; and it must fully engage the clutch before it is fully released. During its path of travel, from the point where it first begins to affect the clutch’s engagement until it ceases to have additional affect, the clutch lever is in what is known as its “friction zone” (between positions 3 and 4 in the diagram below).

![Clutch Lever Diagram](image)

The position of the friction zone within the clutch lever’s path of travel can be easily changed with knurled adjustment nuts on a cable activated clutch lever. If the friction zone location on a hydraulically activated clutch lever needs to be changed, this usually means that there is air in the hydraulic line. That needs to be repaired immediately, because as the problem worsens, it will reach a point where you will be unable to get your bike out of gear.

You should not be able to rotate the lever to make it higher or lower relative to your fingers without the use of tools.

2. Front-brake lever

This is the second most important control your motorcycle provides. Like the clutch lever, it can save your life.

You may have heard that the stopping effectiveness of the front brake is about 70%, while the rest of your stopping effectiveness comes from the use of your rear brake. That might have been true decades ago, but contemporary motorcycles obtain at least 90% of their stopping effectiveness from their front brakes.

Indeed, any bike that can do a “stoppie”—brake hard enough to lift the rear wheel off the ground—can, by definition, obtain 100% stopping effectiveness from the use of the front-brake lever.
When you do your pre-ride inspection of the front-brake lever, you should check that the lever cannot be pulled all the way to the grip, no matter how hard you squeeze it. Because you can apply as much pressure on the hydraulics as your hands are physically capable of producing, you can cause the hydraulic hose to expand in the process. If that hose is weak or otherwise deteriorated, it can burst. Should you notice any bulging of the hose with normal pressure application, replace the hose. You can replace it with an armored or metallic hose to avoid this problem in the future, but you should be aware that such a replacement will make your front brake feel “too fast” or “too strong” as compared to what you are used to. Practice using your front brake is the cure.

You should not be able to rotate the lever to make it higher or lower relative to your fingers without the use of tools.

3. Throttle
This control can both save your life and take it away from you.

It is a popularly held belief that the throttle controls the speed of your motorcycle. It does not. Rather, it controls how fast your engine is running. The speed of your motorcycle is controlled by the coordinated use of both the clutch lever and the throttle.

This is a very important distinction to get clear in your mind, especially when traveling at low speeds, such as when doing parking lot practice.

Since you must control your front-brake lever and your throttle with your right hand, often at the same time, you might wish to add a palm activated “throttle rocker” or “wrist rest” to the throttle.

These allow you to cover your brake lever with two or more fingers, while relying on your thumb and palm to manage the throttle position with minimal stress.

This means reduced odds of cramping your thumb over time. These accessories are made of either metal or rubber and simply clamp onto the throttle near its outer edge.

Another popular add-on is a mechanical lock or “cruise control” simulator. Such a device is dangerous and should never be added to a throttle. Unlike electronic cruise control devices, a mechanical lock does not automatically disengage when your brakes are applied.

4. Rear-brake pedal
This is, by far, the most dangerous control on your motorcycle. It can take your life away in a heartbeat.

Furthermore, if you had to do without a particular control on your motorcycle, this would be the one to choose to do away with. You can almost always ride quite safely without a functioning rear brake on a motorcycle. However, there are times when a modest application of just the rear brake can help you handle low-traction roadways and tight turns, particularly at parking lot practice speeds.

Since stomping on the rear-brake pedal leads to locking the rear brake, you should adjust the position of that pedal so that you literally have to rotate your ankle in order to activate that brake. This might not be possible if you have forward controls, but on most bikes it can be accomplished with a trivial amount of effort.

5. Gear shift lever
These can bend from dropping your motorcycle or from stomping on them as you shift gears. If the lever is bent, replace it.

6. Mirrors
While it’s true that what you see in your mirrors can tell you when it’s not safe to make a lane change, for example, they can never tell you it’s safe to make that lane change. Your mirrors have a limited field of view, and that view changes fast and is often distorted.

Using your mirrors gives you a preemptive look at what’s behind you. They aid in maintaining your situational awareness. But to determine if an action is safe to perform, you
always need to look directly, by turning your head. You look first using your mirrors, then look directly at the place you intend to go.

Mirrors should be adjusted so they show only a tiny part of your body, usually the edges of your shoulders, in order to provide the widest field of view. They must show part of your body in order for you to gauge where what you are seeing in that field of view is, relative to the motorcycle.

The field of view provided by your mirrors should be adjusted while the bike is stopped. Adjusting the mirrors while moving is dangerous. If your mirrors change their field of view while riding because of vibration, tighten them, fix them, or replace them.

C. Lights and horn
The lights on your motorcycle tend to last a very long time before they burn out. Often, they last longer than you will own the bike. During a pre-ride walk-around, check that both the normal and bright headlights work, and that the aim of the headlight is approximately where it should be. A night ride is the best time to determine the best aiming position. You also want to insure that the lens is not cracked and that there is no condensate. Your turn signal lights in front and rear should also be checked along with running lights. Finally, you want to be sure that your brake lights work separately when you use the front-brake lever and the rear-brake pedal.

If none of your lights work, check your fuses. Be sure there is a spare set of fuses on the bike for use when you are away from home if one of them fails.

Don’t forget to test that your horn works during your pre-ride walk-around. It’s too late if it doesn’t work when you need it out on the road.

Many motorcyclists think that the weak bleep provided by their stock horns is pitifully inadequate. They elect to replace their OEM horn with a pair of automobile horns or a pair of air horns. This is a very inexpensive solution to a major gripe.

By the way, automobile and air horns sound loud because they use different frequencies from each of the pair of horns, such as C and D notes beating against each other.

D. Oil and hydraulic fluid
There are many fluids in addition to oil that need to be maintained properly on your motorcycle. You will normally check your oil and hydraulic fluid levels personally on a pre-ride walk-around. The rest, such as the level of acid solution in your battery and the anti-freeze in your radiator (if you have one), need to be checked only every couple of months.

1. Hydraulic fluids
Your front brakes are almost certainly activated using a hydraulic system. The master hydraulic fluid cylinder and reservoir is mounted on the handlebar very near the front-brake lever. It will have a sight window that allows you to see both the color and amount of fluid contained in that reservoir. The darker the fluid is, the more moisture it contains—undesirable moisture that usually enters the system because of a poor gasket seal or torn rubber bladder within the reservoir. These should be fixed and the hydraulic fluid replaced by your mechanic, because the system needs to be bled of all air at the same time. This requires special tools you are unlikely to possess.

Check the level of hydraulic fluid by sitting on your saddle and bringing the bike to a vertical position, and then make sure that the fluid seen through the sight window is between the minimum and maximum markings.

On many bikes, the clutch is also hydraulically activated and has its own sight window. You check its hydraulic system in exactly the same way as just described.

2. Oil
The level of your engine oil is a little harder to determine. Your bike is either equipped with a traditional dipstick or with a sight window on its right side near the rear-brake pedal. The method used to accurately determine that you have an appropriate amount of oil in your system in both cases requires that the bike is vertical and that the oil is warm. It is not possible, in the case of a sight window, to accurately determine the level of oil, or even approximate it, unless you put your bike up onto its center-stand.

Furthermore, because those sight windows tend to darken over time, you may not even be able to see whether the oil is unusually dark (gunky). In the case of the dip stick, however, you can get a very close approximation of that level even though the bike is on its side-stand, and you can see how clean it is, even without a helper.

With the bike leaning to the left on its side-stand, unscrew the dip stick, remove it and wipe it dry. Then place the dip stick back into its hole, but do not screw it in. Go back to the
left side of the bike and raise it off its side-stand until it is vertical. Do not slosh it around, just bring the bike to a vertical position, and then set it back down onto its side-stand. Return to the right side of the bike and remove the dip stick. You will then see a close approximation of the level of oil in the engine, and you’ll see how clear it is. As long as the level indicated is well above the minimum line and not over the maximum line, you have adequate oil in your motorcycle. Return the dip stick to the hole and screw it in place.

What you should check each and every time you do a pre-ride walk-around is the ground beneath your bike. You want to look for oil drops and indications of water drops that have evaporated.

If you find any oil on the ground, that’s when you take the time to put the bike up on its center-stand, start it and warm it up for a couple of minutes, turn it off, and then do a proper check for an appropriate amount of oil in the engine.

If you find that there’s an inadequate amount of oil in the engine, go buy a quart of virtually any engine oil and put it into the bike. Then take it to your dealer and have them check for leaks and replace your oil properly. That includes, by the way, replacing the oil filter.

E. Chassis

Obviously you are not going to take off plastic covers and check out the entire frame of the then-naked bike every time you prepare to go for a ride. But there are several important things you should check that are often ignored.

1. Front-end forks and shock absorbers

The front-end of your motorcycle has a suspension system consisting of forks and shock absorbers. The forks are usually metal tubes of two different diameter sizes which allow a smaller tube to slide within the larger one. Within that larger diameter tube is your shock absorber system. It consists of springs, a push rod, oil, and valves that control how fast the push rod can travel through the oil.

When you add weight to the front-end, or your front wheel hits a bump in the road, the forks compress. This causes the push rod to move through the oil, compressing the springs within. When the weight is removed or the front wheel rolls past the end of the bump (or encounters a depression in the road), the springs decompress. This causes the pushrod and smaller diameter fork tube to expand their way outward from the larger tube.

Thus, you may think the job of the shock absorber is merely to “absorb shocks”, leaving the rider more comfortable as he rides over uneven surfaces. Actually, the real purpose of the bike’s shock absorber system is to help keep the bike’s wheels on the ground so that the rider can maintain control, despite those uneven surfaces. As a byproduct of that effort, the rider feels roadway imperfections less severely.

In order to prevent the oil within a shock absorber from leaking out as the forks compress, the system uses rubber seals. These seals work like tight-fitting windshield wiper blades surrounding the narrower tube. Because dust and other debris can increase wear on the oil seals, forks are also equipped with dust seals. Nevertheless, these seals do wear and deteriorate over time and must be replaced when they begin to allow oil to seep past them.

Unless your forks are protected with bug shields (fork deflectors) or are surrounded with gaiters, the forks will crash into flying insects and splatter remains on them when you ride. Those bodies contain acids that etch your seals, and when the bodies dry out, they become highly abrasive.

If there is light oil sheen on the narrow fork tubes, the seals have started to wear. If that coating is substantial or you can see tracks of oil, and especially if you see any sign of oil dripping, you must replace the fork seals.

This is a job best left to a mechanic, as the spring pressure within the shock absorber makes the job of fork disassembly somewhat dangerous. It also requires some specialty tools that you are unlikely to possess.

Because the larger tubes contain the shock absorber and are therefore more massive than the narrower tubes, contemporary motorcycle designs usually have them at the top of your fork stack. Thus, they become “sprung weight,” resulting in better handling of the bike over rough surfaces.

During a pre-ride walk-around, you should inspect and wipe down your front forks. A wipe-down of the forks actually makes more sense at the end of every ride, but as riders tend to be tired after a ride, they are often reluctant to do any maintenance at that time.

2. Chain or belt

Unless your motorcycle is shaft driven, your rear wheel is powered using either a chain or belt. These are substantially more efficient than a drive shaft, in terms of getting power
to your rear wheel. A drive shaft must change the direction of rotational power through at least one 90-degree turn to apply it to the wheel. That consumes power.

Chains came first, and they are the most popular form of drive for a motorcycle because they are simple, efficient, and inexpensive. Drive belts are found on all contemporary Harley-Davidsons and on all but the 2000 and 2001 models of the Boss Hoss motorcycles, because they have better wear characteristics, are somewhat stronger than chains, and require less maintenance—almost no maintenance or adjustment once it is properly installed. About the only thing that can damage (break) a drive belt is getting a rock caught up between the belt and its sprocket.

Though chains are said to “stretch” with use, it’s actually their pivots that wear, resulting in an apparent stretching. Your pre-ride check of your chain should insure that it doesn’t have more than about one inch of up and down travel at its midpoint but is not so tight that there is no noticeable sag at all. Lift the bottom of the chain with the toe of your boot, with the bike in neutral, to determine its up and down travel length. If the chain travels up and down too much, it will creep up the teeth of the sprockets and result in premature wear of those sprockets. With even more sag, the chain will bind and break while climbing the sprocket teeth.

Insure that the chain is well oiled and is not carrying a lot of dirty grit from previous rides. The time to check for dirt and to apply a spray of oil is when the chain is warm, right after a ride. Grit will quickly result in excessive wear of the chain and its sprockets.

A chain that is too tight will cause wheel bearings and seals to stress and wear prematurely. Check the teeth of both your drive and rear sprockets on a chain-driven bike for wear. If you need to replace a sprocket, replace both at the same time. Because some sprockets are made of aluminum to save weight and cost, and because aluminum sprockets wear much faster than those made of steel, you should always select sprockets made of steel for the replacement when you replace sprockets.

If the side-stand remains extended during that turn, the bike will be launched over onto its right side and will toss you off in the process. For that reason, most contemporary motorcycles have a side-stand sensor switch that will turn off your engine if you attempt to put the bike in gear when the stand is not retracted properly.

Older motorcycles may have a rubber “toe” or extension on the end of the side-stand. These are designed to cause that side-stand to retract by friction from being dragged along the pavement if you forget to retract it before heading out on your ride. They can only work, of course, if they have not been worn flush with the metal end of the side-stand. It’s simple to replace one that is worn.

V. One-time Parking Lot Practice (PLP) Lessons and Explanations

Anybody can ride a motorcycle at highway speeds if it is going in a straight line. The bike cannot fall down unless it loses traction with its tires; and the bike, by itself, will attempt to move in a straight line, and will remain vertical in the process. In other words, you contribute nothing to its stability with your sense of balance at such speeds. In fact, the same is true at any speed greater than about 10 MPH.

Controlling a motorcycle that is traveling slower than about 10 MPH is what is difficult. That’s when your sense of balance is very important, and when you can cause the bike to fall down just by applying your brakes if the front wheel is not pointing straight ahead.

And that is why you must practice riding your bike at slow speeds in order to learn how to control it.

You were told when you finished your basic riding course that you were not yet ready to ride your motorcycle on public streets. That should have been perfectly obvious to you, because what you learned to ride on was not your bike, and it was almost certainly lighter and less powerful than what you now possess. But what was not said at the end of that class is that parking lot practice is something you should do with some regularity, even after you have become proficient in handling your motorcycle.

The very best survival strategy includes doing a brief parking lot practice before each and every ride you make with your motorcycle. Clearly there must be more to parking lot practice than simply getting better and better at riding skills.
Parking lot practice proves to you that you and your motorcycle are healthy enough to make your ride. It is far safer to discover that a mirror is loose, or that your brakes are sticky, or that a wheel bearing is binding, or that your engine won’t keep running, when you are on a parking lot than when you are moving at 70 MPH on a freeway. Similarly, it is better to discover that you are too tired or that you can’t concentrate adequately when on a parking lot instead of that freeway.

Additionally, you use parking lot practice to prove that your skills are adequate; that you are still competent enough to handle the motorcycle to venture out onto the public roads. In other words, most often you will not be attempting to improve your skills with a parking lot practice. Instead, you will simply be confirming your skills.

A. Stress is unproductive

Any time you are testing your limits, you are also stressing yourself. Your muscles will tire more quickly, your stamina will be challenged, and you will, often, fail. That is, you will be unsuccessful at getting better at whatever it is that you are trying to improve. If your skills are already proficient, so what? You were there trying to get even better, and you may well be as proficient as you will ever be without investing a huge amount of time and effort for a marginal improvement. It’s foolish to believe that you can always “get better”. You can, however, become almost perfect in your execution. How much better than that can you get?

If all you want to do is confirm that your skills remain adequate, however you define “adequate”, then it makes no sense to engage in an extensive parking lot practice effort.

Spending five to ten minutes on the parking lot is all it takes to verify your level of competence, and you will not be stressing yourself in the process.

Of course, if you find that a particular skill is no longer adequate, you should practice until it returns to that level.

Even if you do parking lot practice for no other reason than to improve a particular skill, you should limit that effort to no more than about 30 minutes, with a break or two built into that time. Stress is simply counter-productive.

When you are relatively new to riding, you will find that many of your “skills” are less than adequate. You are not a competent rider, yet. But your parking lot practice time must not be used to try to improve on more than one skill at the same time.

Decide what you want to improve on, then practice that skill until you have attained either the level of competence you have decided is adequate, or until you are tired. There are always more days ahead of you to get better if you haven’t reached your goals on a particular day. Before you venture out on the public streets, however, you must be competent in all of the basic skills.

That must have sounded a lot like a “chicken or egg” dilemma, considering that you think you have to use public roads to get to the parking lot. Don’t. Either get an experienced rider to take your bike to the parking lot for you, or trailer the bike there. (Trailering a bike involves some serious skills, too, and is a poor first choice of the two mentioned.) One or two sessions of parking lot practice will make you proficient enough in the basic skills to ride to and from the parking lot on surface streets, if you are careful. Until your skills are those of a competent rider, pick the time and place for your parking lot practices to give you a short ride to and from the lot, on neighborhood streets with little traffic, good visibility, and low speed limits.

B. Dumping a bike is no sin

You will almost certainly dump your bike while you are doing slow-speed parking lot practice. You will if you are new to riding. Once you learn how strategically important it is to keep the weight of the bike over its tires when you come to a stop, then you may never dump a bike again.

In any event, dumping your bike is not a sin. However, it’s unnecessary, and painful, to end up under the bike when it falls. It’s rare that dropping your bike when traveling at near zero MPH will do more than superficial damage to it. But having several hundred pounds end up on top of your leg can ruin your day.

Before you do anything else at your first parking lot practice session, learn how to dump the bike and get away from it as it falls. Take the bike onto a grassy area with relatively firm ground and, with the engine turned off, lean the bike slowly over to the left. You’ll quickly learn that there comes a point in leaning the bike where the center of gravity of the bike will move past the side of its tank.

Most of its weight will then be on your “down” leg. At this point nobody can hold up a motorcycle weighing several
hundred pounds! Trying to do so can result in injury. You must decide for yourself when you’ve reached that point, and then stop trying to hold up the bike. Let go of the lower grip, quickly stand on the high peg and step as wide away from the bike as possible with your “down” leg as the bike falls down.

If you do this correctly, you will find that you remain standing, one foot on the ground, the other on the high peg, with the bike between your legs on its side.

It usually takes no more than two tries to get this right. The first attempt usually finds you landing on your hands. If you do, remember to let go of the lower grip before it pulls you to the ground. This “move” tends to be remembered long after it is learned.

You may drop a motorcycle that is moving at slow speed, so you should understand how to handle that situation, though practicing this is of no real value. Don’t practice this.

If your bike is moving faster than you can run, keep your feet on the pegs as it goes down; a bruised leg is better than an amputation. (Many riders add engine guards to their bikes in an attempt to minimize leg damage in just this scenario.) If it is going slower than that, stand on the high peg and let the bike fall between your legs as you walk (hop) away from it.

If you are going to practice picking up your bike, make sure the bike has some form of engine guard to prevent damage. You can use a flat solid surface, such as a large piece of cardboard, and place one edge at the contact patch of both tires, then see if anything other than your fold-up pegs and engine guards touch that surface as you raise the cardboard until it touches the bike. If so, those parts can hit the ground when you dump the bike and can break.

See APPENDIX A – Engine Guards.

C. Picking up a big bike
First, let me tell you that a bike dumped on grass is harder to pick up than one on the street, for two reasons:

1. The engine guard and rear guard dig into the ground only a little, but it’s enough to make the lean angle of the down bike significantly more than it would be if it were lying on pavement; and
2. Getting good traction with your feet on grass can be iffy at best.

The significance of the fact that the bike rests lower when on ground versus pavement is that you are often unable to get a low enough purchase on it to bring it up without lifting.

The secret to “picking up” a big bike by yourself is that you push it up rather than lift it up. However, if it is lying over at more than a 45-degree angle, you will have to do some lifting as well.

The smaller the angle of lean (relative to vertical), the easier it is to make that angle still smaller. In other words, it is the first inch or so of movement that is the hardest. The first thing you should do is try to make the lean angle as small as possible. If you’re on an incline, for example, twist the bike until its tires are facing downhill.

Then turn the handlebar as far as possible towards the ground. If possible, turn it to its stop and lock it in place. On the ground you may not be able to get the handlebar on a big bike turned all the way. You may have to jerk hard on the handlebar to get the wheel turned, but this is a very important step. Why? Because by turning the wheel towards the ground, the frame of the motorcycle is lifted off the
ground. This means you are reducing the lean angle before you even begin to try to pick up the motorcycle.

If the bike happens to be on its left side, you should insure that the side-stand is fully retracted. If it is on its right side, you must make sure the side-stand is down and locked in place before you begin to pick up the bike.

If possible, insure that the bike is in a low gear or, in the case of certain Gold Wings, in reverse, so that there is minimal chance of the bike rolling when you get it back on its wheels.

Next, you are going to plant your butt (not your hip) on the seat. Face away from the motorcycle and lean against the seat so that the top half of your buttocks are above your contact with the seat, and the bottom half are pressed solidly against the seat. Your feet should be spread no wider than your shoulder width and planted firmly (you are wearing rubber-soled boots, right?) on the ground about three feet away from the bike. Your knees should be bent at about a 40 to 50 degree angle; anything more than that, and you will probably not be able to straighten them. Indeed, though you want some bend, the less bend in your knees that you can manage, the easier this effort will be. What limits your choice is the length of your legs.

Now you need to grasp your motorcycle with your hands on both sides of your body. You need to hold onto firm structures, but because you should not be doing anything with your hands other than guiding and possibly a little lifting when you start, you can use parts of your fairing, a firmly mounted part of your backrest, a passenger handrail, under your seat, or handlebar. What you hold is not very important except that it should be firmly attached to your motorcycle (no give) and conveniently located.

Now simply walk backwards as you push against the seat. If the bike has a lean angle of 45 degrees or more, you must also lift—be careful!

As you approach vertical, the vast majority of the bike's weight will be on the tires. Proceed slowly so as to prevent going too far and causing it to fall over onto its other side. Once the bike is vertical, while you are still facing away from the motorcycle, fish for the side-stand with your left foot and bring it down. Then let the bike lean back onto the stand.

If the bike were on its right side when you started, you already made sure that the side-stand was down. Then you simply ease the bike past vertical and let it come to rest on that side-stand. Please note that if you are not on a level surface you will need to be very careful as the bike approaches being vertical. You may not be able to get it vertical or you may find that when vertical it cannot be leaned over to the left without it then falling over—having to pick it up again from the other side. In either case, change your body position so that it is facing the front of the bike (while it is vertical) and try to push the bike to a more level location—but remember, your side-stand is down.

D. Regaining control

We stated a rule at the start of this book: never lose control of your motorcycle—or yourself! During your parking lot practice sessions is when you learn how to gain and maintain control of your motorcycle, but it is also when you will probably have to regain control once you lose it.

Being unfamiliar with your motorcycle means that you are quite prone to making mistakes in how you handle it. You may find it difficult to manage your clutch lever effectively when you start from a dead stop, and stall your engine as a result. You may “pop” your clutch lever (essentially, let go of it or have a loose hand slip off) and have the bike take off with a lurch. You may unexpectedly wind up the engine until it screams at you with its high rpm. You may over-use your throttle in order to save the bike from falling during a slow-speed turn.

Each of these is an example of losing control of your motorcycle. Each of them can lead to an accident, injury or even death on the parking lot if you don’t know how to react. Before you attempt any moving exercises on your motorcycle, you must understand and believe that whenever you lose control of the bike, you must immediately regain control of it. You do that, almost always, by squeezing both levers.

If you drop a bike, the damage to you and the bike are likely to be minimal; but if you freeze at your controls with the throttle full on, in a matter of seconds you will be travelling in excess of 40 MPH, and you will almost certainly run into something—a curb, a car, a fence, or a building. Freezing at the controls is simply unacceptable motorcycling. It means that you got scared and didn’t have any idea of what to do. You may indeed be scared, but you do know what to do.

Squeeze both levers. Do it without wasting time figuring out what to do. React immediately—squeeze both levers.
There are other things you might do next, but you can hardly find a better first reaction.

E. Posture
When you’re doing your parking lot practice lessons, pay attention to your posture on the bike. If you’re not comfortable while riding, the ride will end prematurely because of fatigue or mistakes. But there’s more to posture than being comfortable or looking good. You should always be concerned about anything that affects safety when riding motorcycles. Proper posture involves keeping your head as nearly vertical as possible, and keeping your eyes pointed at the horizon—never at the ground.

While doing parking lot practice exercises, it’s unnecessary to shift your butt to either side of your saddle. You’re expected always to ride in-line with your motorcycle. You may have heard the expression “hanging off“, meaning you shift your butt off the saddle toward the inside of a turn, or “counter-weighting” or “counter-balancing”, meaning you shift your butt toward the outside of a turn. Neither is ever necessary when riding on public roadways at legal speeds, nor during parking lot practice exercises. Counter-balancing is sometimes used, and is discussed in beginner riding classes, as a means to make riding the tightest turn possible easier. Counter-balancing disrupts the bike’s stability so much that any gains are easily outweighed by problems created.

Hanging off is a technique that allows a rider to take a turn as fast as possible, because it causes the bike to stand as tall as possible in the turn. This prevents the pegs from dragging at higher speeds. It is used on race courses, but the only possible use for that technique on public roads is to allow the rider to break the legal speed limit in turns.

When the bike is leaning in a turn and you are riding in-line with it, your body is also leaning. But your brain works best to keep track of your position relative to everything else when your ears and eyes are as close as possible to being level. Thus, you should try to keep your head and eyes “up” at all times while riding—meaning keeping your head vertical even if your body is leaning with the bike.

Keeping your eyes up means looking at the horizon. Because your bike tends to go where you’re looking, it makes no sense to look at the ground.

When you need to track an object that’s on the ground, such as a line or an obstacle, you will use your peripheral vision.

F. Motorcycle Goes Where You’re Looking
The idea that your motorcycle will go where you’re looking is merely a shorthand way of thinking about a phenomenon that virtually all drivers (of any kind of vehicle) have experienced: if you turn your head, you tend to steer in the direction you’re looking. In fact, it might be clearer to say that it’s hard to steer in any direction other than the one at which you are looking. All of your prior driving experience has taught you how to steer your vehicle where you want it to go. If you look where you want to go, you kick in all that prior experience and automatically steer in that direction.

There’s no magic here, nor is there a hidden law of physics involved. Your bike (or automobile) tends to go in the direction you are looking because, via experience, you have taught yourself to steer more or less subconsciously. To take advantage of that phenomenon, you need to actively look in the direction you want to go—and away from danger. The rest is virtually subconscious reaction. Of course, it takes more than a turn of your eyes or even your head to change your path of travel. You still need to steer away from danger.

Since it is difficult to steer away from what you’re looking at, and easy (almost automatic) to steer in the direction you are looking, it makes sense to look where you want to go.

There are many times when you look in directions other than the one you want to go, of course. After all, one of the most important safety practices you engage in is actively to scan all around looking for hazards. Why is it that your motorcycle doesn’t wander all over the road while you are scanning, if it’s true that it tends to go where you’re looking? (It’s true: more often than not, it does!)

The answer is that when you’re scanning or looking in a direction other than the one you want to go, you tell yourself to keep going in the direction you want; you turn off your “autopilot”. Next time you’re out on the road and it’s safe to do so, point your bike in the direction you want to go and look in any other direction.

Notice how a part of your mind is constantly verifying that you’re still on course. You don’t normally have to do that because that’s what your autopilot does for you.

When told to keep your head and eyes “up” and looking at the horizon, the impression this leaves is that looking down
will cause a motorcycle to fall down. That’s not quite accurate. If you’re in a skid, however, and you look down, the odds are overwhelming that the bike will go down, because you will have failed to steer the bike actively in a way that keeps it upright. Another reason why you should keep your head up and eyes looking at the horizon is that only by doing so can you actively scan for upcoming hazards or know, for sure, whether your bike is vertical.

There’s a more significant reason to understand the idea that your motorcycle tends to go where you’re looking than we’ve discussed so far. This is to avoid target fixation.

‘Fixating’ on something means not being able to take your attention (your gaze, for example) away from it. An example familiar to all is that if you see a pothole in the street ahead of you and don’t look away from it, you’re likely to hit it. While that’s true, it’s too trivial an example to get your attention appropriately. Some riders are left with the opinion that “target fixation” is of trivial concern, because we all know that if we try, we can avoid that pothole. Once you read about an accident in which a motorcyclist drove into the front-end of an oncoming car for “no apparent reason”, however, you’ll recognize how serious target fixation can be in the real world. (Recall Karen Miller’s accident as described in the introduction of this book.) It’s not enough to say “avoid target fixation”. Warning you not to fixate is all very well; but once it starts, you need a positive technique to get yourself out of it in one piece.

If you are in trouble, use target fixation to get out of it. Don’t look at the oncoming truck / tree / pothole. Figure out where you want to be and fixate there, instead. “Target fixation” is an excellent way to control skids. Fix your gaze on a point dead ahead on the horizon, and you’ll be well on the way towards automatically correcting many skids.

**G. Four controls**

During your basic class you were told that you have six main controls on your motorcycle, counting your handlebar. It’s time to ignore that instruction. You have **four** main controls. Listed in their order of importance to you during parking lot practice, they include:

1. Clutch lever
2. Front-brake lever
3. Throttle
4. Rear-brake pedal

Don’t be concerned about your gear shift lever now. We will talk about that later on.

The first two of those controls can save your life, while the second two can easily take your life away. It should make perfect sense, then, for you to gain **mastery** of the first two before you even think about testing limits with the second two.

1. **Clutch lever**

If you ride a scooter or a motorcycle equipped with an automatic transmission, you do not have the most important safety control available on other, more typical motorcycles: your clutch lever.

Control of most motorcycles at slow speeds rests almost exclusively in the rider’s left hand. The clutch lever, as describer earlier, provides you the means with which you can manage how much of your engine’s power gets to your bike’s rear wheel. Unlike your throttle, at slow speeds it provides you with an incredibly precise vernier control. It allows you to start from a dead stop without stalling your engine. And it can instantly disconnect the engine from your rear wheel, in the event that you lose control of your motorcycle.

You absolutely **must master** the use of your clutch lever before you attempt to test any limits (of yours or the bike’s), such as braking.

Mastery of that lever involves being able to **smoothly** and **accurately** move it to a position within your friction zone in order to control, with finesse, how much of your engine’s power reaches the rear wheel.

Now look closely again at Figure 13 on page 40: Clutch lever showing zones.

Let’s immediately get rid of a misunderstanding about two phrases describing how to use the clutch lever: “release your clutch lever” and “ease out your clutch lever”.

All too many riders have come to believe that those phrases mean, “Get your clutch lever all the way out to position 5 so that you can let go of the lever with your fingers.” That is not accurate. Assuming you are at a dead stop with your engine running, and your clutch lever is being held in position 1, then in order to start moving you must allow the lever to move to a position just barely past 3, **and then hesitate there**.
If you were told to release the clutch lever or to ease it out in order to start moving, what was meant was that you move the lever to just past 3 in the diagram and leave it there for a moment or two.

You may already know this, but focus on the explanation of what’s happening with your bike. When you are at a dead stop, your rear wheel is not turning at all, but your engine certainly is. In other words, the speed of your engine is not synchronized with the speed of your rear wheel at that time. No matter what gear you are in, there is exactly one engine speed that is synchronized with the rear wheel speed.

The purpose of the clutch lever’s friction zone is to allow your engine and rear wheel speeds to synchronize. It takes time for anything to change speed. Thus, you need to hesitate within the friction zone for that to happen. Once your bike is moving at a speed that is close to being synchronized with the engine’s speed, you can ease the clutch lever out farther (deeper into the friction zone) to allow those speeds to get closer to being synchronized.

Your clutch is slipping while your clutch lever is anywhere within the friction zone. Your engine and rear wheel speeds are synchronized only when your clutch lever moves past position 4, as that is when the clutch slipping has stopped.

Riders who pop their clutches have an unrealistic expectation of how quickly synchronization can occur, or they misunderstand what “ease your clutch lever out” and “release your clutch lever” actually mean.

Besides allowing speed synchronization, hesitating in the friction zone is done to allow you to verify that you have chosen to up-shift or down-shift appropriately. Even very experienced riders have made the boneheaded mistake of down-shifting when they really meant to up-shift.

Now let’s deal with the idea of clutch slippage. When you drive a standard transmission car, you understand that clutch slippage is hard on the clutch and needs to be avoided as much as possible.

Your motorcycle clutch, however, is specifically designed to allow slippage. “Wet clutches” are enclosed in an oil bath to keep them from overheating while you are holding the clutch lever within its friction zone. There will be times when you will want to hold your clutch lever within its friction zone for a prolonged period of time.

A few motorcycles continue to use a dry clutch; and you can be certain that parking lot practices are hard on them. However, owners of bikes with dry clutches do not report that they have shorter lives than do wet clutches.

a. Finding the friction zone – lesson one

You must become intimately familiar with your clutch lever’s friction zone. The first step in the process is learning to feel for where it starts (position 3). With your engine running and in neutral, place both feet on the ground. Squeeze both your clutch and front-brake levers. Let the bike simply idle. Now shift the bike into first gear. With the clutch lever and front-brake lever being squeezed, there is no possibility that the bike can move or that any portion of the engine’s power is reaching the rear wheel. You are in complete control of your bike when you are squeezing both levers.

You should understand that all positions of the clutch lever between 1 and 3 are identical—the engine remains disconnected from the rear wheel. But as soon as you reach position 3, a tiny part of the engine power reaches the rear wheel, as the rest of it is lost due to the large amount of clutch slippage. As you move from position 3 to position 4, progressively more power reaches the rear wheel and there is less and less clutch slippage. Your objective in this exercise is merely to approach an engine stall, but not let the engine actually stall in the process. Just before it stalls, stop allowing the clutch lever to move any farther. This is where you are hesitating within the friction zone. Because you are squeezing the front-brake lever, the worst that can happen in your efforts is that you stall the engine and have to start over again.

Though you can certainly restart a stalled engine by merely squeezing the clutch lever and pushing the starter button, get into the habit of actually starting this exercise after having placed your bike in neutral with the engine off, then starting the engine. If you stall your bike out on the street, you are better off not going through the ritual of getting it back into neutral before starting it, but for this lesson only, start that engine while the bike is in neutral.

Ease the clutch lever away from position 1 toward its friction zone. It doesn’t matter how quickly you let the lever move until you reach the friction zone (position 3). Once you just enter the friction zone, stop easing it out and reverse directions—now you’re squeezing the clutch lever to bring it back to position 1. Do that over and over again as you begin to build muscle memory in your left hand. This may seem like
a trivial exercise, but it is absolutely key to your mastery of the clutch lever. Do not apply any throttle whatsoever. You want the engine to stall if you miss your mark.

Now do it several more times, but each time ease the clutch lever to just past position 3 more quickly. Notice that nothing, whatsoever, changes. All positions of the clutch lever between 1 and 3 are identical in terms of their lack of effect on the motorcycle.

The objective of this lesson is to learn where your friction zone starts.

You also learn that, since all positions of the clutch lever between 1 and 3 are identical, you do not have to pull your clutch lever all the way back until it touches the grip when you shift gears. Later, you will find that this allows you to make more rapid and “sure” gear shifts. For now, all you really must learn is where your friction zone starts.

b. Finding the sweet spot – lesson two

The next thing you need to learn about your friction zone is how to find the right position within it to maintain a driving force on your rear wheel, without actually moving. That is, you need to learn how much clutch slippage must exist in order to maintain a driving force on your rear wheel. Clearly that must be a position within your clutch lever somewhere between 3 and 4.

For this lesson, you want to apply just enough throttle so that the engine is turning about twice as fast as it did during a simple idle. As your engine turns faster, it provides more torque, at least until it provides the maximum torque it is capable of producing. Your engine idles somewhere near 1,000 rpm. If it redlines at, say, 10,000 rpm, it produces its maximum torques close to when it is running at half of that speed, or at about 5,000 rpm. You are going to get your engine speed up to only about 2,000 rpm. It does not matter how accurately you gauge that speed in this lesson, only that the engine is turning about twice as fast as it did while it idled. You absolutely do not want your engine “racing”.

Again with both feet on the ground, clutch fully withdrawn, in first gear, throttle allowing the engine to run at about twice idle speed, and squeezing the front-brake lever (you are using your right hand to do two things at once), release your clutch lever until you get to position 3 (the start of your friction zone), then gradually ease it still farther into the friction zone until you feel the rear wheel trying to move the bike. Don’t let the engine stall! Hesitate at that position and get a feel for where that position is within the friction zone. Then squeeze the clutch lever back into position 1 to relieve the pressure from the rear wheel. Do that as many times as necessary until you have built a good muscle memory “understanding” of where that position is.

The objective of this lesson is to learn where, within your friction zone, you must place the clutch lever in order to start moving. Notice that you hesitate at that point, not at the start of the friction zone. And notice, too, that had you not provided some throttle in order to speed up the engine above its idle speed, your engine would certainly have stalled by the time you reached that clutch lever position. That point within your friction zone is the sweet spot—it’s where mastery of the clutch lever begins.

By hesitating at that position, if you were riding you’d allow your engine speed to synchronize with your rear wheel speed. Here you are stopping your rear wheel from turning.

c. Moving from a dead stop – lesson three

Now it’s time to use the clutch and the engine to actually move your bike without stalling your engine. This is the lesson you did on day one of your range work, without first learning where the start of your friction zone is, or that you need to hesitate at the sweet spot.

You’ll do exactly what you did in the second lesson, but don’t squeeze your front-brake lever. Wrap all four fingers of your right hand around the throttle grip and maintain an engine speed of about twice its idle rpm. While hesitating at the sweet spot within your friction zone, allow the bike to gradually move forward about six inches, then ease the clutch lever back out of the friction zone until you are near its start. Use your legs to push the bike back into its starting position. Repeat this lesson, rocking the bike forward and back, easing the clutch lever into and back out of the friction zone, until your muscle memory fully “understands” the feeling of hesitating in the friction zone as the bike begins to move. You don’t need to hold your front-brake lever during this lesson; you already mastered the concept that your clutch lever controls how much engine power gets to your rear wheel. Your clutch controls your bike’s speed. We will do much more later to cement that concept.

Your objective with this lesson is to cause the bike to move without stalling the engine, and without losing control of it (without letting the bike launch from where it was parked).
When you start to move your bike from a dead stop, **let the engine do the work**. You don’t have to race the engine to move it, and you definitely don’t need to use your legs to launch the bike forward. These behaviors indicate that a rider is new to riding and not well trained.

**d. Synchronizing engine and rear wheel speed – lesson four**

If you hadn’t stopped the bike’s movement during your third lesson by easing the clutch lever back out of the friction zone, the bike would have continued to roll forward; but it would have been extremely unstable, as it wouldn’t have enough speed for you to do anything but “duck-walk it” with your feet. In order to gain speed and, thus, stability, one of two things must happen: either allow more power to reach the rear wheel by easing the clutch lever farther into the friction zone, or apply more throttle, so that the engine rpm increases. There’s a third alternative: do both.

This lesson is designed to show you that your engine and rear wheel speeds are synchronized only when you leave the friction zone. Synchronizing occurs while you are within it. No matter where you hold your clutch lever within it, there’s some amount of clutch slippage going on.

Repeat the third lesson, but this time allow the bike to keep moving (as you “duck walk” it), and ease the clutch lever all the way through the friction zone so that you pass position 4. That applies all the power the engine is producing to the rear wheel and, as a result, the bike’s speed has increased until the rear wheel speed is synchronized with the engine speed.

Determining that you have reached position 4, or the end of your friction zone, is subtle. You’ll know that you’ve reached that point because, as you pass it, the bike no longer tries to move faster. When you’ve learned where the friction zone starts and ends, you’ve learned the complete limit of where that clutch lever is effective in influencing your bike’s behavior. And just like all positions between 1 and 3, after you pass position 4, it doesn’t matter how fast you allow the lever to move all the way to position 5. In the range between 4 and 5, all of the engine’s power is reaching the rear wheel.

You’ll quickly find that you can’t keep up with the bike’s speed by just duck-walking it. Put your feet up onto the pegs as soon as you reach a stable speed consistent with your engine speed. Then squeeze the clutch lever to bring it within the friction zone again. Observe that your bike slows. Before it gets too unstable to avoid falling, reverse direction again with your clutch lever and ease it back through the friction zone until you reach position 4 or beyond. Again you’ll notice that your bike’s speed increases. When you run out of space on the range, squeeze both levers to bring the bike to a stop, putting both feet on the ground, then duck-walk it around to face in the direction you came from. Repeat this as often as you wish until you absolutely understand that while you are anywhere within the friction zone, your engine and rear wheel speeds are trying to synchronize. Only when the clutch lever has left the friction zone are they in synch.

The objective of this lesson is to change your thinking about the purpose of the clutch lever. It is not merely a binary switch-like device that connects or disconnects your engine from your rear wheel. It’s used to control how much engine power goes to that rear wheel, on a spectrum as wide as your friction zone; and, thus, it controls the speed of that rear wheel with incredible precision.

We stated above that you can allow the clutch lever to move as fast as you want to, once you have moved it past the end of the friction zone. That includes, for example, simply letting go of the clutch lever (*something that you should never do unless your clutch lever is beyond position 4*).

As you master control of your clutch and friction zone, remember: all riders make mistakes, sometimes starting in the wrong gear or missing a gear when shifting. But if you’ve mastered clutch control, it’s only embarrassing.

**e. “Slow race” – lesson five**

We stated in lesson three that you’ll learn with absolute confidence that at slow speeds, it’s your clutch lever, not your throttle, that controls how fast your bike is moving.

Find an open area on your parking lot that is level and at least 100 feet long for this lesson.

Position your bike at the start of this area, and place it in first gear, squeezing the clutch lever and front-brake lever firmly.

Roll on your throttle until the engine is running at about twice idle speed and leave it there. Release the brake lever. The bike should not move.

The objective of this lesson is to learn with absolute clarity that your clutch lever is what you use to control your motorcycle speed when moving slowly, not your throttle or brakes.
Move your clutch lever into the friction zone to the sweet spot where the bike begins to move. Then begin to ease it out even farther as the bike picks up speed. Put your feet on the pegs. Hesitate within your friction zone as the bike’s speed begins synchronizing with the engine speed, and then let the clutch lever move farther into the friction zone, but not all the way to position 4. Your bike’s speed will increase. Hesitate within the friction zone as the bike stabilizes at its new speed. Now start to pull the clutch lever back toward position 3, the start of the friction zone and allow your motorcycle to slow down as a result.

Your motorcycle is moving continuously during this effort; only its speed is changing modestly. You want to get to the end of that 100 foot area moving as slowly as you possibly can. That means that you will make constant adjustments to the position of the clutch lever to keep the bike’s speed fast enough to be stable, but not any faster. As the bike slows down and becomes a bit unstable, allow the clutch lever to move farther into the friction zone so that the speed of movement increases. When you’re stable, pull back on that lever to prevent the bike from going faster.

With experience you’ll find that you can “dial in” the right amount of clutch lever travel to maintain a barely stable motorcycle speed without a lot of additional changes to its position; but as a new rider, you will be making virtually constant adjustments to its position.

As a new rider, you may also find that your automatic reaction to feeling that your bike is becoming unstable, because it is going too slow, is to increase your throttle. That is absolutely not allowed in this lesson. Another automatic reaction you may experience is lifting your feet off the pegs and feeling for the ground with them as you reach for the front-brake lever. That is also not an appropriate behavior during this lesson, but it is an understandable one for a beginner, and not nearly as dangerous as trying to roll on your throttle.

The proper reaction to low speed instability is to increase speed by instantly easing out the clutch lever. Indeed, learning that behavior is the real purpose of this lesson. You are to control your bike’s speed when moving slowly by using your clutch lever’s friction zone.

By the way, a normal and proper reaction to a bike’s slow-speed instability is to twist the handlebar in the direction the motorcycle is starting to lean. You will want to become good enough with your slow-speed clutch lever control that you don’t have to do that very often; but that will be the result of practicing and developing outstanding balancing rather than clutch-lever skills.

For perspective, you can assume that any speed less than 10 MPH is slow speed. If it takes you 10 seconds to travel the entire 100 feet, then your average speed along the way is 6.8 MPH and is just fine for a beginner. Taking 20 seconds to travel 100 feet means your average speed is 3.4 MPH, which is excellent for most riders. At 30 seconds, your average speed is just 2.2 MPH, which is indicative of outstanding control of your clutch lever.

Your speedometer is not very accurate at these low speeds. But it’s not at all important that you measure your actual average speed during the “slow race”. You can glance at your watch when you start or simply count “one-one-thousand”, etc. as you ride the 100 feet. That’s perfectly adequate for this lesson. What you want to know is approximately how long it takes to travel the distance, with the objective of taking as long as you can.

While we’re at it, let’s discuss your goals during your practice sessions. If you’re a beginner, then each practice session should be used to get a little bit better, at least until you feel that you are “good enough” for that session. In the case of the “slow race”, if you are able to travel 100 feet in about 15 seconds, then that’s what you are capable of doing. The next time you work on slow-speed skills, you’ll want to do some more “slow races” and try for 20 seconds. Sooner or later you’re going to decide that it’s good enough for you. From then on, your practice sessions will be less stressful, and all you’ll do is confirm that you can still take at least 20 seconds to travel 100 feet. Other than at a real “slow race” (a fun event at motorcycle rallies), what difference does it make whether you can ride with confidence at 5 MPH or 4 MPH? A professional motor-cycle law enforcement officer might be able to average a speed of 3 MPH or even less in a “slow race”. A trials rider could take hours to travel 100 feet, if he wanted to. You aren’t either of those people yet. If you wish to excel at this skill, practice.

**f. Coordinated left and right hand control – lesson six**

Until now you have ignored your throttle during these exercises. Normally, however, when you start from a dead stop, your throttle is providing just idle engine speed, and
you will roll on that throttle at the same time as you find your sweet spot in the friction zone. Then, as your bike picks up speed, you will roll on still more throttle as you ease your clutch lever out of the friction zone. The result will be that your engine and rear wheel speeds are fully synchronized quickly, and you will have no further need to use your clutch lever except when you shift gears.

The objective of this lesson is to establish a coordinated left and right hand behavior when starting out from a dead stop. You’ll learn that it is absolutely unnecessary to race your engine or to push the bike forward with your feet in order to help launch it forward. Your engine will do all the work.

Starting with your engine running and both feet on the ground, squeezing both levers, using no throttle at all and in first gear, release the front-brake lever and begin to find the sweet spot within your friction zone as you gently roll on the throttle.

Slowly ease out the clutch lever as the bike begins to move and your engine speed approaches about twice its normal idle speed. Put your feet on your pegs. When your clutch lever gets past position 4 (the end of the friction zone), your engine and wheel speeds are synchronized, and your throttle becomes the sole control of your bike’s speed. You have properly started moving from a dead stop at this point, because you didn’t stall or race the engine in the process.

As simple as all this may sound now, because of what you learned in the previous lessons, it will surprise some to hear that you’ll stall your engine with some regularity until you’ve practiced enough that the coordinated movements of both your hands become smooth and effortless. Until then you’ll want to roll on more throttle than you actually need, sometimes to high or “racing” speeds. Remember, always, always ease out the clutch.

h. Saving a falling bike – lesson eight

When you are riding at speeds of less than about 10 MPH, all steering is direct. That is, if you want to turn to the left, you need to turn your handlebar to the left. At higher speeds, all steering is accomplished in exactly the opposite manner. That is, when you want to turn to the left, you will attempt to turn the handlebar to the right. That is called counter-steering and is the subject of several later lessons. We bring it up here because that crossover speed (about 10 MPH) is where several other changes occur in how your motorcycle behaves. The most important of these changes is that when traveling below that speed, if you are going too slowing while in a turn, your motorcycle will try to fall down, but if you are traveling above that speed, it will try to fall up. That doesn’t make sense, yet, but we will soon discuss why in some detail.

The objective of this lesson is to learn how to use the clutch lever to “save” a bike that is falling during a low-speed turn.

Begin riding a relatively small circular path in first gear travelling at about 5 MPH. The radius of the turn should be about 20 feet and will result in your bike having a lean angle of close to 5 degrees as you ride it. You must be riding in a stable, not a wobbly manner! If you are wobbling, slightly increase your speed. There is no possibility that the bike will fall while riding this path so long as you do not lower your speed. For this reason, you are not to cover your front-brake lever, and you are not to touch your rear-brake pedal. You are to adjust your speed using only your clutch lever; which
means that you must be riding with your clutch lever somewhere within its friction zone and with the engine running at least twice idle speed, using the throttle for that.

Gently pull your clutch lever in toward the grip, and observe that the bike’s speed will decrease. You’ll feel that the bike is about to fall down. At that point, immediately reverse the direction of your clutch lever and ease it farther out so that the bike’s speed increases. You learned that increasing speed will prevent a bike from falling if you’re riding at slow speed. Control of your motorcycle at slow speeds is primarily a function of what you do with your left hand.

Please pay attention here. If you don’t do this right, if instead of gently pulling the clutch lever toward the grip in order to reduce your speed, you happen to grab a handful of clutch lever and bring it all the way to the grip, your bike will fall down.

Fortunately, you learned to react to a falling bike by letting go of the down-side grip, stepping on the higher peg, and stepping away from the bike with your down-side leg. This is why you learned that set of moves.

This lesson is not designed to teach you how to safely drop or dump a motorcycle. It is how to prevent a slow-moving bike from falling by increasing its speed. Also, don’t tap the ground with your down-side foot if you feel the bike start to fall, even though that’s an instinctive behavior that is hard to prevent. Practice this lesson a few times to get control over that instinct.

On the street, if you feel like your bike is going to fall down during a slow-speed maneuver, you will probably roll on some throttle and change your path of travel, abandoning the direction you were going in favor of insuring that you don’t actually fall. As long as you move safely into a new path, that’s fine! But we have not yet practiced throttle control and, believe me, if you over-react with your throttle, you can easily change the situation from a near-drop of your motorcycle to a wildly out-of-control race into a brick wall or fence or parked car or curb. Let’s learn motorcycling one step at a time, and do it in a sequenced manner that allows us to remain in control of the motorcycle at all times.

i. Remedial lesson to correct stalling
Some people simply have more trouble starting from a dead stop without stalling their engines than others and cannot, despite practicing lesson six, avoid occasional stalls. In an effort to avoid such stalls, these people inappropriately use a great deal more throttle than they should—they race their engines. Riders can get away with doing that, of course, but you are practicing to learn how to control your motorcycle.

One exercise will completely cure your stalling problems. As crazy as it may sound, all you have to do is practice lesson six by making it harder to do. That is, instead of starting out in first gear, try to start out in second gear. Certainly, at first you’ll stall more often than you did when you tried to start out in first gear; but as you practice starting out in second gear, you will occasionally be successful. You will learn even more subtle clutch and throttle coordination control in the process. When you can successfully start out from second gear more often than you stall the engine, you should not have any more trouble starting out in first gear.

j. Hand cramps
The newer you are to motorcycling, the more likely your left hand will feel very tired from simply using the clutch lever. It can get so bad, for some, that their hand will actually cramp. You should pace yourself and rest between practice lessons whenever you feel that left hand protesting. Don’t be surprised if your left hand is sore the next day, too.

In just a few days the muscle tone in your left hand will develop sufficiently that it will no longer feel tired and sore from normal use of the clutch lever. A long practice session, however, will always result in left hand fatigue. The solution, of course, is not to do practice sessions that are too long in duration. A half hour of practice is adequate for most people. An hour is too long.

When you become fully competent as a rider, you should develop the habit of doing a pre-ride parking lot practice to assure that all is well with you and your bike. That session is adequate if it lasts no more than five minutes, and you won’t usually notice any problem with hand cramps in that time.

2. Front-brake lever
Since your front-brake lever is the second most important control on your motorcycle, and because it is almost as effective as your clutch lever in saving your life, you need to master its usage as soon as possible after you have mastered the clutch lever. This parking lot practice discussion will lead you to that mastery and help you avoid common mistakes made by others who have attempted to gain that mastery in a less structured manner.
Please be aware that proper usage of your front-brake lever can save more lives than just your own: motorcycles kill pedestrians, automobile drivers and automobile passengers, and with alarming frequency, the passengers they are carrying. Here’s an example of a case of a nearly fatal lack of skill:

We receive e-mails similar to the one that follows with some regularity. Notice what the rider’s lack of understanding about brake usage caused, along with his unquestioned adoption of certain myths commonly held by a part of the motorcycling community. The response shows how we deal with them. (Identifying information has been removed for privacy purposes.)

I was recently in a motorcycle accident with XXXXXXXXXX as a passenger. We were forced to react to an illegal turning large truck that blocked all means of us swerving to avoid.

Our motorcycle was a XXXX Harley-Davidson Electra Glide without ABS.

After a quick analysis of the avoidance options, I braked hard using rear brakes first then adding front. With a curb right, my lanes blocked by the now stopped truck and oncoming traffic left, it seemed I had no other resources available. I had accelerated slightly at first from 35 to 40 with the hopes of a lane change and knew there was rear following traffic.

The police report indicates that I am at fault for my (passenger’s) injuries, which include a xxxxxxxxxxxxxxxxxxxxxxxx. This is a class 2 felony if convicted in my state.

How can I get data that shows 90 feet would not have been enough room to stop on this large Harley with the passenger weight included. My braking was 164 feet with less than 6 month old tires and brakes with minimal miles on them. Everything I find regarding braking distance on the Internet provides a vast array of different data from quite a few resources, mostly manufacture adjusted motorcycles for police force testing.

My ability to display my non-fault for the accident is more important to me that anything but (passenger’s) full recovery, but I don’t believe I have the accurate details to defend myself. I also don’t know if the report uses very generic info to calculate the findings.

I have never been charged for a crime in my XX years of life and your assistance in any manner would be greatly appreciated.

Our response:

XXXXX,

We're terribly sorry to hear of the accident and its outcome. If you don't mind, we'd like to make this a bit of a tutorial for you so that you can answer your own question.

First, let’s assume that you had either MSF or Riders Edge training. During that class you did a braking skill test in which you had to bring your bike to a complete stop starting at 20 MPH within 23 feet in order to not get any points. In other words, the recognized standard minimum braking capability, even for rank amateurs riding an unfamiliar bike is met by achieving a deceleration rate of 0.6g's.

In that class you were also told to use both brakes for quickest, shortest, stops.
You learned that as you decelerate weight transfers from your rear wheel to your front wheel which makes the front brake more and more effective as traction increases on the front tire, and the rear brake less and less effective for the same reason.

Many old-timers, especially Harley riders, shy away from using their front brakes for fear that if they over-use that brake they will get tossed over the handlebar. That is simply untrue. In fact, it is virtually impossible for most Harley-Davidson’s to do a stoppie, so it’s a dead certainty that they cannot do an end-over. But the myth remains; and the result is that Harley riders, especially, over-use their rear brakes. Here is a fact: It is never, ever, not once in your lifetime appropriate to aggressively use your rear brake. Period!!!

The height of your combined bike and rider/passenger center of gravity on a Harley is relatively low as compared to the length of its wheelbase. Sportbikes, on the other hand, have a relatively high Center of Gravity) as compared to their wheelbase length. That means that for any given deceleration rate, a Harley transfers less weight (as a percentage of its total weight) from the rear to the front than does any sportbike. That is why sportbikes can stunt and do stoppies and wheelies with ease, but your bike cannot.

Now let’s look at what happens when you use only the rear brake on your Harley. By the time you get to a deceleration rate of only about 0.4g’s, the rear tire skids. That, because there is no more weight on that tire and, thus, no more available braking traction. That means that you cannot stop with a deceleration rate in excess of about 0.4g’s using just your rear brake. Notice, please, that that is far below the 0.6g’s of deceleration that even a newbie achieves to pass the basic rider course.

Using the rear brake first, as you probably did (not just because you said so, but it is consistent with that myth) is dumb. Since you have no less than 70% of your stopping power in your front brake, why would you delay using it?

Now, let’s assume that you achieve a deceleration rate of 0.4g’s starting at a speed of 40 MPH. How much distance will it take you to stop? It would take you 133 feet!

If you were no more competent with your brakes than a newbie in a beginners class, and achieved a deceleration rate of 0.6g’s, how much distance would it take you to stop your bike? It would take you 89 feet. In other words, you would have stopped in less than the 90 feet you said you had to stop in.

But here is a bit of real world for you ... almost any competent rider can achieve a deceleration rate of 0.8g’s during a panic stop, and leave no skid mark in the process. And, at 0.8g’s, your bike would come to a complete stop in only 67 feet.

Finally, adding weight to a motorcycle does not increase stopping distance or time. All you have to do is use more brake (squeeze harder) because the added weight increases your traction.

So, XXXXX, your lack of understanding of how to use your brakes and your over-use of your rear brake probably constitutes rider error in a court of law. That translates into *your* negligence as a principal contributor to the cause of the accident.

We wish we had better information for your soul, but those are the facts, friend.

This letter is worth consideration for several reasons. First, it’s naive to think that the only two outcomes from an accident are that you live or die. Both moderately severe and serious injuries as a result of a motorcycle accident are much more common than death. That means living with the consequences, however difficult that can be.

In the case described above, nobody died, though the lady passenger probably came close. But she had severe injuries and may well suffer for the rest of her life, because she trusted her welfare to a rider who was negligent in two ways: he used his rear brake improperly on the occasion in question, and he didn’t understand how to use his brakes
correctly in general. But the hapless rider may also suffer. He may be faced with legal, financial, career, and psychological problems that may also last for the rest of his life. He may decide that he never wants to ride again; and he may never be able to afford to.

Surely it makes sense to do absolutely everything possible to learn how to control your motorcycle and, especially, how to properly use your clutch and front-brake levers at a master’s level of competence.

a. Concepts

- Your brakes are not designed to stop your bike when it is moving. Instead, they are designed to slow the bike from any initial speed all the way down to a dead stop, and anywhere in-between. If they were designed merely to stop your motion, they would be like an on-off switch; applying your brakes would always result in skidding tires.
- Gravity is merely acceleration. When you are close to the earth, falling in a vacuum would result in your speed increasing by 32 feet per second every second. That rate of acceleration is known as 1.0g. It is also used as a measurement of deceleration.
- How fast you can stop a moving vehicle is primarily a function of the traction available.
- What your brakes do is convert one form of energy into another: kinetic (motion) into heat.
- Contrary to popular belief, stopping is not a function of weight. A heavier motorcycle can stop just as quickly as a lighter motorcycle. It is the contact of your rubber tires with the roadway, and how much pressure (weight) is pressing them together, that determines how much traction you have. Thus, a heavier bike has more traction available for braking. In other words, though a heavier bike takes more braking effort to stop, there is more traction available so that by squeezing the brake lever harder, it can stop just as quickly as a lighter bike.
- The quick-stop capability of rank amateur motorcycle students, tested for minimum deceleration while riding unfamiliar bikes, is 0.6g’s.5

Such performance is completely unsatisfactory in the real world when you must avoid a collision.

- With practice, your braking performance should achieve a deceleration rate of at least 0.8g’s. Almost any experienced rider can achieve this level of braking performance. In other words, an experienced rider is able to stop his motorcycle that is moving at 20 MPH in less than 17 feet.
- When a car driver stomps on his brake pedal in an emergency and locks all four wheels, his car will slow down with a deceleration rate of approximately 0.8g’s. Surely, as a competent motorcyclist, you want to be able to slow down just as quickly as the vehicle that’s stopping in front of you, no matter what kind it is.
- When a car that’s equipped with ABS is involved in an emergency stop, it achieves a deceleration rate of slightly more than 0.9g’s. Only very skilled motorcyclists can achieve that rate or better.
- While a very skilled rider can achieve deceleration rates of at least 0.9g’s (stopping from 20 MPH within 15 feet), a world-class rider can often achieve deceleration rates in excess of 1.0g’s (stopping within 13.5 feet).
- When you decelerate, weight transfers from your rear tire to the front tire.
- Increasing the weight on the front tire increases its traction, allowing you to brake more aggressively.
- The amount of weight transferred during deceleration is a function of the deceleration rate and the ratio of the height of the Center of Gravity of the bike and rider combined to the length of the wheelbase. In other words, a bike with a high CG (Center of Gravity) and short wheelbase (such as a sportbike) transfers more weight (as a percentage of the total weight) for any given deceleration rate than does a bike with a low CG and / or a longer wheelbase (such as a cruiser).
- If you transfer more weight from the rear tire than exists, the rear wheel is lifted off the ground. This is called a “stoppie”. Now you know why sportbikes can “stunt” with ease while cruisers cannot.
- Riders should virtually always use both brakes at the same time when they need to stop quickly.

5 MSF requires a student to stop within 23 feet from 20 MPH. With a starting speed of 20 MPH (29.34 ft/sec), the average speed during the stop is 10 MPH, or 14.67 ft/sec. Thus, it takes a total of 1.57 seconds to stop (23 ft / 14.67 sec), and the bike must be shedding 18.69 ft/sec of speed every second (29.34 / 1.57). That is a deceleration rate of 0.58g’s (18.69 / 32.2). Rounded, that is 0.6g’s.
• Use of the rear brake, alone, cannot result in a deceleration in excess of about 0.4g’s. This is because, with a normal height of CG to length of wheelbase ratio, you transfer all of the weight off the rear tire that can be used for braking at that rate of deceleration and, thus, the rear tire cannot produce any more stopping power. This is the worst possible braking method in the event of an emergency and is even worse than the inadequate 0.6g’s a rank amateur must achieve in his beginner’s riding class. As the following chart shows, even when a rider uses both brakes, the rear brake’s contribution to the overall deceleration rate cannot exceed about 0.4g’s. It also shows you why you must moderate your braking pressure on the rear-brake pedal as the bike’s deceleration rate exceeds 0.4g’s in order to avoid locking the rear wheel and causing it to skid.

• Unless your bike can perform a stoppie, no amount of braking can cause you to be launched over your handlebar.

b. You must master the front-brake lever

Of all the concepts listed above, you probably noticed that passing the quick-stop braking skill test during the BRC indicated that you had only a trivial braking capability, inadequate for the real world. At the end of that class you probably heard your RiderCoach tell you that you were qualified only to ride on a parking lot at speeds less than 20 MPH as a result of passing.

Perhaps you laughed and “kinda got it”, but now you should know that he was deadly serious. Your state’s willingness to issue you a motorcycle endorsement, you would think, indicates that the authorities are convinced you are qualified to ride on public streets.

This is a government failure of consequence.

The Department of Public Safety in your state has abdicated its licensing responsibility (at least as to certifying your minimum competence to ride on public roads) to an organization (the MSF or another training program) which itself does not believe you are qualified to do so.

After mastering your clutch lever, your parking lot practice sessions should focus on the front-brake lever so that you can master its usage. Until you are proficient in its use, you are not ready to ride on public roadways.

c. Minimal Brake Pressure – lesson one

There must be some free play in your front-brake lever. That is, you must be able to pull the lever perhaps a quarter of an inch toward the grip without it causing either your brake lights to turn on or activate your brakes.

The objective of this lesson is to learn how little braking pressure is required to cause braking to start.

With the engine off, but your ignition turned on, stand on the right side of your motorcycle facing toward the rear and determine how much free play exists in your front-brake lever. You’ll see your brake lights come on when you’ve reached the end of the free play.

That’s the minimum brake pressure you can provide to your front-brake lever to accomplish any result.

d. The CAUTION/WARNING/DANGER Signal – lesson two

Your brake controls provide two functions: braking and signaling. They are both important.

![Figure 17: Maximum deceleration rate from rear brake](image)

The objective of this lesson is to demonstrate how to use the front-brake lever as a signaling device.

While riding your motorcycle at any speed less than 20 MPH around a large circular or oval pathway, quickly, but gently, squeeze the front-brake lever, then release it. Do this two times. The amount of pressure you apply to the lever should cause your brake lights to come on but will have essentially no effect on your speed. This is how you “tap your brake” as a motorcyclist and it’s a useful and important behavior. What
you have done is issued the “CAUTION / WARNING / DANGER” signal to all vehicles behind you saying be alert, because you may have to brake suddenly.

e. The gentle touch – lesson three

Automobile drivers learn pretty quickly that normally they are to be gentle with their brakes except in an emergency. In an emergency, they slam their foot against the brake pedal and press as hard as they can. Finesse is no part of their mindset in an emergency, nor is it part of their technique. It took a few tries at normal braking for most automobile drivers to learn not to be aggressive with the brake pedal, as passengers were startled, drinks in cup holders sloshed the interior of the vehicle, and they didn’t like looking clumsy.

Your motorcycle brakes are far less forgiving than automobile brakes. And, unlike the brakes in your four-wheel vehicle, they have two controls and are activated individually. You must use distinctly different techniques in using the front-brake lever and the rear-brake pedal.

For example, in an emergency on a motorcycle you must never, ever, not once in your lifetime be aggressive with your rear brake, while being aggressive with the front-brake lever means squeezing hard, to begin with, and progressively squeezing harder and harder. Being aggressive means using anything more than gentle but firm pressure.

“Grabbing a handful” of the front-brake lever can be just as dangerous as “stomping on” the rear-brake pedal. Normal usage of your bike’s brakes requires a gentle touch.

The objective of this lesson is to demonstrate that your front-brake lever can be almost as sensitive as your clutch lever in controlling the speed of your motorcycle, especially when riding at slow speeds.

Repeat the clutch lever lesson (lesson seven, 54) called “Not just in a straight line”, but this time you are to keep your left hand off the clutch lever and cover your front-brake lever with just two fingers. Use your front-brake lever, gently, to cause your motorcycle to slow down in precisely the same way as you had earlier used your clutch lever. Experience the trivial speed changes using the brake lever that feel similar to the changes you caused with your clutch lever.

When you release the front-brake lever, your motorcycle will resume the speed it had before you applied that braking pressure.

c. Normal stops – lesson four

You were taught during the BRC that you were to use both brakes whenever you wanted to bring your motorcycle to a stop, and you were tested on being able to stop within 23 feet when you were moving at 20 MPH. (The MSF now has students perform this stop while moving at from 12 to 18 MPH.) As you learned in the “Concepts” section above, such a stop (though called a “quick-stop” by your RiderCoaches) resulted from your having achieved a deceleration rate of only 0.6g’s. You also learned that such a deceleration rate was inadequately low in the real world, when your life depends on collision avoidance.

This objective of this lesson is to verify for you that a deceleration rate of only 0.5g’s is easily attainable using only your front brake, and that any deceleration rate of 0.5g’s or less is usable in normal riding situations.

Don’t use only your front brake when you brake at such a low rate, but understand that you can, since the vast majority of your braking capability comes from the front brake. But normal braking rates, even when using only the front brake, are not particularly dangerous and cannot result in your being tossed over the handlebar.

With chalk, make the following marks on a portion of your parking lot that is unobstructed.

You were taught during the BRC that when you stop a motorcycle you are to put your left foot down, or that you were to put your left down first followed with your right foot. We’re telling you that you should always place both feet on the ground at the same time when you stop a motorcycle. Holding your front-brake lever is perfectly adequate to prevent your bike from moving after you stop; normally, you will not need to use your rear-brake pedal to do that. Because you cannot possibly know that the ground will always be level where your bike comes to a stop, and because any lean of the roadway can be either to your right or left, the only possible way to insure that you keep your bike vertical when it is at a dead stop is to hold it with both feet on the ground. The heavier the bike is, the more important it is that you do this.

Figure 18: PLP Stopping Lines

<table>
<thead>
<tr>
<th>Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
</tr>
<tr>
<td>33</td>
</tr>
<tr>
<td>27</td>
</tr>
<tr>
<td>22</td>
</tr>
<tr>
<td>19</td>
</tr>
<tr>
<td>17</td>
</tr>
</tbody>
</table>

| Gate |

[501x278]Figure 18: PLP Stopping Lines
Approach the “gate” (dashed lines) from the bottom of the course layout, riding at as close to 20 MPH as you can manage with your head up and your eyes looking straight ahead. Using peripheral vision, when your front tire touches the gate, begin **squeezing** your front-brake lever. Recall that you are covering your front-brake lever with only two fingers. That is to discourage you from grabbing the lever. This is not a quick-stop! Instead, you are to attempt to stop your bike with your front tire resting on the line 44 feet from the gate. Again, you are to use your peripheral vision to determine where you are to stop.

This is a very gentle, normal stop. When your bike has come to a complete stop, if your tire is on the 44 foot mark, you have achieved a deceleration rate of 0.3g’s. This is the kind of stop you will use as you come to an intersection with a signal light that has already turned red or with a stop sign. There is nothing aggressive about this stop.

Next, repeat the lesson but stop with your front tire resting on the 33-foot mark. You will need to squeeze your front-brake lever a little harder to accomplish this; and when your bike has come to a complete stop, it will have achieved a 0.4g deceleration rate. This is the kind of normal stop you will use when approaching an intersection when you notice a signal light changing from green to yellow. It is not a difficult stop in any way. When you first begin squeezing the brake lever, you’ll use the same gentle effort as when trying for the 44-foot mark, but this time you progressively squeeze harder until you can see you’re getting close to touching the 33-foot mark. This is called “progressively squeezing harder” and is the proper way to use your front brake—*always*.

Finally, repeat the lesson but stop on the 27-foot mark. This is the kind of stop you will make when you notice a potential threat ahead of you but do not believe it is likely to result in a collision. You just want to stop well before it becomes a problem. When your front tire stops on the 27-foot mark, you have achieved a 0.5g rate of deceleration.

Again, you will need to progressively squeeze your brakes harder than before in order to accomplish this relatively rapid, but normal, stopping challenge.

Repeat the last run, but this time use a medium amount of pressure on your rear brake at the same time you use your front brake to bring your bike to a stop. **This is the real way normal braking is performed.** In other words, do not get in the habit of just using your front brake.

You should have noticed that as your deceleration rates increased, you felt more and more of your weight on your hands and wrists. This is a perfect example of the weight transfer that occurs whenever you change speed. The greater the deceleration rate (or acceleration rate), the greater will be the resulting weight transfer. This also vividly explains for you why you never remove your right hand from the grip and simply reach for the front-brake lever to pull it back in an emergency. You need the palm on your grip to support that weight transfer, in order to remain in control of your motorcycle.

See APPENDIX B – Weight Transfer.

**g. Normal braking in a curve – lesson five**

Of course you can use your brakes while you are riding in a curve. At no time during the BRC are students told that they must not brake in a curve. No BRC material, written, video, or range work tells them that. Instead, students are told that aggressive use of the brakes while leaned over should be avoided and when it is necessary to stop quickly in a curve they are to either straighten their bike first then brake or begin to apply brakes while squaring up. Still, a few students graduate that class believing that they are not ever to brake while in a curve.

When you use your brakes while in a curve, your bike is leaned over and your tires are experiencing a cornering force which is often called “centrifugal” or “lateral”. Because your tires can provide only a limited amount of traction, it is possible for the combination of centrifugal force and braking force to exceed that limit and cause your tire to begin to skid or slide if you use your brakes while in a turn.

That means that you must never use aggressive braking while in a turn, and never make an aggressive turn while using normal braking. Certainly you must never attempt to use both aggressive braking and aggressive turning at the same time. There is substantially more traction available for use than most people realize, but it’s a good idea to understand the whole concept—because it has frequently been misrepresented in what is erroneously called a “traction pie.”

See APPENDIX C – Traction Pie.

Now consider this: **Normal cornering** forces also never exceed about 0.5g’s of centrifugal force. When riding curves at normal and reasonable speeds, you never exceed about
50% of your tire’s traction. Thus any combination of normal braking and normal cornering can be done at the same time without threat of losing traction in the process. But if either aggressive braking or aggressive cornering forces exist, you must not brake and corner at the same time.

Don’t apply your front brake during a tight turn or a very slow (<10 MPH) turn! Assume that slow-speed direct-steering is “aggressive cornering”, and any braking effort at the same time is inappropriate. This doesn’t mean that you may exceed the amount of available traction. It means that simultaneous slow-speed turns and braking let gravity get the better of centrifugal force, and the bike falls down.

The objective of this lesson is to learn that you can use normal braking when riding in a turn at normal speeds.

Repeat lesson four, on page 60 (“Normal stops”), using the 37-foot mark as your target. When your bike stops with the front tire on the 37-foot mark, you will have stopped using a normal deceleration rate of 0.4g’s. With the feel of that stop fresh in your mind, begin riding around a large circle or oval path at a speed of 20 MPH. “A large path” means one that uses most of the parking lot.

While the bike is leaned over (meaning that you are in a curved portion of your path of travel), apply 0.4g’s of braking pressure using just your front-brake lever. Do not stop! Just experience the bike begin to slow down. Immediately release your front-brake lever and continue to ride on the same path. You have just discovered that you can brake gently while you are in a normal curve. You just did.

Repeat the lesson by first doing a normal stop using the 27-foot mark as your stopping target. When stopped, you will have just experienced a normal 0.5g deceleration rate. Begin riding the large circular (or oval) path again, and briefly use a 0.5g braking effort with your front-brake lever. Again, do not stop! Release the front-brake lever and continue your ride.

Repeat these exercises and master the technique for gently stopping in a curve. You must straighten the bike up before applying your brakes to stop in a curve instead of just slowing down. Once you have straightened the bike, it will no longer follow the curve but will go straight until you stop. When you have experienced this technique a few times, you will never forget it, but do not practice aggressive braking in a curve now. You will learn the technique just as well making gentle stops.

h. Aggressive (quick) stops – lesson six

When your life depends on it—when a collision must be avoided if at all possible—is when a rider uses aggressive braking.

When a rider recognizes a serious threat of a collision, he or she usually must fight a huge dose of adrenaline at the same time that aggressive braking is called for. That adrenaline can cause the unprepared rider to panic and simply freeze at their controls. But if you have learned how to do aggressive braking—learned what it feels like when you are doing it right—then all you have to do is what you remember practicing.

During the BRC, you were taught to down-shift while braking, so that your bike is always in first gear when you come to a stop and is ready to move again, if necessary. This advice is unrealistic for riding on the street, and it should be ignored.

If you must make an aggressive stop with your motorcycle, you should concentrate on only one thing: stopping safely. Any attention spent on shifting gears, or how you look, is a distraction. No matter what gear you are in when you start to make an aggressive stop, your attention should be exclusively on progressively squeezing your front-brake lever, with little to none spent on also using your rear brake, and absolutely none whatsoever on anything else. After you stop, you can down-shift one or more gears.

Why must you focus so much attention on the front-brake lever during an aggressive stop? Because you need to recognize if you are over-doing it. That is, you need to sense that either tire is about to or has already begun to skid so that you can immediately ease off the pressure you are using on both brakes. Assuming you’ve absorbed the information on weight transfer, you should know that a stoppie (lifting of the rear wheel off the ground) cannot happen unless you have exceeded a deceleration rate of at least 0.9g’s.

A rank amateur motorcycle rider can, as you’ve experienced, achieve a deceleration rate of at least 0.6g’s. An experienced rider, who has even modest braking experience behind him, can achieve deceleration rates of at least 0.8g’s in an emergency.

Here’s the problem: most motorcyclists will not allow themselves to reach a deceleration rate higher than about 0.8g’s, for fear of being tossed over the handlebar—even if
the rider’s life depends on it. A very skilled rider who regularly practices his braking skills can achieve deceleration rates in excess of 0.9g’s. Only riders with world-class braking skills can consistently achieve a deceleration rate that exceeds 1.0g’s while maintaining control.

This table was created from data published in the January 2006 issue of Motorcycle Consumer News showing the top eight motorcycle stopping performance (60 to 0 MPH).

Notice that they each achieved a deceleration rate of 1.1g’s. Practice your braking skills to the point that you can at least achieve a deceleration rate of 0.8g’s.

After a year or so of riding experience and a lot of parking lot practice sessions, you may decide that you wish to develop the braking skills of very skilled riders, but it’s too early in your riding career to reach that far at this time.

<table>
<thead>
<tr>
<th>Motorcycle</th>
<th>Distance to stop from 60 MPH</th>
<th>Deceleration rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999 Triumph Speed Triple</td>
<td>106.7 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>1997 F6 Valkyrie</td>
<td>107.4 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>1997 Suzuki Marauder 800</td>
<td>107.6 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>1997 Yamaha YZR600R</td>
<td>108.2 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>1998 Ducati 750 Monster</td>
<td>109.1 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>1998 Suzuki TL1000S</td>
<td>109.4 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>2002 Honda VTX 1800</td>
<td>109.5 feet</td>
<td>1.1 g's</td>
</tr>
<tr>
<td>2002 Harley V-Rod</td>
<td>109.5 feet</td>
<td>1.1 g's</td>
</tr>
</tbody>
</table>

Table 2: Best stopping performance

Your goal should be to be able to stop as quickly as possible without a skid or a slide or any real possibility of doing a stoppie or end-over, or of losing control and dumping the bike on its side.

The objective of this lesson is to allow you to experience aggressive braking with deceleration rates up to, but not exceeding, 0.8g’s.

Use the same chalk marked area of the parking lot that was used for normal braking skill practice (lesson four on page 60). From now on, however, **always use both brakes** when braking instead of just the front one. In this lesson, apply only a **light, constant** pressure on the rear-brake pedal throughout the braking phase—almost none.

If your rear tire skids, obviously you have used too much brake pressure.

Remember, if either tire skids, immediately remove pressure from **both brakes**! Since the front brake is trying harder to stop your bike than is the skidding rear tire, unless you release both brakes, the bike will immediately begin to yaw.

Use only a **light** constant pressure on your rear-brake pedal in this lesson—almost none. Use just enough to get you familiar with using both brakes, but not enough to meaningfully contribute to your bike’s deceleration rate.

You should get in the habit of using some rear brake pressure whenever you try for a quick-stop, but only a modest amount. **Never** stomp on the rear-brake pedal.

Approach the gate at 20 MPH. As you cross over it, simultaneously squeeze your front-brake lever and apply a modest amount of pressure on the rear-brake pedal.

Progressively squeeze harder and harder on the front-brake lever until you are almost stopped at the 22-foot mark, then stop with your front wheel on that mark.

This is the kind of stop you will make if you notice a threat ahead of you that you can’t be sure you can avoid but that wouldn’t be serious if you ran into it. For example, if a very small animal rushes across the street ahead of you, you might try to stop before hitting it (as opposed to other animal avoidance techniques discussed later).

When your bike stops with its front tire on the 22-foot mark, you will have achieved a 0.6g deceleration rate. This is actually just a bit faster than what the MSF requires in what they call their quick-stop skill test.

Note: If you’re actually trying to slow down as much as you can to avoid running over a small animal but you don’t succeed, release your front-brake lever just before you hit it, so that you don’t run the risk of sliding after impact. Small animals are made of slick, wet stuff.

Next, try the 19-foot mark. Progressively squeeze harder and harder on the front-brake lever until you are almost stopped at the 19-foot mark, then stop with your front wheel on that mark. You will have experienced a deceleration rate of 0.7g’s.
Make sure your head is up and your eyes remain looking straight ahead, weight centered on the motorcycle with your knees hugging the tank. Use your peripheral vision to locate the gate and stopping marks. If you’re unable to stop within 19 feet, try it again a couple of times. If you still can’t stop within 19 feet, end the lesson and go on to work on your throttle skills, or go home. Next time you do some parking lot practice, try this lesson again a few times. Do not go on to try the 17-foot stop (0.8g’s) until you are confident in your ability to make the 19-foot stop.

Until you can achieve a deceleration rate of 0.7g’s (the 19-foot stop), you are not ready to ride your motorcycle in the real-world environment of public roads.

Once you have achieved mastery of the 0.7g effort, but not until then, you can move on and try stopping on the 17-foot mark. If you’ve been successful, you experienced a deceleration rate of 0.8g’s. Just as was the case with the 19-foot (0.7g) stops, if you are not successful, try it a few times and then end the lesson. You will be amazed at how much easier it gets after a 24-hour period of letting your muscle memory “sink in”. Frequent short practice sessions will yield a big improvement in your deceleration rate.

No matter how many days of practice sessions it takes, you have not completed this lesson until you are able to achieve a deceleration rate of 0.8g’s. But don’t get frustrated along the way. So what if it takes a week or a month, or even a year? You aren’t getting a grade in this skill. You do what you can, working for improvement, and give yourself a realistic target to shoot for (0.8g’s) with your practice. Thereafter, maintaining your skills is what matters most.

This set of lessons to improve your ability to achieve higher deceleration rates is within a set we’ve described as one-time only parking lot practice exercises. But you will want to repeat this last lesson with some regularity for the rest of your riding career. We remind you to do so again when we address on-going parking lot practice exercises. In the future, you will re-do this for no other reason than to insure you still can do it. You already know you can, but without practice, your skills (and confidence) will atrophy away.

And again for perspective, until you can achieve a deceleration rate of 0.8g’s, you are not a competent rider from a braking skill point of view. (Being able to demonstrate braking skills that produce 0.7g deceleration rates “qualifies” you, from a braking point of view, to ride on public roads. You will need to achieve a 0.8g deceleration rate to mark you as “competent”.)

\[i.\text{ Aggressive braking while in a curve – lesson seven}\]

You are not ready to do any aggressive stops while riding in a curve. This is marked as lesson seven because that’s the lesson to be learned at this point in your parking lot practice and riding career.

Don’t get ahead of yourself and think about trying it because you imagine you can probably do it right.

Remember the first rule of motorcycling:

\[\text{Never lose control of your motorcycle–or yourself!}\]

If you just have to go out and try aggressive braking while in a curve now, you are not in control of yourself. You will get to this level of skill, but you’re not there yet.

3. Throttle

We’re going to repeat this advice for emphasis: the clutch lever and the front-brake lever are the most important controls on your motorcycle, and they can often save your life. The throttle and rear-brake pedal, on the other hand, can often take your life away from you.

You should master the use of the two levered controls before you ever begin testing the limits of the other two controls. In other words, you should not be working on throttle-oriented parking lot practice lessons unless you have reached a master’s level of control of the clutch lever and the front-brake lever.

You no doubt believe that your throttle controls your motorcycle’s speed. That is not quite accurate. Instead, your throttle controls your motorcycle’s engine speed by controlling the amount of fuel it receives. Your motorcycle’s speed is controlled by the combined use of the throttle and clutch lever (and proper selection of gear with your gear shift lever). No matter how much fuel your engine receives to burn, if the clutch lever has disconnected the engine’s power from the rear wheel, your motorcycle’s speed is unaffected.

We have already seen that when travelling at very slow speeds, such as when doing parking lot practice exercises, the motorcycle’s speed is best controlled using your clutch
lever. But at normal riding speeds, the clutch lever is almost always fully released, leaving the motorcycle’s speed to be controlled by the throttle and brakes.

When you were first introduced to the controls on your motorcycle in the BRC or the RE, the RiderCoach had you twist the throttle a quarter turn, then release it, allowing it to snap back. Then you were asked to twist it as far as it would go before releasing it. That was intended to get you familiar with throttle operation.

The problem is that neither a quarter turn nor a fully open turn of the throttle are normal ways to use that throttle.

When passing other vehicles on a freeway or on an incline, you may resort to twisting the throttle more than about a quarter turn, but not in normal riding. Normal use of the throttle involves almost imperceptible changes in the throttle position.

If you have an opportunity to ride a very powerful motorcycle and twist the throttle full on, that motorcycle could easily end up lying on top of you after it’s lifted its front wheel off the ground and back over your head. Indeed, for some motorcycles this could happen with only a quarter turn of its throttle. About the only time one should reasonably twist a throttle to a nearly full-on position is on a two-lane country road in order to pass another vehicle when you suddenly realize a blind curve or the end of a safe-passing zone is approaching—in other words, to respond to a threat. Absolutely never crank your throttle wide open on a surface street.

And if you need to twist that throttle more than a quarter turn on a surface street, it’s no doubt because you have a 100-pound Rottweiler attempting to intercept your bike and plant its teeth in your leg. Otherwise, gently does it.

(Naturally, the amount of throttle you use in any situation is largely a function of how powerful your engine is.)

a. A gentle touch – lesson one

Begin riding your motorcycle on the largest circular (or oval) path you can find on the parking lot you are using and set your speed at as close to 15 MPH as possible while remaining in first gear. For this lesson you are to have all four fingers wrapped around the throttle, instead of having any covering the front-brake lever.

The objective of this lesson is to determine the least amount of throttle twist you can manage and still cause a slow and gradual increase of your motorcycle’s speed to 20 MPH.

When the bike is stable at 15 MPH, you are to roll on its throttle the smallest amount possible. When you have attained a speed of 20 MPH, you are to roll off the throttle by the same tiny amount and let the motorcycle’s speed drop back down to 15 MPH as slowly as possible.

What you are attempting to do is change speed from 15 MPH to 20 MPH taking as much time as possible. You should not feel a surge of power to the rear wheel of any kind. Instead, you should barely be aware of any change of speed except by glancing at your speedometer.

Repeat this lesson at least two dozen times, taking as many laps of your travel path as necessary.

b. An even finer touch – lesson two

Reverse directions on your path of travel and once again get your bike stable while riding at 15 MPH in first gear. This time you are going to try to get the smallest possible change of your motorcycle’s speed using your throttle.

The objective of this lesson is to determine the least amount of throttle twist required to cause any change at all of your motorcycle’s speed.

When the bike is stable at 15 MPH, you are to roll on its throttle the smallest amount possible that will still cause a change in the motorcycle’s speed. An increase of your motorcycle’s speed of just 1 MPH is possible, though you may not be able to detect such a small change. Do not bother glancing down at your speedometer. Instead, feel the tiny amount of acceleration you cause with the throttle roll-on. When you are aware that a speed change has occurred, roll off the throttle as gently as possible to return to a stable speed of 15 MPH.

Many riders will swear that they don’t actually change the throttle position at all during this lesson. Instead, they will say, they just thought about rolling on the throttle and the bike “sensed it” and responded accordingly. That is the feeling you should try to discover during this lesson.

When you have attained this level of finesse with your throttle, you are where you want to be at this point of your parking lot practice.
Repeat this lesson at least two dozen times, taking as many laps of your travel path as necessary.

c. Covering your brake lever, too – lesson three
Repeat lesson one on page 60 (“A gentle touch”), but now use two fingers to cover the front-brake lever. Use no front brake pressure whatever, just rest your fingers on the lever.

The objective of this lesson is to determine that you have identical control of your throttle whether you are covering the front-brake lever or not.

d. Slow-speed balance assist – lesson four
You learned while doing your clutch lever parking lot practice that if your speed is too low while riding in a curve at relatively slow speed, the bike will fall down. You found that you could save it from falling by using your clutch lever to increase your speed. But that lesson depended upon your engine speed turning faster than it needed to in order to maintain a given speed of your motorcycle, so that by easing the clutch lever out, more of the engine’s power could get to the rear wheel and increase your speed.

While riding out on the public roads, your throttle (engine speed) will not be set significantly higher than required when you start a slow-speed turn. If you’re moving so slowly during a turn that the bike feels like it is about to fall down, you save it by easing the clutch lever out of the friction zone and rolling on the throttle at the same time.

This lesson is not going to cause you to nearly fall down. Nor is it designed to teach you anything about your clutch lever.

Instead, all you should do is notice that at speeds below about 10 MPH, if you lower your speed, the bike leans more (increases its lean angle); and that as you increase your speed, the bike stands taller (decreases its lean angle).

The objective of this lesson is to demonstrate the idea that at very slow speeds, your lean angle increases as your speed decreases, and it decreases as your speed increases.

In first gear, begin riding at a speed of approximately 10 MPH along a small circular path with a radius of about 20 feet.

All fingers of both hands should be wrapped around their grips; you are not to be covering either your clutch or your front-brake levers.

As gently as possible, roll-off some throttle and observe that the bike will begin to lean more. If you continue this, or if you do it aggressively instead of gently, your bike could fall down. Be gentle.

As soon as you recognize that the bike’s lean angle has begun to increase, gently roll on the throttle in order to increase the bike’s speed. Be gentle! Make no aggressive moves with your throttle position. The bike will immediately begin to stand taller, as its lean angle decreases.

e. Effect of speed changes once you have reached the cross-over speed – lesson five
Your bike’s geometry causes the cross-over point to be at about 10 MPH. You will enter counter-steering speeds when your bike is moving faster than that speed. At counter-steering speeds, when you increase your speed while in a turn, your bike will lean farther into the turn, not less.

More to the point, at counter-steering speeds, if you reduce your speed while in a turn, the bike will attempt to fall up instead of down; its lean angle will decrease.

The objective of this lesson is to observe and relate the effect of speed change on your lean angle when traveling at counter-steering speeds.

Ride around a medium-sized circular path (with about a 50-foot radius) at a speed of 15 MPH while in first gear. At that speed, a curve radius of 50 feet will cause your bike to have a lean angle of just under 20 degrees.

Attain a stable speed and bike attitude. Gently roll off the throttle in order to reduce your speed, but maintain your existing path of travel.

Notice that as the speed decreases, your bike will stand taller; its lean angle will decrease. Roll-on your throttle and bring your speed back up to 15 MPH. Observe that your bike’s lean angle will increase; it will be leaning more.

This is exactly opposite from the behavior your bike demonstrated when you increased and decreased its speed when it moved at lower than the cross-over speed.

Notice that when you enter a tight turn with too much speed (you are “hot” in the turn), your bike can lean so far into the turn that it begins to drag a peg on the ground.

An uninformed rider’s reaction to hearing a peg drag on the ground may well be to increase speed to try to “save it”, if he
or she has lots of experience with slow-speed, tight turn practice. You should now know that is exactly the wrong thing to do at counter-steering speed! If you increase your speed, the bike will lean farther into the turn.

When a peg first starts to drag, it is not particularly dangerous because it is always hinge-mounted to the frame of your motorcycle. If, however, the bike leans farther into the turn, then the peg will exhaust what limited travel it has available to it and will gouge into the ground, lifting the motorcycle off its tires. The bike crashes in a low-side when the tires stop supporting it.

Slowing your bike down at counter-steering speeds decreases the bike’s lean angle. Braking or rolling off the throttle tends to lift a motorcycle when it’s traveling in a turn at counter-steering speeds and lifts the peg off the ground.

f. Wheelies

We are all about safety, not risk or thrills. This book offers no instructions about doing wheelies.

The only reason a person intentionally does a wheelie is to show off his manliness and superb balancing skills. Showing off and stunting are absolute indications that the rider is not in control—of himself.

But that doesn’t mean that you might never do a wheelie unintentionally. Remember the discussion we had about weight transfer earlier. The height of your CG as compared to the length of your wheelbase determines how much weight is transferred from one end of the bike to the other for any given deceleration or acceleration rate. If your bike can do a stoppie, it can do a wheelie. If the geometry of your bike permits it, and your engine is powerful enough, all you have to do to accomplish a wheelie is roll on too much of your throttle. Are you beginning to see why we have stressed that you always gently roll on your throttle? More to the point, you should now fully understand why rolling on your throttle more than about a quarter turn is rarely, if ever, needed. Even if you are out on the road and want to pass another vehicle, you should find almost no occasion where rolling on the throttle all the way makes any sense whatsoever. Instead of passing that slower-moving vehicle, your overuse of your throttle can put you into a hospital—or the morgue.

If, despite your best intentions, you use so much throttle that the front-end of your motorcycle lifts off the ground, you have two responses that will save you from eating asphalt: roll off the throttle and/or squeeze the clutch lever. The front brake is useless as the wheel is off the ground. Your rear brake is a clumsy control, at best, and can cause you to dump your bike in a heartbeat when the front-end is in the air. But your right hand is already operating the throttle. Just roll-off that throttle, keep the bike and your body straight, and bring that front tire back solidly onto the ground.

4. Rear-brake pedal

The rear-brake pedal is, by far, the most dangerous control on your motorcycle.

Improper use of the rear-brake pedal causes more accidents, prevents riders from avoiding more collisions, and causes more motorcycle damage than all of a motorcycle’s other controls combined. If you had to do without one of your motorcycle’s controls, this is the one you could best afford to give up. On the other hand, the rear-brake pedal can provide some unexpectedly valuable services.

a. Concepts

So far, you know that brakes are used to do five things:

- Slow the bike
- Stop the bike
- Stand the bike up in a curve
- Act as a signaling device
- Prevent the bike from moving when stopped.

Additionally, if you have any form of electronic cruise control, your brakes can be used to turn that function off.

There are two more important functions performed by your brakes, at least by the rear brake:

- It can make your clutch lever more effective at slow speeds
- It is an anti-yaw device that helps keep your motorcycle’s rear-end from sliding to the side.

Recall from the clutch lever parking lot practice lessons that at very slow speeds, you use the friction zone to control your bike’s speed rather than the throttle. You ran your engine at about twice its idle speed so that, as you eased out the clutch lever, the bike would increase its speed without stalling the engine. But as you squeezed the clutch lever to reduce the bike’s speed, no braking was involved. You relied exclusively on your bike’s rolling friction to slow you down when the engine was disconnected from your rear wheel.
You can dramatically increase the ability of the clutch lever to slow you down at very low speeds by simply using a modest amount of rear brake during your very slow-speed maneuvers. Applying a modest amount of braking pressure with your rear-brake pedal requires that you allow somewhat more of your engine power to reach the rear wheel just to maintain your speed, but that’s what your friction zone is for.

Then, when you pull back on the clutch lever to slow the bike down, your rear brake will actively provide braking energy and the bike will slow much more quickly than when only rolling friction was available.

Your motorcycle can change its orientation to the rest of the world in only three directions: Pitch, roll and yaw. When weight transfer occurs, the bike pitches: its front-end dives or rises. When the bike rolls, it is leaning to the right or left. When the bike yaws, its rear wheel is tracking clockwise or counter-clockwise compared to the front wheel.

If, for example, you are riding in a curve to the right and your bike loses traction on its rear tire, the bike will immediately begin to yaw in a clockwise direction as the rear-end slides to the left.

One of the most important reasons that you should always use both brakes when slowing down your motorcycle, and the reason that seems the easiest to overlook, is that the rear brake provides a significant anti-yaw force.

When you use only your rear brake, the motorcycle becomes slightly more stable as it slows down because the bike lowers at the same time that its wheelbase gets longer. This happens because your rear wheel attaches to the frame of your motorcycle via a swing arm.

As you can see in the diagram above, when you accelerate, the pivot point of the swing arm rises. When you use only your rear brake, the swing arm’s pivot point is pulled down—lowering the motorcycle and lengthening its wheelbase.

Let’s be clear about that. “When you use only the rear brake” means that you are not also using the front brake, and you are not accelerating. Your rear wheel can either be accelerating or braking if it is not simply spinning—but not both at the same time.

We discussed using the rear brake to increase the ability of the clutch to slow down your motorcycle at low speeds. There you applied rear brake pressure at the same time you applied engine power to the rear wheel. So long as your rear braking force was greater than your engine driving force, the bike slowed down, it lowered, and its wheelbase lengthened.

But as soon as the engine driving force exceeded the braking force, you accelerated, the bike rose, and its wheelbase shortened. Using the rear brake in slow-speed maneuvers does not increase the bike’s stability.

b. Proper rear-brake pedal adjustment

The toes of your right foot belong on the rear-brake pedal, not the ball of your foot. When sitting on your saddle in a normal riding posture, there should be insufficient pressure on the rear-brake pedal to activate your brake light. You should not have to lift your toes or rotate your ankle to avoid activating the brake light. The rear-brake pedal can be adjusted so that you can keep your toes lightly on the pedal at all times without that brake light coming on. You can
adjust it so that you are not riding the rear brake all the time, wearing out the brake, and causing a drag on the performance of your engine.

When adjusting that pedal, make sure that you must **literally** rotate your ankle to activate the brake light. Pressing harder with your foot without rotating your ankle at the same time must not activate your brake light. You literally want to make it difficult to use the rear brake.

**c. Medium rear-brake pedal pressure – lesson one**

Dismiss the notion that your rear brake, by itself, can be used to make an aggressive stop in an emergency. A very weak—and unsatisfactory—deceleration rate is 0.6g’s. The very best deceleration rate your rear brake, by itself, can provide is a trivial 0.4g’s. Weight transfer when braking at that deceleration rate removes virtually all the weight from the rear tire that can be used for braking, and the rear tire will skid.

This diagram demonstrates a motorcycle’s deceleration rate while it is coming to a stop when its rear brake is “stomped on”, forcing the wheel to lock and skid. Notice that for a brief moment, the bike’s deceleration rate exceeds the rate at which traction is lost. Then the tire skids at a more or less constant 0.4g’s until the speed falls to zero. It takes 300 feet for this bike to come to a complete stop. Contrast that to a still-unsatisfactory level of aggressive braking at 06.g’s using some front brake, where the bike will come to a stop in only 200 feet. Using the rear brake by itself can kill you with ease.

**d. Progressively moderate rear-brake pedal pressure – lesson two**

When you use both brakes to stop your motorcycle, weight transfer increases traction on the front tire and decreases it on the rear tire. It takes somewhat more than one-half second for you to progressively increase the braking pressure used on the front brake, before maximum weight transfer has occurred. That means that you have about one-half second to use medium braking pressure on the rear-brake
penal before you must begin reducing that pressure in order to avoid skidding the rear tire. In other words, the way you are to use your rear-brake pedal is to begin by pressing with medium braking pressure on the brake pedal and then immediately to begin moderating (easing off) that pressure. The following diagram shows you this behavior as your motorcycle continues to slow.

The objective of this lesson is to experience the moderating of pressure on your rear-brake pedal.

Repeat lesson one on page 60 (“Medium rear-brake pedal pressure”), but in addition to using a medium pressure (never more than 0.3g’s worth) on the rear-brake pedal when you reach the gate, simultaneously squeeze your front-brake lever modestly.

Then, about one-half second after passing the gate, moderate the pressure on the rear-brake pedal. Use whatever (non-aggressive) squeezing pressure you want on the front-brake lever to bring your bike to a stop.

No matter how far down range you traveled before coming to a stop, you experienced moderation of the rear-brake pedal pressure. It’s critically important to recognize that the front brake is doing almost all of the work to stop you, not the nearly useless rear brake.

e. Improving the effectiveness of your clutch lever at low speeds – lesson three
Recall that we said earlier, another function of your rear brake while performing slow-speed maneuvers is that the clutch lever becomes more effective in controlling your speed within its friction zone.

The objective of this lesson is to experience how use of the rear brake during slow-speed maneuvers increases the clutch lever’s effectiveness in controlling the bike’s speed.

Repeat lesson seven on page 54 (“Not just in a straight line”), from the clutch lever lessons. Do this once just as that lesson was described. Pay attention to how ineffective pulling the clutch lever out of the friction zone is in slowing you down when rolling resistance is providing the only drag on your speed. Then, repeat the lesson while you maintain a light (0.1g) dragging pressure from your rear brake.

Note how much more effectively pulling the clutch lever out of the friction zone results in slowing your bike, because you now have actual braking energy working for you.

H. Gear shift lever
The discussion of the gear shift lever has been separated from the other controls for two reasons:

1. It is not a main control; and
2. It comes in two forms.

This control provides you the means for selecting and changing the transmission’s gears. All standard transmission motorcycles provide the same shifting pattern. Whether the transmission provides five or six gears, neutral is always found between the first, or lowest gear, and second.

The lever pivots in both an upward and downward direction from where spring action holds it normally. Down-shifting is the selection of a lower gear and is accomplished by pressing the gear shift lever downward with your toe, while up-shifting is done by pushing the gear shift lever upward.

The reason for what appears to be an illogical gear selection pattern where neutral is between first and second instead of being below first is to prevent the rider from inadvertently down-shifting into neutral. This disconnects the engine from the rear wheel. Such an unexpected loss of engine power from the rear wheel can result in a rider’s loss of control.

Though the pattern suggests that the neutral position is like any of the numbered positions, it is not. When up-shifting or down-shifting, the transmission is designed to provide a positive stop as you reach each of the numbered positions. Thus, you normally cannot change more than one gear at a time; one lift of the lever results in up-shifting only one gear,
and one depression of the lever results in down-shifting only
one gear. The neutral position, however, is midway between
first and second gear and can only be reached by using a less
than assertive upward or downward pressure on the gear
shift lever. You must intentionally “find” neutral—normally.
Riders with little experience or those who are riding an
unfamiliar motorcycle sometimes “find” neutral uninten-
tionally because they fail to use an authoritative / assertive
shifting effort. A timid shifting effort (having a “sissy foot”)
can result in an equivalent of neutral being “found” between
any two normal gear positions.

Some motorcycles have floorboards instead of foot pegs.
Many riders find floorboards to be more comfortable than
 pegs, especially on long rides. But floorboards make it very
difficult to achieve an upward pressure on a standard gear
shift lever. For this reason, bikes equipped with floorboards
also have heel-toe shifters which provide separate levers for
up-shifting and down-shifting. These devices are operated by
stepping on the forward lever with the toe of your foot to
down-shift, and stepping on the rearward lever with the heel
of your foot to up-shift. The gear pattern is identical to
standard single-lever gear shifters.

Regardless of the gear shift lever design, it and the internal
workings of your bike’s transmission are relatively fragile.
Should you hear another biker talk about “kicking it up or
down a gear”, or “stomping it down into first”, for example,
that is simply “biker talk”. They are referring to changing
gear quickly rather than with great force. Too much force can
bend the shifter lever or cause internal transmission damage.
There’s never a reason to use more than an authoritative /
assertive amount of pressure on your gear shift lever.

I. Counter-steering
We stated above that, at speeds above about 10 MPH, you
must counter-steer your motorcycle to change directions.

Some riders argue that you can, instead, simply shift your
body weight around to cause a change of direction, as if that
disproves the concept of counter-steering. When you shift
your body weight around, you’re causing a slight disruption
in the steady state of your bike’s front-end and allowing
gravity to have a brief advantage over normal steering
forces. But it’s imprecise and its effect is limited. No matter
how it happens, however, the reality is that the front wheel
must be turned slightly outside of its path of travel (called
out-tracking) in order for the rest of the bike to “fall” into the
desired new direction of travel. This is counter-steering—
driving the front wheel out from under the steady-state mass
of the bike. This increases centrifugal force which, in turn,
causes a new lean angle and a new path of travel.

Centrifugal force exists whenever you are traveling on a path
other than straight ahead. The amount of centrifugal force is
a function of how fast you are moving and the radius of the
circle you are traveling in.

If you are not moving straight ahead, then your path is, by
definition, a part of a circle.

If you have turned your handlebar a tiny fraction of a degree
from its position when it pointed straight ahead, then the
circle you are traveling along could be miles in diameter, but
it’s still a circle.

Centrifugal force is actually an inertial force trying to make
your bike travel in a straight line. It’s not really a force
pushing you to the outside of a circle. Instead, it tries to push
you in the direction of a tangent to that circle.

Assume you’re riding in a straight line and you turn your
handlebar any amount whatsoever to the left. Centrifugal
force will try to push the motorcycle to the right until it’s
traveling once again in a straight line.

A person not riding that bike  would seem to see the rider
and bike lean to the right at that time. That’s just a matter of
perspective. In fact, the rider and the top of the motorcycle
are staying close to the original path of travel, while the
wheels of the motorcycle are “out-tracking”—moving away
from the path of travel. If nothing else were to happen, the
motorcycle would immediately fall down at that point.
But something else does happen—the front wheel turns (with the aid of gravity) toward the inside of the turn following the top of your head and the greater mass of the rest of the motorcycle. That continues until a steady state is achieved, where the bike is stable with a lean angle and path of travel exactly balancing each other in terms of forces generated.

Gravity and centrifugal force offset each other. Thus, turning the handlebar slightly to the left results in the bike’s path of travel ending up more to the right than where it started.

In effect, whenever you turn your handlebar, you destabilize the front-end of your motorcycle, and the bike takes corrective action to re-stabilize itself.

Note, it is the bike, not you, that determines what its lean angle must be while in a turn. It is simply the bike obeying the laws of physics, as it must.

At speeds below about 10 MPH, there is simply insufficient centrifugal force to cause the bike to behave in this manner. That’s why you must “direct-steer” at such low speeds.

In case you haven’t quite got the message, at speeds above about 10 MPH, counter-steering is not optional. You cannot decide to use it or not. There is no decision involved. The bike honors the laws of physics, every time.

When you are in a turn and stable, you change your path of travel (make the circle wider or narrower) using counter-steering. That is, if you want to make a turn with a smaller diameter than the one you are on, you cause the front wheel to out-track more than it already is pointing. To make a larger diameter turn, you cause the front wheel to have a smaller amount of out-tracking.

1. Proving that counter-steering works – lesson one

The objective of this lesson is to prove to you that counter-steering works at speeds above about 10 MPH.

On a large, unobstructed parking lot area, ride in a straight line at 20 MPH. Lift the fingers of your right hand so that they point into the air, leaving only your palm on the grip.

Remove your left hand from its grip entirely. You will continue moving in a straight line, stable.

Then, with only the slightest pressure, push the right grip forward (not down), and observe that the bike will immediately turn to the right. Keep your body in-line with the bike. That is, you are not to lean in any direction in an effort to “help”—no help of any kind is necessary.

You counter-steer with trivial amounts of energy. You could change the direction of a 1,000-pound bike traveling at 100 MPH with just fingertip pressure.

Further, you cannot fall down unless you lose traction on your tires. The bike will attempt to remain upright by itself.

When you have made as tight a turn as you wish (or are comfortable with), simply reduce the pressure you are applying in a forward direction on your right-hand grip. The bike will tend to stand up and move in a straight direction all by itself.

You can return your left hand to the grip at any time if you feel uncertain about the stability of the bike—or when you are convinced that counter-steering works.

When you pushed the right-hand grip forward, that caused the front wheel to momentarily out-track to the left. That, in turn, caused the bike to lean to the right and the front wheel automatically to follow—turning toward the right. Virtually instantaneously, the bike adopted a steady state, and you were traveling in a large circle to the right.

You tried to turn the handlebar to the left, yet the bike turned to the right.

No magic was involved, just centrifugal force. Obviously the same thing would happen if you had pushed the forward on the left handlebar grip—the bike would turn to the left.

From this time forward you should hear in your mind “push right, go right; push left, go left.”

That is not trivial advice. There will come a time when you’re riding your bike on the road and find yourself in a turn that you are not certain you can make. You’ll find that you must turn more to the left, for example, in order not to run off the road or into a curb.

The only way to do that is to “push left, go left”. If you panic and forget this simple but terribly important lesson, you will be tempted to try to turn your handlebar to the left—and you will find that the bike simply will not go in that direction. It will feel like it is fighting you!
The harder you try, the more it will go to the right, and you will quickly discover what eating asphalt, or grass, or a tree trunk feels like.

In fact, the bike never fights you. If you ever feel like it is, know that you are fighting yourself.

“Push right, go right” and “Push left, go left” works absolutely every time you do it at speeds above 10 MPH. Believe it, absolutely. To make a turn tighter when you are already in that turn, apply slightly more forward pressure on the inside grip.

See APPENDIX D – Counter-steering Pressure Management.

2. What is it that tries to straighten the bike out?
We discussed earlier that when you remove forward pressure on the grip, the bike will attempt to, on its own, stand taller and continue its travel in a straight line. What causes that to happen? It’s called the “restoring force”.

The geometry of your bike’s front-end results in a positive length of trail. Trail is what causes the restoring force. The faster you are moving the more weight is being carried by the front tire; and the greater the length of trail, the more restoring force it will cause.

See APPENDIX E – Restoring Force.

Counter-steering has almost nothing to do with “gyroscopic precession.” If you replaced your front tire with a ski, counter-steering would still work, as has been demonstrated countless times. Counter-steering also has very little to do with the camber of your front tire. Both precession and tire camber serve merely to smooth the counter-steering process and make it marginally easier as a result of providing minor supporting forces to the force that does virtually all the work—centrifugal force.

3. Proving that the restoring force works – lesson two
The objective of this lesson is to experience the restoring force that tries to stand the bike taller and adopt a straight line of travel when you remove forward pressure on the grip.

Start riding your bike in a large clockwise circular path at 20 MPH. By now you know that the only way you could have gotten the bike into that circular path at this speed is through the use of counter-steering.

As you ride along in a stable attitude, remove your left hand from the left grip and lift the fingers of your right hand until only the palm of that hand is touching the right grip. Maintain the pressure needed to remain stable on that path. Now ease the forward pressure off the right grip and observe the bike immediately, though possibly slowly, widen its path of travel. The only thing that has caused that change of travel path is the restoring force.

Return your fingers around the right grip and place your left hand back on the left grip. Bring your motorcycle to a stop.

You’ve experienced your motorcycle automatically trying to go in a straight line standing vertically. It does this without human intervention. This explains why, for example, if a motorcyclist falls off his bike during an accident, a bike that is still on its two wheels will not then simply fall down. Instead, it will attempt to find a straight path of travel and stand taller as its speed decreases. The bike will probably wobble dramatically in the process because the rider isn’t providing pushback pressure management input to the handlebar, which means that the front wheel will overshoot the straight ahead path and reverse itself as it tries again, and again, and again, until it falls down from lack of speed.

Because motorcycles almost always have some form of steering damper built into the steering stem assembly (even if it’s just properly torqued steering head bearings), that wobbling diminishes rather than growing stronger as the bike tries to find a stable steady state. If that steering damper fails, or is too weak, the wobble will turn into a tank slapper.

Indeed, if the steering damper is weak or fails, a tank slapper can occur even if your hands are on the grips. The restoring force can be viciously strong! (A tank slapper is somewhat more complex than just described. It happens because the restoring force causes an overshoot correction to the steering angle, then reverses itself at a specific frequency; a harmonic that amplifies the next overshoot response.)

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6 A description of what happens when a motorcycle's front-end goes unstable and results in the handlebars rapid and uncontrollable swinging between a full-stop right and a full-stop left turn, usually ending up with the motorcycle's crash. On many motorcycles, this can actually cause dents in the gas tank, thus the name. A tank-slapper can happen at any speed.
4. Reversing your turn direction – **lesson three**

As you discovered during the previous lesson, relying on just the restoring force to return your motorcycle to a straight line of travel is an inefficient and not very fast way to accomplish that objective.

Instead, the normal way you would return to traveling in a straight line—that is, cancel a turn—is to press forward on the grip that widens the turn.

If you were traveling in a right-hand turn, you would press forward on the left grip until the bike was pointing straight ahead again.

The objective of this lesson is to experience changing a right-hand turn into a left-hand turn using counter-steering input.

It should be obvious that if you can cancel a turn by using counter-steering input that widens a turn, you can continue with that steering input past the point that you are traveling in a straight line and begin a new travel path in the opposite direction. You would do this, for example, when riding a figure eight pattern or making an S-turn.

Begin riding a medium-sized right turn at 20 MPH with both hands lightly holding the grips. Change the direction of the turn to the left by pressing forward on the left grip, then ease up on the forward pressure when the bike has attained the desired new path of travel.

Continue through the full left turn circle, and then reverse direction again to ride the circle to the right.

Bring your bike to a stop when you have completed the maneuver.

Almost any competent experienced rider, for example, can achieve a deceleration rate of about 0.8g’s when confronted with an emergency stopping situation. Very skilled riders, that is, those who are very skilled in the use of their brakes, can achieve deceleration rates of 0.9g’s. However, only riders with world-class braking skills can achieve deceleration rates in excess of 1.0g’s, and even then, not always. Roadway surface material and condition, tire rubber quality, even motorcycle geometry can limit a bike’s ability to achieve very high deceleration rates, regardless of the braking skill of the rider.

More often than not, it is the rider who self-limits how high of a deceleration rate a bike can achieve.

Most riders simply will not try for more than a 0.8g rate of deceleration, believing that is as close to skidding their front tire, or as close to doing a stoppie or end-over as they are willing to go. That is a personal limitation on braking skill, not one imposed by the laws of physics.

If you want to do endless practice sessions in order to attain world-class abilities, by all means do it on a parking lot. But most riders don’t have the slightest desire to achieve world-class braking skills.

To get there, they would make mistakes that result in front tire skids, bikes that fall down, possibly injuries to themselves, and certainly damage to their bikes.

Those are reasonable and expected “learning pains” for track racers and others who strive to become the very best. They are unacceptably harsh penalties for those of us who want to become proficient and safe riders but have no world-class ambitions.

Thus, most of us will use parking lot practice sessions to improve our skill levels to a point that we are satisfied with, but not farther.

We certainly want to be able to control our bikes during an emergency stopping event and to stop in the shortest distance and time that we are capable of, even if that is not world-class performance. We want, in other words, to learn what our personal limits are; and to attain and maintain that level of proficiency.

Even if we find that our personal limits are adequate, we know that in time of need there is a real possibility that we can do just a little better. Adrenaline has the habit of making
us all a bit more aggressive than when we are calm and collected.

As a result, if that 18-wheeler enters an intersection across our path of travel, we are likely to squeeze the front-brake lever a bit faster and a bit more aggressively than we have practiced.

That sounds like a “win” on our score cards, unless what we have practiced is getting on our brakes so aggressively that we are extremely close to locking them up. In that case, the adrenaline pushes us over the edge in an emergency, and we end up eating asphalt.

This is the reason a thoughtful and safety-conscious rider never rides at his or her limits – never. Leave a safety margin, just in case you need it.

If our personal limits are such that we could safely ride a particular curve at 50 MPH, we never take that curve at a speed greater than about 45 MPH. That safety margin can mean the difference between surviving a ride or not.

The idea of always trying to get better, to push our personal limits higher and higher, the never-ending strive towards “perfection” is perfectly appropriate for those who wish to become world-class as competitors; but for most of us, it lacks appeal from a survival point of view. And it’s not necessary to be a world-class rider, in terms of skills, in order to manage your risks like a world-class rider when you’re out on the streets.

Parking lot practice sessions are not meant to be dangerously testing of limits. Of course it’s true that in order to improve a skill, we must test that limit; and if we succeed at pushing our personal limits just a bit higher, then we have improved. But if we fail, we have not actually failed at all—unless we have damaged ourselves and/or our motorcycles in the process. We have simply not improved. We can all live with that outcome.

The desire to improve, to get better at a skill, is very hard to temper. But a little knowledge about what you are actually trying to get better at may be sufficient to harness dangerous ambitions.

**Do’s and Don’ts about PLP to improve your braking:**

Suppose that you have managed to achieve deceleration rates, consistently, of 0.8g’s through your previous parking lot practice efforts. And suppose that you were rational in the way you went about achieving that skill level, meaning that you practiced at speeds never greater than 30 MPH.

Now you may believe that to really be proficient with your braking skills, you need to practice stopping from speeds of, say, 50 MPH. But is that really progress? Does doing that prove anything about how much better your skills are over what they were before the effort? The answer is no!

It takes a bike that has lost front-tire traction about one-half second to end up on its side. It takes a bike that has lost rear-tire traction more than twice that long to fall down.

About one-half second is consumed while full weight transfer occurs to your front tire, as you are progressively applying more brake pressure.

Thereafter, if you have locked a brake, you have another one-half to one full second before the bike falls down. You practice your braking skills at somewhere between 20 and 30 MPH, because during the first one full second or more of braking, even if you lock up your brakes, your bike has come to a relatively safe speed before it hits the ground.

<table>
<thead>
<tr>
<th>Deceleration rate</th>
<th>Ft/sec²</th>
<th>MPH per second</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0g’s</td>
<td>32.2</td>
<td>21.9</td>
</tr>
<tr>
<td>0.9g’s</td>
<td>29.0</td>
<td>19.7</td>
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<td>0.8g’s</td>
<td>25.7</td>
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<td>0.7g’s</td>
<td>22.5</td>
<td>15.4</td>
</tr>
<tr>
<td>0.6g’s</td>
<td>19.3</td>
<td>13.1</td>
</tr>
</tbody>
</table>

Table 3: Conversion of deceleration rates

Had you locked up your rear brake starting at 30 MPH, the bike would still be moving at slightly less than 4 MPH when it hit the ground. You will recall that at such low speeds you can step away from the falling bike and remain standing on your feet if you think fast, instead of being sprawled on the ground next to or under it. Even if you fail to step away from the motorcycle on the way down, if you are wearing appropriate safety gear, you would have no problem surviving the event, though you might do yourself some
damage. But if you tried this starting at 50 MPH and lock it up, you would hit the ground at about 24 MPH. That’s enough to kill you.

If you’re curious about this data, you’ll notice that deceleration rates are linear in nature. Thus, if you were traveling at 50 MPH and achieved any given deceleration rate until you came to a complete stop, your average speed while stopping would have been 25 MPH.

While it’s obvious that increasing your starting speed when you make a braking mistake will affect how fast you will be moving when (if) you hit the ground, it is not as obvious that you gain nothing in terms of skill by practicing that maneuver at a faster speed.

What you learn with practicing your quick-stops is how stopping feels. A deceleration rate of 0.6g’s feels much tamer, less aggressive, than a deceleration rate of 0.8g’s. You experienced that during your earlier parking lot practice sessions. It doesn’t matter if you are moving 100 MPH or 20 MPH, a deceleration rate of 0.8g’s feels exactly the same at both speeds.

In order to stop from any speed greater than 20 MPH, you will sooner or later reach a speed of only 20 MPH. In other words, the last 20 MPH of your stopping is exactly the same in terms of distance and time to stop, regardless of how fast you started.

The following chart shows the speed a bike is moving as it decelerates at a 0.9g’s deceleration rate over distance. The speed listed on the left is the speed this highly skilled rider is going when he starts to brake, assuming he achieves a deceleration rate of 0.9g’s.

The scale on the bottom gives the distance required to stop. The curved lines show the rider’s speed as he decelerates to a stop. Starting at 20 MPH, the bike will come to a complete rest within slightly less than 15 feet.

Notice that if you started at a speed of 25 MPH, the bike will have traveled just under nine feet before it is raveling at 20 MPH. Then it will take exactly the same distance (14.8 feet) to stop as the bike that started at 20 MPH. Whether you start at 20 MPH, 25 MPH, 30 MPH, or anything higher, a deceleration rate of 0.9g’s will always feel exactly the same.

You learn nothing new, nor have you demonstrated enhanced skills, if you achieve a deceleration rate of 0.9g’s starting at 50 MPH as compared to starting at less than 30 MPH.

There is absolutely nothing to be gained by practicing quick-stops at any speed greater than 30 MPH, and much to lose.

Notice, also, that you scrub less and less speed over a given distance, the faster you are going. All of the difference in stopping distances between different starting speeds occurs at the start of your braking.

This isn’t “theoretical”, it’s as real world as crashing into a truck that suddenly stops ahead of you on the freeway. The Phase 1 rider must understand how essential it is that you master the use of your brakes on a parking lot, so that you know what it will feel like, and what you can do, when you need to use your brakes to save your life on the streets.

By the way, a 30-foot skid mark won’t tell you how much speed was reduced during the skid without knowing how fast the bike was going at the start or end of the skid mark. If a rider began to brake at 50 MPH, a 30-foot skid mark accounts for a reduction of speed of only about 7.8 MPH; but if the rider began to brake at 30 MPH, it would account for a reduction in speed of 16.5 MPH (assuming a Coefficient of
Friction of 0.8 between the tire and the road). One more important reason not to do PLP in excess of 30 MPH: the risk of high-siding your bike is very small at such low speeds.

See APPENDIX F – High-side Dynamics.

Now that we’ve looked at some do’s and don’ts related to achieving better braking skills during your parking lot practice, let’s consider what you’re trying to do overall.

There are three purposes for, and therefore three kinds of, parking lot practice sessions:

1. For as long as you ride a motorcycle, to assure that your skill levels meet and are maintained at your personal limit levels. Developing a routine of doing a short pre-ride session before every ride will confirm the functionality of your bike and yourself;
2. Early in your career, or when you notice that a particular skill level has atrophied, to improve one or more of your skill levels; and
3. When you are a competent rider and must learn a new skill, such as carrying a passenger.

A. Before each ride
You’ve already performed a reasonably thorough pre-ride walk-around to assure yourself that at least your tires are in good shape and contain proper air pressure. The rest of the walk-around assured you that your motorcycle at least looks and feels “healthy” enough for your ride (feels, if you touch every bolt, screw, and cable you can see). But that walk-around only catches obvious problems. You have no idea if the gasoline in your tank is good, or if your carbs are properly synched, or if your wheel bearings are beginning to freeze up due to failed grease seals, for example. A static inspection can’t reveal certain problems with your bike.

The single most important reason for performing a short (five- to ten-minute) parking lot practice before each ride is to confirm that both you and your motorcycle are healthy enough to make that ride. This PLP is to be a non-stressful event. You aren’t using it to improve your skills in any way. Instead, perform a couple of simple exercises designed to confirm that your skills are at or near what you have decided are adequate, and that there are no operational problems with your motorcycle. In addition, and of no less importance, you’ll determine whether or not you are physically and emotionally ready for the ride.

If for any reason whatsoever you believe that you should not make the ride, abort the PLP session and the planned ride. Don’t assume that you’ll feel better, or ride better, once you’re on the road. Take the bike home, and get on with life. Listening to that “inner voice” is not crystal-gazing or communing with “fate”. It is honoring your subconscious awareness of reality. There will be many opportunities to ride your motorcycle in the future; but you can only enjoy tomorrow’s ride if you survive today’s. A pre-ride parking lot practice session stacks the deck in your favor. It’s foolish to use that time to determine that you shouldn’t ride that day, for whatever reason, and then decide to ride anyway.

For a session of PLP meant as a check-out before a ride, you should perform all the exercises at speeds less than 30 MPH. None of them should involve attempts to test any limits. You’re out there to confirm functionality of your bike and yourself, not to determine how tight you can turn or how quickly you can stop. No cones or markers of any kind are needed. You probably will not even dismount your bike.

1. Location and environment
Select a relatively large and virtually empty parking lot that is a short distance from your home. It should be free of curbs, pedestrians, and random automobile traffic while you are practicing. A large parking lot at a movie theater, school, church, or even a remote part of a large grocery store parking lot will do nicely.

The surface should be reasonably clean and dry most of the times you elect to use it, but it’s actually quite beneficial to use that facility for a normal practice session while it’s still wet following a period of rain. (You should not practice on a parking lot that is newly wet following a brief cloudburst, however, as it’s still slippery from accumulated oils floating to the surface.) Since most riders will not start a ride if it’s raining, you can assume that there will also be no pre-ride PLP if it is raining.

Unless a group of riders (like a club) frequently takes over that parking lot, it’s very unlikely that the owner of the lot will object. Some educational facilities may allow a planned practice event when the parking lot is empty, for example at the range where you took your BRC. Should you wish to have regularly scheduled group practice sessions on a parking lot, obtain permission first (which is highly unlikely to be granted) or expect to be asked to leave soon after you begin. An impromptu session with only a few riders will probably be over before the owner is even aware you are there.
2. First things first
Ride onto the parking lot surface and do a complete circuit to check out its surface.

You want to be aware of any pieces of broken glass or surface damage, and you will want to select where on that lot you are going to do your various practice exercises. Generally speaking, you will want to “adopt” an area that has painted parking spaces without curbs.

If you are going to practice with one or more other riders, make sure that they all know that this is completely independent effort. That is, you are not to simply follow each other and perform the same exercises.

Instead, you will each adopt your own part of the parking lot and perform whatever exercises you wish to perform, without any concern for being observed by or evaluated by the others. With more than one rider on the lot there can and will be some crossing of travel paths.

3. Example basic exercises
Your first exercise should be a simple decreasing radius turn; turn gently, and then tighten the turn. Once your bike is leaning as far as you want it to go, maintain your travel path and complete one full 360-degree circle. End the turn and find a row of marked parking spaces for your next exercise.

Approach the line of parking spaces at a speed of between 5 and 10 MPH as shown by the dashed arrow in the diagram below. When you get to the end of the first line, make an aggressive turn to the right and line up with the third or fourth line down. Ride that line until you get to its end. Make an aggressive turn to the left. Repeat this serpentine effort until you run out of space.

![Figure 25: Approach for slow-speed PLP](image)

You should aim for the third or fourth line following your turn but it doesn’t matter one bit if you can’t make even the fourth line at this time. All you want to be practicing is your aggressive turning ability, not how tightly you can turn. Some days you will be able to handle the fourth line, others you will be able to handle the third line, and on still others, if you are very, very good at it, maybe even the second line. Whatever your personal abilities are, you are merely assuring that you have adequate skills as compared to what you have learned in the past are your personal limits.

You are not out there trying to improve that skill, only confirm it—and loosen up tired or stiff joints and muscles.

The “X”s shown in the diagram are not actual cones or markers. They are your mental targets for your target lines. In other words, you do not target the end of the line you are approaching as that will cause you, invariably, to overshoot that next line. This is, in other words, a way to practice target fixation working for you instead of against you. Once you have finished doing the serpentine, ride back to the first line and prepare for the next exercise by approaching the area along the green arrow.

In Texas and several other states, public parking spaces must be nine feet wide, but the national standard is a minimum
eight feet in width. You will want to know what the actual spacing is on your parking lot in order to evaluate your performance in some of your exercises.

This one is the equivalent of the “slow race”. As you cross the first line you are to be moving as slow as you comfortably can manage. Continue in a straight line for at least five spaces before braking to a complete stop with your front tire on one of the lines to begin your next exercise.

From a dead stop, turn your handlebar fully (to its stop at or near the tank) to the right or left, then ride out of that position without crossing the next line. Again, the “X” in the diagram is a mental target for your path of travel on the parking lot, not a cone or other marker. It will be helpful to remember to look up and out, picking a visual target on the horizon and far to your left or right, instead of looking at the place you intend to put your front tire. Should you mentally fixate on the next line and look down at your imaginary “X”, you will almost invariably cross over the line.

This is yet another example of learning to use target fixation. Repeat the exercise while turning in the opposite direction.

Now ride back to where the lines begin, line up along the center line and approach at 20 MPH. As you cross any one of the lane marker lines, use that as your starting point to perform an emergency (aggressive) stop. You should be able to come to a complete stop with your front tire at or just beyond the second line from the one you chose to start braking. But in your pre-ride exercise it’s not important that you are successful at braking this fast!

This is, like all the other pre-ride exercises, just used to confirm that your skill level is adequate, not a test of your personal limits.

4. Swerving
There is no need to practice swerving during a pre-ride PLP session. However, a discussion of the concepts involved is appropriate, along with an explanation of why there is no need to practice them.

If, while out on that empty parking lot doing your practice session, you find a light post in a cement stand, you know enough not to run into it. If you happen to head for it and get too close for comfort, you will avoid it. That, for the most part, is what swerving is all about. You change your path of travel in order to avoid running into a relatively small object in that path. On the parking lot, that is accomplished with a single turning maneuver. You really don’t care what your resulting path of travel is so long as you miss hitting the lamp post, because you have plenty of free space around it.

On the road, what you should try to avoid hitting with a swerve maneuver is fairly small (a bottle, a dog, a pothole), but you do care about your resulting path of travel because there are lanes designated for your use, and changing lanes in an arbitrary fashion is dangerous. Thus, on a roadway your swerve will involve at least two turns; the first to avoid the obstacle; and the second to return to your original direction of travel (both within the same lane). Should you swerve so far out of your original path that you cross into the next lanes, then there are three turns involved in your maneuver. The third one brings you back to your original lane. (The diagram showing a swerve is not to scale; it is merely conceptual.)

The MSF classes have you “swerving” with two turns around a sequence of cones at speeds between 12 and 18 MPH. There is absolutely no reason to think that you cannot now
avoid running into or over a pothole that is in your path, while traveling at 20 MPH.

Where you might have a problem is dealing with that pothole (or dog) at 40 MPH or greater. There’s no justification for performing a PLP activity in excess of 30 MPH. Doing a pre-ride swerve practice is a waste of time.

A larger concern here is to correct the notion some may have that any maneuver designed to avoid hitting a large obstacle (such as an 18-wheeler entering an intersection from your right or left) can be thought of as “swerving around”.

Your proper response to that kind of threat is to aggressively brake your bike to a complete stop.

A one-turn “swerve” is simply a turn. On a public road, that would take you off the roadway or into a curb, an oncoming or parked car, or the side of that truck—unless you simultaneously braked while turning. But you know not to brake while performing an aggressive turn.

And any thoughts that perhaps you can first brake, then release the brakes and do an aggressive swerve should be dismissed immediately. If you think that a collision is unavoidable, a swerve cannot prevent an impact more often than not.

Worse, it maximizes speed of the impact and it practically guarantees loss of control. Maximum braking is your best response.

A two-turn swerve leaves you in an oncoming lane, off the road, or hitting a curb or parked car or the side of that truck. If you have time for a three-turn swerve, you have time to stop the bike. Only by trying to stop do you reduce your speed meaningfully (if at all). It follows, then, that given a choice of swerving or stopping when confronted with a large obstacle, there really is no choice: if you want to maximize your odds of survival. *Brake aggressively.*

The serpentine exercise provides you with aggressive turning practice. That’s enough to avoid small obstacles, making swerving practice a waste of time.

5. Ending Your Session

These maneuvers are sufficient for a pre-ride parking lot practice session. When you’re done, even if you’re alone, get in the habit of honking your horn once when you have completed the session. That will do what you almost certainly failed to do during your pre-ride walk-around: test that your horn works. It also announces to any other riders who might be doing their pre-ride PLP that you are done, so that they can determine when they can all head for the exit and begin the actual ride.

A single beep of your horn says you have decided that you are “good to go” and are willing to make the planned ride.

If for any reason you have concluded that you are not able, or willing, to make the ride, cease your PLP and move to an out-of-the-way place to stop. (This should catch the eye of at least one of the other riders, who will probably ride over to check on you. It’s courteous to let others know that you’re leaving but you’re still healthy enough to ride home.)

Instead of honking your horn with a brief single “bleep”, when you exit the parking lot, you should head home.
If other riders are there with you, no one has the right to disagree with your decision or try to talk you into continuing, nor should anyone make a show of disappointment, even if this means the whole ride is cancelled or postponed because you decided not to participate. The concept of “ride your own ride” means that you are unequivocally to be in charge of your riding decisions.

B. Improvement sessions

When you are brand new to riding, and once a month or a couple of times a year thereafter, you should dedicate half an hour at the parking lot to improving certain skills. These parking lot practice sessions are, by definition, highly stressful. When you’re a newbie, you may wish to work on several different skills during these sessions; but once you have become proficient with most of your skills, an improvement session should be used to work on only one or two different skill levels.

No single exercise should last longer than about five minutes. Between exercises you should come to a complete stop and spend time to recover your composure, your confidence, and your equilibrium. Particularly in the summertime, you may wish to find shade, kill the engine, dismount, remove your helmet, and rest or re-hydrate for a few moments. Then replace your gear and work on a different skill.

These are the sessions in which you develop the ability to do a quick-stop with a deceleration rate of 0.8g's and, if for some reason you think you need to, practice swerves at speeds of from 20 to 25 MPH.

They are also times to practice aggressive U-turns. In doing so, you will not only tire and sweat profusely, your muscles will likely hurt when you are done. You'll find yourself mentally fatigued when you’re done, too, because you will have been concentrating intensely.

These practice sessions will also test your resolve and commitment to become a competent rider, because in each case you will be attempting to exceed what you know are your personal limits, and you won’t be certain you’ll ever succeed. In fact, you will fail more often than not, though you will probably get better at each skill as you continue these practice sessions.

And let’s face it, the more experienced you are as a rider when you perform these improvement sessions, the more convinced you will be that your current personal limits are “good enough”. Nevertheless, improvement sessions are the only way that you will ever become a truly competent rider. If you can consistently achieve a deceleration rate of 0.7g’s, you are qualified to ride on the public roads, from a braking skills point of view; but you are not a competent rider, from a braking skills point of view, until you can consistently achieve a deceleration rate of 0.8g’s.

Proof of that is obvious. If the car in front of you slams on its brakes and does a four-wheel skid, it will decelerate at about 0.8g’s. Surely you want to be able to avoid running into it?

VII. Must-haves whenever you ride past your driveway

A. Identification

Most motorcycle accidents occur within a short distance of where they start. That should not, however, lead you to think that if you are involved in an accident, someone who knows you will be immediately available to help or to give information that could be vital to your medical treatment.

On the contrary, a relative often becomes involved long after first responders rendered assistance and the injured motorcyclist has already been moved to a hospital.

The issue of identifying a downed rider may not seem to be important. Normally in a vehicle accident, one need only find a driver’s identification in a wallet or purse; but these items may not have remained on or near the rider after a motorcycle accident. A woman rider who puts a purse in a saddlebag or tankbag may become separated from her belongings because of the post-accident condition or position of their bikes, or from limited access to her motorcycle during her hospital visit.

Having ID on your person, where it can be found immediately, is a good idea for anyone but especially for women riders.

7 According to the famous 1982 Harry Hurt study MOTORCYCLE ACCIDENT CAUSE FACTORS AND IDENTIFICATION OF COUNTERMEASURES VOLUME I: TECHNICAL REPORT: These data show clearly that the accident occurs relatively close to the origin of the trip and only a short time after departure.
But the motorcyclist’s name may not be nearly as important to caregivers as other information, such as emergency contact data, blood type, known allergic reactions to certain medications, medical history (especially concerning metal devices) and medications this person is currently taking.

Some people are conscientious enough to keep that kind of information with them as a matter of course. You are well advised to do so.

Where you keep that documentation is also important. Every rider should have the vital information needed in an emergency printed on a card that is laminated for protection from the elements and hung conspicuously on the outside of your safety gear.

If your address, medications, or contact information changes regarding who is to be notified in an emergency, be sure to update this tag. You should understand that such tagging is a minimum suggestion—something that almost any rider can provide for themselves.

A better solution would involve a more permanent ID system, attached to the body, such as a dog tag, which is active in nature; one that notifies appropriate people via radio technology that an emergency situation exists and pinpoints the location of the rider.

Such a system is currently under development but is not yet available to the motorcycling public.

Figure 30: Motorcyclist Safety Information Tag

B. First Aid kit

Almost all riders carry a First Aid kit. It’s a primary reason to purchase saddlebags or a tank bag; but this item is often forgotten once it’s purchased. Some have kits which were purchased to meet a perceived safety requirement (or to qualify for a safe-riding badge from a club); but if you don’t know what your First Aid kit contains, you may be unpleasantly surprised if you ever need to use it.

What passes for a First Aid kit from sources such as discount stores and auto supply shops (and sometimes given away as Poker Run prizes) is far short of what is needed for our sport.

Experienced EMTs who see serious accidents on a daily basis and who have worked accidents involving motorcyclists stress several non-obvious points:

* Your First Aid kit must contain a really good pair of scissors in it, to cut away thick clothing. If you can’t see the rider’s injured area, it’s hard to figure out what is best to do. Only heavy-duty shears can handle thick material.

* Every rider should carry a pair (several pairs is best) of latex gloves to be used in case of an accident where blood is spilled. Having them on your bike may allow persons who want to assist you to make that decision without fear of contamination, as well as being available to you to help someone else.

* A good First Aid kit should have a number of triangle bandages in it, which can be easily made from inexpensive muslin purchased at any fabric or discount department store. These pieces should be large enough that you can make a sling from them, or fold them to use as a pressure-point type bandage, or put them on a head injury to hold other bandages into place. They should be about 30” by 30” and cut on the diagonal. Unbleached muslin works well as long as it’s clean and strong. Commercially-purchased First Aid kits simply do not come with these items. If you need more than one (for example, after making a sling for an arm, it's a good idea to immobilize that arm by binding it to the upper body), you can tie several triangle bandages together if the patient is a large individual. Carrying a minimum of three triangle bandages is a good idea.

* Few commercial First Aid kits have anything like enough sterile gauze pads. If you need to put pressure on a bleeding wound, you'll go through these items fast and will want enough to add another clean one often. NOTE: Place each new gauze patch on top of the existing blood-soaked bundle.
of patches, adding them to the stack, to prevent tearing off any blood clot that has begun to form at the wound site.

* Carry a bottle of filtered or distilled water in your kit. This can be useful in case of broken bones, eye injuries, cleaning out other minor injuries, and for dehydration. If a rider has a compound fracture, you should, if possible, cover it with a muslin bandage (one of the three triangle bandages you carry) on top of a sterile gauze bandage that you’ve dampened with water. The damp gauze is put on the end of the exposed bone, to keep it from drying out. Many minor problems can be dealt with initially by washing them with clean water, and sunscreen or debris in the eye can often be relieved by this, with nothing else required. (Even if the water isn’t distilled or filtered, it can still be used if it’s clean enough that you can drink it.)

* In the case of very bad head injuries, it’s not unusual for riders to have substantial eye injuries because of head impact or because the forces involved in the crash are so violent. Unfortunately, human eyes do come out of place on impact. The recommended First Aid in this situation is to have a cup (like a clean Styrofoam cup) available to contain the damaged and displaced eye, and to strap that cup onto the face with one of those triangle bandages or a roll of sterile gauze. Medical experts today can do amazing things to put an eye back into place and restore a rider’s vision. A rider with an eye injury should have both eyes covered to keep the person from panicking (and to slow the “eye-matching” reflexes, which try to make our eyes work together). Having a clean Styrofoam cup in your First Aid kit may permit you to do someone an invaluable service in saving their sight.

* Most simple First Aid kits contain some kind of antiseptic ointment or cream. These can be useful for minor sunburns or insect bites, but they should usually not be used on a serious injury. When the medical personnel start to work on a wound, they don’t want to wonder what has already been applied to it. And if you don’t know whether it has expired, when in doubt, throw it out.

In case of an accident, the best first response is to call 911. In most regions of the country, even in rural areas, emergency assistance can be sent out right away. However, if you ever become a witness to a bad accident, you’ll discover how important it is to have current information and adequate First Aid gear from the rider’s identification tag to help describe the situation to the 911 responder, even if you can’t really do very much at the scene. It may also save a life to know what not to do.

When you reach for a First Aid kit, you’ll be better prepared if you know what’s in it and how to use it, and if it’s what you really need.

**C. Communications**

Cell phones are ubiquitous today. You should carry yours whenever you are riding your motorcycle, and you should have it in a pocket, on your body, where you can reach it from wherever you might land in event of an accident. Some riders who have had single-vehicle accidents without witnesses have been thrown out of sight of immediate rescue. Imagine the desperation of knowing your cell phone is on the bike, only feet away, but you’re too injured to get to it, or you can’t move the bike enough to reach it.

But cell phones are not the only communications devices available to you when riding. For decades truckers and motorcyclists have carried Citizen’s Band (CB) radios on their vehicles, and not just for emergency situations. CB radios are absolutely the best device for members of a group ride to use to communicate with each other. Even if you do not have a working cell phone with you, if you have a CB radio and you are on or near a major highway, it is quite likely that you can reach a trucker or other biker and ask him to send help your way if it’s needed. Note, however, that CB radios have very limited range.

Still, they are very useful in reaching other travelers to determine upcoming traffic or weather problems (like flooding) in addition to broadcasting for help.
D. Tools, spares, and other supplies

Let's face it, unless you are riding a bagger or a scooter, you don’t have much room on your bike to be carrying much of anything other than yourself and possibly a passenger. Suggestions of what you should be carrying with you might seem academic.

We have listed a few things that make sense for you to have with you, however, in addition to your cell phone and wallet.

First is the previously mentioned First Aid kit. If you’re short of stowing space, find one in a waterproof case that you can strap on the bike as a permanent external addition, for example behind the sissy bar.

Second, tools. It will come as a surprise to some that your bike already has a complement of tools stored on it. On new bikes there is a small storage space, usually under your seat near the battery, that contains a set of cheap tools adequate to do most of the maintenance or repair work that can be done at home or along the roadway. You can tighten your chain, align your wheels, remove covers, and tighten bolts with that set of tools, if no one has removed them.

What is missing, however, is a set of vice grips. That is one tool that you really should have with you.

Third, fuses. While you will find a spare master fuse, it is not likely that you will find any spares for the several other fuses in your fuse box. They are cheap and small, so there is no reason at all for you not to carry at least one spare of each different amperage fuse on the bike.

Fourth, wire. Wires break or burn up if shorted. A three-foot piece of stranded wire will take up essentially no room on your bike. You can use it like a rope to tie things together, replace a short piece of existing wire, even strip a couple of strands of wire and use them as a replacement for a burned-out fuse in an emergency.

Fifth, tape. Two kinds of tape should be available on your bike: duct and electrical.

Sixth, a fire extinguisher. This is one thing that you will not find on more than one bike in a thousand.

Finally, you should carry two or three different lengths of bungee cords.

So where does all this gear get stored?

In your backpack, or in a carry-all that you bungee to your pillion. If you carry a passenger, you’ll find that you will probably need a tank bag or saddlebags to accommodate your regular gear and whatever additional items your passenger brings. You will do your passenger a favor to warn her about this in advance.

VIII. Street riding – Solo

There is no other way to advance from newbie status to proficiency as a rider than by accumulating experience in riding successfully. We will describe a progressive approach for gaining that experience while you encounter threats that you must learn to manage or avoid.

It might seem strange to you that we would focus on threats here instead of mileage, so we ask you to begin this section by recognizing some realities that are not obvious.

For example, your odds of being involved in an accident are several times higher when riding on surface streets than when riding on freeways. One rarely hears of a newbie being killed or injured while traveling 65 MPH on a freeway. But you frequently hear of even the most experienced of motorcyclists being in serious accidents while riding on city streets involving left-turning vehicles—when other drivers cross into the rider’s lane directly in front of him and the rider cannot brake fast enough to avoid the collision; or the rider fails to recognize the threat in his lane in time to react and prevent it when the other driver doesn’t see him.

Nevertheless, your path to competence involves starting out on local neighborhood streets, progressing to city streets and ending up with high-speed travel on country roads, highways, and freeways. Clearly that progression is one which favors speed avoidance over risk avoidance.

Motorcycling is not safe at any speed, but if you’re going to learn to ride, you will make mistakes; and we want you to survive the mistakes you make while you learn to manage the multitude of risks presented by every ride.

Speed does not kill! No matter what you’ve heard to the contrary, speed is not what kills you when riding a motorcycle; impacts do that. If you are ever involved in a collision, however, your best chance at surviving it is to have the lowest speed of impact possible.

Your safety gear is primarily designed to reduce the chances of scraping your skin off your body and to absorb a modest
amount of impact. But none of it protects you from crush damage or broken bones resulting from high speed impacts, not even your DOT-approved helmet if the stress is high enough. Clearly, you don’t want your head to end up underneath the wheels of that garbage truck that just turned left in front of you without signaling. Here’s where you don’t want to make a learner’s mistake.

If you focus on maintaining a good attitude about your own safety and that of others, keep your skills up, especially your braking, take good advice from seasoned riders, and wear all your gear, all the time, you will probably never have to test your helmet to see how much crush-protection it gives. But there is no sure way to protect from what other drivers will do, and motorcycle riders crash somewhere every day.

All the gear, all the time. Make it a habit you never break.

There are two ways to reduce speed upon an imminent collision:

1. Effective and timely use of your brakes; and

2. Lower speeds when you begin braking.

See APPENDIX G – 5 MPH is Not Trivial.

As a relatively new rider, you are not likely to roll-on your throttle aggressively and test your ability to handle high speeds. Instead, you will be testing your ability to recognize unexpected threats and trying to improve your skills at dealing with them. No matter how many miles of riding experience you attain, unexpected threats will present themselves to you with regularity. Expect the unexpected—at all times.

Your driveway is well known to you. When you leave home or return with the car, you travel along that driveway. You know “everything” there is to know about it. So how do you explain that the first time you tried to ride your motorcycle down that driveway and into the street, you suddenly noticed that there’s a gutter your wheels must dip into, in order to cross over it? Why didn’t you ever notice that you must make a sharp 90-degree turn to the right immediately after crossing over that gutter, and that there’s only ten feet of room to complete that turn without being in an oncoming lane?

These could be the first two “unexpected threats” that you encounter on your first ride on public streets.

Let’s look a little more closely at that gutter. The first time you ride down your driveway toward the street, the odds are very high that you will stop before your front tire touches that gutter. It will look like an easy task to just continue on and begin your turn. But you are at a dead stop. Your first attempt will have you easing the bike’s front tire into the gutter and out of it. That’s when you realize that you are about to drop the bike, because you’re going to “short-leg” if you continue.

If you see this in time, you can stop your bike without dropping it. Then you must decide whether you should simply try to ride out of the situation, or back yourself up and try again. You are, in other words, learning something from the experience.

In short order, you’ll decide that the way to handle the shallow gutter at the end of your driveway is to simply ride over it—without stopping. But the next time you drive down your driveway, without stopping for the gutter, you make a right turn that is far too wide! You enter the oncoming lane before steering back to your desired path of travel. The lane was empty, and you survived it, but what if--?

This was another “unexpected threat” for you to deal with.

Now it’s expected: unless you change the way you exit from your driveway, sooner or later there will be a neighbor’s car in that oncoming lane; and that you simply must not cross into it as you leave the driveway.

Think it through and approach the gutter from the left side of the driveway with a sharp angle pointing to the right so that you have less turning to do in order to complete your access to the right lane; or learn how to make sharper right-hand turns at slow speeds.

Whatever you decide, you are learning something about the real world of motorcycling, and how to manage yourself and your bike in that world.

It may not have yet occurred to you that there are at least two other “solutions” to the end-of-driveway “threats” problem:

1. You can choose to put off learning anything for the time being and make a left turn out of your driveway, where you will have twenty feet of turning room; or
2. You can return the motorcycle to your garage and elect never to ride again.

These choices evidence no learning and certainly no skill development. The reason you take your motorcycle out into the neighborhood is to learn how to deal with unexpected threats. You already know how your motorcycle works and how to control it on a parking lot. You need experience, and you’ll have to survive encounters with any number of unexpected threats to amass a set of skills and responses that allow you to deal with similar threats, and more serious ones, in the future with confidence.

Putting off problem resolution is not a real-world option in motorcycling. On the other hand, deciding to hang it up and to abandon the idea of riding motorcycles is a viable alternative for some riders when they meet a difficult situation that exceeds their abilities, especially if it leaves them terrified and out of control; and it may actually be exactly the right way for you to deal with the real world.

While “no fear” has made a good marketing slogan, it’s nonsense for a rational person who wants to ride the streets. Facing and overcoming your fear is one of the challenges and joys of motorcycling. But it should never go away completely.

The confidence you learn to feel when riding on public streets and highways has to be tempered with a healthy respect for the deadly risks involved in what you’re doing, a respect that never goes away and that makes you develop safe riding habits for the rest of your life. Whether it’s really worth it to you to ride, only you can know. Let’s assume it is.

A. Neighborhood

Let’s agree that by “neighborhood” I’m discussing a residential area that extends no more than perhaps a mile around your home. If you live in a city such as Brooklyn, your neighborhood consists of more city streets and traffic than if you live somewhere in the country. If you actually live in the country, your neighborhood streets are probably country roads. But what we will deal with in this section is the set of threats and learning experiences that are common to residential areas. We will discuss city streets in the section that follows.

1. Slow speed and frequent stops

Except in the country, virtually all residential areas have posted speed limits that are very low. They shouldn’t pose a problem for the new rider who has yet to experience higher speeds. At the same time, however, low speeds are the most difficult for new motorcyclists to manage.

Even if you don’t yet enjoy higher speeds, your motorcycle absolutely loves them. It has five or six gears in its transmission for that very reason. You will quickly find out that despite your desire to keep your bike’s speed at or below the posted speed limits when you are riding in your local neighborhood, you will find yourself exceeding those limits.

The solution to that is to ride your bike in a lower gear than seems natural. If you can easily ride in third gear and still not exceed the speed limit, you should gain your early experience in your neighborhood riding in second gear.

Instead of having to glance down at your speedometer to see if you are speeding or not, you will hear that the engine is running at too high an RPM level for you to be under the speed limit. This will educate you on the meaning of your engine’s sounds at the same time that it teaches you how to keep your eyes on the roadway ahead of you, instead of looking down at your instruments.

As you gain experience you will be better off riding in the most appropriate gear for the speed at which your wheels are turning, and you’ll know by the sound which one that is, but as a learning tool early in your career, this simple “solution” is well worth the effort.

The next thing you will experience on neighborhood roads is frequent stopping and starting. You will find stop signs at the corners of many blocks. Sometimes there will be yield signs instead of the classic red stop signs, and sometimes there will be no signage at all. But the result is that you will not be able to maintain any given speed for a distance of more than about a block without having to stop or slow down before proceeding. These stops and starts will occur so often that you will be highly tempted to not quite stop; that is, to make a “California stop”, to pause without touching the ground with your feet before launching your motorcycle back up to speed. That behavior is both dangerous, because chances are the rider has failed to look for cross traffic, and it’s illegal.

Instead, use each stop to develop a set of survival habits. Stop with both feet on the ground, not just one. Use your front brake to hold you in place on the ground at a stop, not the rear brake. (Unless you’re on a steep incline, your front brake alone is strong enough to hold your bike still.) Look to
the left for possible traffic, then look to the right. Take a moment to decide if you actually saw anything that might be a threat to you when you had your head turned. Then always look to the left again to verify that it is free of threats, and do the same to the right. This concept of looking twice in each direction can save your life. The first time is to see, the second time is to verify. You will be absolutely amazed at how often that second look picks up something that you missed or misinterpreted with the first look.

Even if you have slowed down for a yield sign instead of stopped for a stop sign, a double look is in order. In many places, the “California stop” is actually appropriate for a yield sign, so that you can make a final head check before you proceed into another vehicle’s right of way.

If other traffic arrives at a stop sign at the same time you do, decide who is expected to move next (do you yield to traffic on your right?); and then decide how to signal other vehicles what you want and expect them to do, so that it’s absolutely clear when you’re moving into the intersection.

Because you’re a vulnerable user of the roads, you will have to learn to be assertive with other drivers without losing your patience or your temper, and without being threatening.

Often a nod of the head, with an emphatic jerk, will indicate to another driver that you’re waiting for them to move out of the way before you go. You will often wave another driver through when it was in fact “your turn” to go, because your sight line is bad on one direction until traffic moves forward, or because you can see a threat—a child about to run into the road—that the other drivers can’t see. When in doubt, wait.

Neighborhood riding will prove to you the wisdom of having practiced working with your friction zone during your parking lot practice time. Except for heavy city traffic, which you probably want to avoid at first, no other kind of riding puts this amount of demand on your ability to start and stop your motorcycle smoothly without stalls or lurching. If your neighborhood happens to be hilly or if you have to travel a road with a steep incline, you’re going to become an expert at this right away.

Something else is learned while riding in neighborhoods: engine braking. Whenever you roll-back on the throttle, your bike slows down even if you don’t apply your brakes. This is the result of your engine “unwinding”—lowering its RPM. It is to your distinct advantage over the long run to take advantage of engine braking whenever you must slow down gradually; such as when you approach a stop or yield sign. You are not prematurely wearing out your brakes, and the attitude of your motorcycle remains stable. When engine braking is insufficient to slow you as quickly as you want, adding a little braking effort takes care of the deficiency. That occurs, of course, as you get close to a stop sign and must actually stop.

2. Frequent gear shifts
Though you can probably ride all day long within your neighborhood without ever leaving first gear, that behavior would be a mistake. You need the experience of making smooth gear shifts without inadvertently “finding” neutral when you don’t want it. You’ll soon be able to hear what the engine sounds like as an indication of when you should shift gears. This will become almost subconscious when you gain enough riding experience.

Your MOM will list the manufacturer’s recommended shift points. That is, it will tell you at what speed you should upshift from one gear to the next.

Those recommendations may be helpful, but you will quickly learn that they do not seem to make much sense. The manufacturer’s recommendation to change from first gear to second at about 15 MPH, for example, will feel premature, arbitrarily low, and maybe a bit silly, given that you can probably easily reach a speed of nearly 30 MPH in first gear. (Many “bullet bikes” can reach speeds in excess of 70 MPH in first gear.) The manufacturer’s want you to move into a higher gear as soon as you can comfortably get there without hearing your engine “lug”, in order to keep you from inadvertently damaging it.

Let me just say that those shift points are safe; meaning that you can make the shift at that point every time without causing yourself any trouble. But they are not the speed at which you must shift. You could increase your speed from 15 MPH to 20 MPH or even a bit faster and continue riding in first gear without any trouble at all. So why such a low manufacturer’s listed shift point? Because the lower the gear you are in, the faster you can accelerate. Thus, when you are in a low gear, you can increase your engine speed into the “redline” (unsafe engine speed) in a heartbeat. What does this mean?

Your bike probably has a tachometer. Some do not. It is one of the least used instruments on your motorcycle, because
once you become familiar with your bike, you will learn to 
determine your shift points based on how the engine sounds 
and when your acceleration rate starts to decline. If you do 
have a tachometer, you will notice that near the top end of 
engine speeds indicated on its face is an area marked in red. 
The start of that red area is known as the “redline”. This 
indicates at what speed you are seriously stressing your 
engine. If you go beyond it, or continue for any length of 
time running the engine at that speed, the engine will 
destroy itself. That does not necessarily mean that the 
engine will explode. It means that the engine will experience 
eccesive wear, and sooner or later it will freeze up, or 
otherwise break.

Midway between idle speed and the redline, your engine 
produces its maximum torque. (Maximum horsepower is 
invariably produced near the redline.) Since torque is what 
causes rotation, you need torque to turn your rear wheel; 
that is, to accelerate it from zero RPM to any other speed. 
The midpoint is actually not a specific engine rpm, but a 
relatively flat band of speeds. This is often called the “sweet 
spot” for engine performance. Whenever your engine is 
runtime a speed within that band, it produces the 
maximum torque possible and, thus, the greatest 
acceleration rate for your motorcycle.

The way you determine the speed at which you should be 
moving when you up-shift is by sensing that the bike’s 
acceleration rate after the shift is very nearly the same as 
before. Without experience, you simply cannot know that 
speed. But what you do know is that a motorcycle cannot 
accelerate as quickly in a higher gear as it can in a lower gear. 
And you also know that after you pass your “sweet spot” in 
your acceleration curve, your acceleration decreases.

You obviously wouldn’t want to shift gears while you were in 
your engine’s sweet spot, but sometime thereafter. If you 
shift too soon after the sweet spot, your gear ratios will 
cause you to miss a lot of acceleration potential, but if you 
shift too much later than that sweet spot, you run the risk of 
entering your engine’s redline.

Note that acceleration potential has nothing to do with 
racing or “testing limits” on your motorcycle. Riding around 
your neighborhood at speeds below 20 MPH, stopping and 
starting, is how you learn this aspect of riding. You’ll need to 
have a sense of this for normal riding at higher speeds, in 
order to survive ordinary—but expected—threats when you 
accelerate fast. It will be easiest gained by practicing on the 
same motorcycle so that you will understand its normal 
sounds. If you take a ride on a different motorcycle one day, 
you’ll want to be familiar with this method of “tuning” 
yourself to it so that you don’t struggle with deciding when 
to shift while riding an unfamiliar bike.

See APPENDIX H – Why Finding the Right Shift Point is Important.

Your experience riding in your neighborhood is teaching you 
where to shift between gears. You are learning to hear what 
your engine is telling you, at least for the speeds you’re 
traveling in first and second gear. You’ll find that a similar 
shift point exists between each higher gear.

Down-shifting is also a matter of matching engine and bike 
speeds, but again, what your tachometer says is irrelevant; 
you don’t need to look at it or know what it says. Instead, 
down-shift only when your engine is at or above its sweet 
spot in terms of RPM so that you do not cause the engine to 
enter its redline when you shift into that next lower gear. 
Experience is how you learn if your speed is too fast in the 
current gear for you to safely down-shift, and it is a matter of 
sound, not instrumentation that you rely on for input.

One of the most important reasons that you hesitate within 
your friction zone when you shift gears is to give you time to 
assess whether the engine and rear wheel speeds are 
synchronizing, or if their speeds are too far apart for syn-
chronizing to occur. For example, if you make the mistake of 
down-shifting when you really meant to up-shift, you can 
recover without redlining and damaging your bike if you’re 
paying attention and known how to use the friction zone.
One other thing should now be obvious: you should normally 
ride in the gear that keeps the engine running at close to its 
midpoint in terms of RPM, so that you can easily accelerate 
or decelerate as conditions dictate.

3. Driveways

By definition, neighborhoods have lots of driveways 
intersecting with the local streets. These pose unique 
problems for you as a rider, because automobile drivers are 
ofen driving in reverse when they exit those driveways. In 
other words, those drivers have severe visibility problems 
and may also have control problems when they back out. 
You and your motorcycle may not be seen. You must insure 
your safe passage, and it’s not merely a function of having 
the right-of-way. You may have to stop to allow those cars to 
complete their exits, even though it’s the car driver who has
the legal obligation to stop and let you travel down the street. The truth is that you always have the obligation to protect yourself, whether a driveway is involved or not.

And that is the primary lesson learned while riding on neighborhood streets: no matter who has the right-of-way, you are responsible for your safety, not others. Your behavior is not controlled exclusively by laws; it is controlled by you as you communicate with other drivers and make judgment calls as a matter of self-preservation.

The second lesson that should be clear by now is that wherever there is a driveway, there’s always the chance that an approaching driver will turn left in front of you to access it. Even without its turn signals flashing, if a car approaches you on a neighborhood road, it could make a dramatically fast turn into a driveway across your lane and in front of you. The driver would be in violation of your right-of-way, but you’d lose the confrontation. Your motorcycle can’t win against the greater mass of even a small car in a collision.

You must prepare for such an unexpected incident by imagining it as you look ahead; and then by assuming that it might happen and slowing down to the point that you can always stop without a collision if your speculation turns out to be correct. At the speeds typically encountered in a neighborhood, a collision would not necessarily be fatal. But this lesson can save you from serious injury or death when riding on city streets. Commercial areas provide many driveways for you to deal with and, of course, the same situation arises as you approach any intersection.

4. Parked cars

Parked cars on either side of the street pose obvious visibility problems for you. You cannot see what is between those cars, such as children, or animals, or a bicyclist/skateboarder who has elected to leave the sidewalk to cross the street.

Furthermore, when a car pulls along the curb to park, the next thing that happens is that the driver opens his car door.

Running into an opening car door will abruptly end an otherwise uneventful, casual ride for you.

You should give parked vehicles lots of room, even if you have to cross over into the vacant oncoming lane. The same is true for anything else that threatens you while you are riding in your normal lane.

Whether it’s a child, a dog, a bouncing ball, or a mother pushing her child in a stroller in the street, your reaction should be to put distance (lateral) between you and that obstacle. If there is oncoming traffic, stop in the road instead of crossing into its lane, and wait until the threat no longer exists.

When you are approaching a parked car that a driver has just entered, you should anticipate that it will make a hurried exit from its parking space, right into your path of travel.

Naturally you should slow down as you approach that parked vehicle. If you decide to ride past it, honk your horn once to insure that the driver is aware of you and understands that you are going to pass.

5. Children

Young people are like animals; they are darling and inexperienced. In fact, until they gain a modicum of “worldliness”, they act with an enchanting dumbness. They are unpredictable in every way. They may see you and decide to run right in front of you in order to wave at you or just to cross the street. They may freeze like a deer in your headlights and stand there waiting for you to run into them.

If they decide to run away from you (“danger”), there is no way to predict in which direction their escape path will take them, or whether they’ll circle back directly in front of you.

They are, in a word, dangerous. But unlike other animals, they will, if they survive, grow into adult human beings.

They should receive a special amount of attention from you as you ride past them. Not just to keep a wary eye on them, but to give them some recognition and even a friendly wave so that as they grow older, there’s a chance that they don’t harbor a dislike for “motorcycle bums”.

By the way, do the same for any police officer you see in uniform and standing on his or her feet. That officer is working in your behalf. A bit of courtesy from you goes a long way toward how that officer treats the next few motorcyclists he or she encounters.

6. Animals

Neighborhoods are home to most domestic animals. Some of them are not properly controlled by their owners. You will
see loose cats and dogs wandering on yards, sidewalks, in parks, and sometimes even on streets.

A loose dog is probably your most significant threat. Some are so territorial that they will perceive you as a threat encroaching on what is theirs. These dogs like to chase their adversaries away.

Not all of them will bite you if they get a chance, but some of them might like to try. As a result, a loose dog may decide to chase you and your motorcycle down the road.

It makes no sense to stop and let the dog have its way. Instead, take advantage of the fact that it must try to reach you on an approach path at some angle to your bike, instead of simply from behind. Your motorcycle can certainly outrun it if traffic allows, but you might not be able to avoid an encounter where the dog has a good angle on its approach. The solution is to allow the dog to believe its attack angle is good. When it gets closer, increase your speed and put the animal behind you where it can no longer catch you.

If a dog approaches you from the front, swerving to miss it might be effective, but the odds are that it will collide with you. Should that happen, you will want to be absolutely vertical at impact, and you do not want to be aggressively braking at the time. Center yourself on the bike, knees firmly hugging your tank, and ride over the animal, not through it; meaning accelerate just before impact. You will come out of the encounter better than the dog.

If the animal you encounter in a neighborhood is incapable of attaining a speed faster than you can walk, such as a turtle, then simply swerve around it. You need some practice using a swerve technique, anyway.

If the animal is larger than a medium-sized dog, you will not be able to ride over it. In that case, your solution is either to stop before hitting it, or reduce your speed to as close to zero as possible before you do hit it.

In either event, that means aggressive use of your brakes. This is yet another reason to practice and improve your braking skills.

7. Intersections

In residential areas some intersections have no signage controlling stops or yields. You must treat these as if they had yield signs on all four corners. Even though a vehicle entering from the right has the actual right-of-way, you are vulnerable on a motorcycle; so you must not assume that if you are on that other vehicles right, it will yield to you.

The larger problem for you is what to do about a vehicle approaching you in the oncoming lane. Even if it’s flashing a turn signal, you must assume that its driver does not see you and will make that left turn directly in front of you. Naturally, you slow down in order to gauge the real intention of that oncoming vehicle. Critical in your analysis is whether it is slowing down (as you are). If so, that car becomes a significant threat to you, because it is more likely than not about to make that turn.

But suppose you have established eye contact with the driver who is approaching with a turn signal blinking? Do you stop and let him make his turn, or do you proceed because you feel sure he knows you are there? More often than not, you will proceed, but not with speed, and with your right hand covering your front-brake lever; and not if the vehicle continues moving toward you.

The most difficult coordination effort between you and an oncoming vehicle driver is when both of you intend to make left turns at an intersection where any meaningful length of median separates the lanes going left and right, and there are no signal lights that control when each vehicle moves.

If there were no median, or if that median was narrow, you would normally turn in front of each other. But the wider that median is, the more likely you will turn behind each other, as shown in the following diagram.
This is a case where there’s no rule you can depend on. Instead, drivers must “negotiate” with each other and come to an agreement on how to proceed. But that negotiation doesn’t just happen. Instead, you will both advance until one or the other begins making the turn, or until turning in front of each other is no longer possible.

It should not be a surprise to you that passing behind each other is far the safer choice. Imagine if there is a car coming from the right while you have passed to the left side of the oncoming vehicle. That car on your right could not see you and could become your worst nightmare as it rushes through the intersection.

No matter what your level of experience, even in the most benign of riding environments, you must be “in the moment” and actively making decisions about how to manage your own safety. Riding motorcycles is not a casual endeavor.

If there are no tall buildings and few tall trees near intersections in your neighborhood, that is generally good from a visibility point of view. It also means that when the sun is low in the sky, your ability to see well when looking in that direction will be seriously compromised. Imagine, for example, if the sun were low on your right side as you come to an intersection. Your ability to see potential traffic coming from the right is restricted. But that is far from the only problem posed by the low sun. Suppose that there was a
pedestrian standing on the corner nearest you as you scan for potential traffic on the right. That pedestrian will be totally lost to your vision or rendered insignificant to you. Seeing no traffic coming from the right, you proceed into the intersection only to find that the pedestrian has stepped into the lane to cross in front of you. That kind of surprise ruins a good ride.

8. Pedestrians
Motorcyclists are exposed to more pedestrian problems in suburban neighborhoods than anywhere else. In these neighborhoods there may not even be sidewalks, so pedestrians are often found walking or playing in the streets. Joggers often run on the streets. Seniors may walk in groups there, as well. Dogs and their owners walk in the streets. If there are children playing in their yards, you may assume that at least one of these vulnerable roadway users could run into the street.

Whether four years-old or 90 years-old, pedestrians always have the right of way. Give them as much separation as you can when riding, even if it means traveling on the “wrong” side of the street when the lane is vacant. If the speed limit is 25 MPH, travel at 10 MPH around pedestrians. You can’t predict their path, their purposes, or their stability.

People who are in motorized scooters (usually for the elderly or non-ambulatory) are to be treated like pedestrians, even if they seem to believe they are driving cars. Give them plenty of room and be patient until they have clearly reached a place of safety. Don’t think you can predict what they will do.

9. Bicycles, Rollerblades, and skate boards
Again, you will find bicycles, rollerblades, “pocket bikes” (mini-motorcycles), and skate boards to be a greater threat to you in suburban neighborhoods than anywhere else. The threat is probably at its worst starting on Christmas morning and for a couple of weeks thereafter; but children have birthdays throughout the year, so the risk of encountering children who have almost no control of these devices doesn’t go away. You will find that bicycles often enter intersections without slowing and almost never stop first.

10. Motorcycles and motor scooters
If you see a rider on a motorcycle or motor scooter on your neighborhood streets, the odds are good that they are like you, relatively new to the sport and gaining some experience. Give them as much space as you give bicyclists. Don’t crowd them, don’t “join” them thinking that you can become a “group” on neighborhood streets (you always ride single file in neighborhoods), and don’t follow them thinking that you can learn how to ride by duplicating their behaviors. Wave if you pass them, and get on with gathering your own experience.

If you think the other riders are friendly, you may notice where they live and go back in your car to see if they’d like to visit. This is when you check out their bikes, their attitudes toward safety, and their experience level to see whether these are people with something to offer you. Don’t ride over on your motorcycle the first time unless you’re prepared to say no very firmly and to leave alone and fast if you’re uncomfortable at all. Some parts of rider “family” are dangerous, so be aware.

11. Hills and slopes
This is where you will discover how to start and stop on roadways that are not flat. You should always have both feet on the ground when you come to a stop and for as long as you must stay in a single location for any length of time.

Your front brake, by itself, is perfectly adequate to hold your bike in place at any stop.

Some riders learn how to manage the front-brake lever and the throttle at the same time when starting out on a hill; others learn to use their rear brake so that they can concentrate the task of managing the throttle with the right hand. Some riders prefer to keep both feet on the ground until they are moving, managing both the front-brake lever and throttle with the right hand, but others simply need a lot of practice to do that. Whichever technique you use, you’ll learn these techniques while riding in neighborhoods instead of city or country roads.

12. Speed bumps and railroad tracks
Many residential neighborhoods have placed paved speed bumps on some of their streets. Usually these are gently tapering mounds of asphalt that cause no inconvenience to riders of vehicles that pass over them, so long as the speed traveling is 20 MPH, or less. Grocery store parking lots may have much smaller speed bumps, but they cause harsher feedback to riders in vehicles traveling at even slower speeds than 20 MPH.

So long as you ride over these bumps, with all their different designs, with your bike as close to vertical as possible, hitting them at a nearly perpendicular angle, and at very low
speeds, they cause you no significant problems with the handling of your motorcycle. But if you ride over the bumps at any angle other than perpendicular, they can cause you to lose control of your motorcycle and promptly cause the bike to fall down.

Similarly, bordering most residential neighborhoods, and rarely even through them, you will encounter railroad crossings. Most of these represent a trivial threat to motorcyclists unless they are crossed at a very steep angle as compared to perpendicular.

But any vertical irregularity in a roadway can momentarily destabilize a motorcycle and lead to it falling to the ground. The problem is that most riders have no idea why that is, or why, if a group of several motorcycles crosses over one of these bumps, virtually all of them have no problem whatsoever in doing so; but occasionally one of those bikes will go out of control and end up on its side.

To understand this phenomenon, you first need to get your arms around some motorcycle dynamics and design concepts including:

- Front-end geometry; and
- The Restoring Force.

See APPENDIX I – Front-end Geometry and the Restoring Force.

13. Manhole covers

At neighborhood speeds, manhole covers present a trivial problem, unless they are wet.

If you drive over them, do so with your bike as close to vertical as possible. Avoid accelerating or decelerating at that time. These are great “obstacles” to practice swerving techniques around so long as you do not get too close to them and risk riding over part of them while in your swerve.

The biggest problem with manhole covers occurs when you’re making a right turn at an intersection where the manhole cover is almost impossible to miss. Here the issue is that you’re turning, and so not vertical by definition, when you cross over it—which you already know should be avoided. Traction demands are at their greatest when in a turn, and the manhole covers are made of steel, so they start out having low traction, even when dry. Manage these situations by steering around the manholes instead of over them, if you can, and staying off your throttle if they cannot be avoided.

14. Water, Ice, Oil, Leaves, Grass clippings, Road kill

No matter where you ride you will encounter these threats on the roadway. They all present traction problems. They all require you to ride over or through them in as a nearly vertical orientation as possible. They all require you to avoid accelerating and decelerating aggressively while your tires are touching them. (You can modestly brake or accelerate anytime, except in the case of ice or oil.) The single most important thing you have going for you when you encounter these threats is your low speed. It is impossible, for example, to hydroplane at speeds less than about 60 MPH. A cool head, smooth and deliberate application of control inputs, and no sudden changes of any kind are required when you have to ride through these low-traction threats.

See APPENDIX J – Hydroplaning Issues.

15. Transitions to city streets

When you leave a neighborhood, you must transition from neighborhood streets to city streets. That means that you must increase your speed, and you must prepare yourself for a very different set of threats.

16. Why you need neighborhood riding experience

What you have learned in this section is that neighborhood riding exposes you to a huge number of different kinds of threats. These threats come at you from all directions, though minimally from the rear. Some of them may be unexpected, but none of them should be unanticipated.

If that seems contradictory, understand that you should expect the unexpected. Were it not for the relatively low speeds at which you ride in a neighborhood environment, almost any one of these threats could result in a fatal outcome. And even at very low speeds, that’s exactly the outcome for some riders anyway, for reasons of improper gear, inadequate medical attention, or poorly-maintained equipment.

Riding a motorcycle, even slowly, is not safe.

The reason you are practicing in a relatively tame environment such as your neighborhood is to gain experience in dealing with common threats at lower speeds, providing you more time to respond effectively. Each time you encounter similar threats in the future, you will have a
reasonable expectation of responding properly to it and of taking less time to decide what that response should be. Your confidence increases as a result of handling threats.

There are far more threats to you while riding in your neighborhood than you probably realized. Because of that, this kind of careful riding early in your career is absolutely essential.

Every time you depart and return on your motorcycle you’ll encounter these threats and want to meet them successfully.

B. City

Though there are many differences between a city and residential neighborhood, as motorcyclists we should be most concerned with these:

- City streets are more often multi-lane in each direction
- City streets often have turn lanes and sometimes permit only one-way traffic
- City intersections are often controlled by signal lights instead of signs
- City streets have higher posted speed limits
- City streets usually have sidewalks and crosswalks for pedestrian traffic
- City street traffic is far denser
- City streets are usually better lighted
- City streets have distracting lighted signs everywhere
- City streets are lined with commercial (shopping) areas, including restaurants and bars
- City streets are lined with churches, multi-story apartments and hotels, motels, and hospitals
- City streets have much more non-standard (i.e., truck, taxi, bus, ambulance, and police) traffic
- City streets have more drunk and drugged drivers on them
- City streets tend to have more construction areas
- City streets sometimes become high-speed highways
- City streets sometimes directly receive or provide freeway traffic
- City streets have more transient drivers (or locals) who don’t know exactly where they are going

Most of these cause motorcyclists problems, especially when traveling through unfamiliar cities and towns.

1. Distractions

Though the proliferation of lighted signs can be distracting, in fact almost all of the items listed above can be a distraction to relatively new riders.

Unless you are a passenger, you must never be just “along for the ride” on a bike. Motorcycling requires that a rider maintain a high degree of “situational awareness” at all times; meaning that the rider has not spent what attention he or she has focused narrowly on distractions. A rider needs to be aware of virtually everything around him, allowing nothing but a clear and present threat to divert his attention from a constant scan of the environment. Scanning when on city streets must include your “six.” Although you rarely had to know what was behind you while riding in your neighborhood, threats can come at you from any direction while riding on city streets.

You’re riding on city streets now to become familiar with that environment and, as a result to build a city street mindset. The more familiar you are with city riding, the less mental time will have to be spent deciding how to deal with that environment. That frees up some of the attention capability you otherwise consume figuring out which lane you should be riding in, whether or not you can turn right on a red light, and what to do when you hear a siren wailing.

Accumulating these experiences also results in an increased sense of competence and confidence, as you determine how to deal with each of them and then successfully do so.

Discipline allows you to engage this new environment and manage your risks. You must consciously decide to scan for and assess each potential threat, rather than simply react to them as they change from being potential to actual.

But discipline does not mean simply staying in the moment. It means taking preemptive actions to reduce your risks. If you have any form of audio background entertainment devices on your motorcycle, such as a tape deck, CD player, “good time radio,” or MP3 player, turn them off while dealing with a distracting environment such as city streets provide. Eliminate as many distractions as you are capable of, because there are many that you have no control over.

Discipline also means that you must absolutely dispense with any ideas that you are entitled to be first or fastest; going through an intersection, for example. Being first or fastest on a city street is like being at the head of the organ donation line. Control yourself and be satisfied being “in the herd”.

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2. Multiple lanes
You will probably choose to ride in the left lane of a two-lane road when in the city, because it tends to move faster than the lane to its right, and because there are fewer direct threats to you while in that lane. There are no car doors opening into your path, few vehicles that are leaving commercial area parking lots will cross directly into the fast lane, and you almost never find a bicyclist in the fast lane.

On the other hand, unless there are turn lanes, you will encounter more frustrating, longer-duration stops in the fast lane, because some of the cars ahead of you will have to wait to make their left turns. As a result, a lot of cars will make a quick lane changes to the right.

If you habitually ride in the slow lane on your motorcycle you should expect that kind of behavior and always be prepared to make a quick-stop—i.e., cover your front-brake lever.

You might think that being hit by a left-turning driver who is approaching you on a city street is more likely if you are riding in the fast lane. Don’t be so sure. When you are riding in the right, or slow, lane on a city street and you must pass a left-turning driver, any oncoming drivers have very likely not seen you. And, if an oncoming left-turner reaches your lane, he is traveling faster than when he roared across the left, or fast, lane, because he’s accelerated to make his turn.

One of the most serious threats you will have if you ride in the left, or fast, lane is from other drivers in that lane who expect it to actually be the fast lane. When a traffic signal turns yellow, you need to check your six to see if any following driver is preparing to speed through that light. If he’s accelerating, thoughts about your being in his way are unlikely, and he may expect you, as a motorcyclist, to run the light anyway. Double tap your front-brake lever to issue the CAUTION / WARNING / DANGER signal (to get his attention), then use your brakes to stop for the light, unless you have good reason to expect the driver behind you to ignore your hint. Going through a yellow light is not the most dangerous thing you can do if the alternative is being rear-ended. Do not use engine braking as you approach a lighted intersection, because your brake lights will not come on to warn following drivers, who are usually in a hurry.

3. Traffic Density
City streets often are the densest in terms of vehicles. Because there are frequent stops, there is little time for traffic to stretch out when it begins moving again. This poses a very uncomfortable environment for new riders, because they feel pressured to keep up with the car ahead and because any cars behind them feel like tailgaters—which they often are.

Nevertheless, you must endeavor to maintain a safety cushion of space around you whenever you ride a motorcycle. Most literature on the subject argues that a safe distance between moving vehicles is, at minimum, “two-seconds’ worth”. We will discuss why that is usually adequate later, but for now let’s deal with what you can do about maintaining that safety cushion of space.

You probably think that riders have little control of space behind them other than by occasionally double tapping a front-brake lever to wake up a tailgater. It’s true that most of your effort must be spent in establishing an adequate space ahead of you. Note, however, that creating a two-second space ahead of you is likely to invite the frustrated driver behind you to become even more frustrated. Nevertheless, there is a way for you to affect the traffic condition behind you, and to increase safety for all.

a. Lock-step synchrony is bad form
The recent evacuation experience of thousands of drivers and riders who live in hurricane-prone areas of the U.S. offer additional lessons for motorcyclists. Before the storms, miles-long lanes of traffic exited coastal cities moving together in blocks of cars and trucks at stop-and-go speeds, when they were moving at all. Consider, for example, the danger to you of a rear-ender under these conditions—not just the cell-phone talker who fails to realize that traffic is stopping ahead, but the every-day Joe who happens to accelerate just as traffic begins to slow down. If you are the vehicle ahead of him, you are the most likely to get hurt.

Riding in lock-step synchrony with the traffic ahead of you just might be a significant cause of a problem behind you, which, in turn, becomes your problem.

Suppose normal traffic around you, ahead and behind, is moving at 35 MPH. You have a two-second gap between you and the vehicle ahead of you. That vehicle, for whatever reason, begins to decelerate. You do the same, of course. In the process you find that your gap is somewhat less than it was, because it took you a moment to realize and then react to the slowing car ahead.

Just how much shorter a gap should you allow?
The answer, as we all know, is still two seconds’ worth. In fact, it may well be that you want to allow that gap to narrow just a bit more than two seconds’ worth, because that leading vehicle may well reverse the deceleration trend and regain its original speed. The slowing down may have been an anomaly, a slight variance that quickly disappears.

If you allow that gap to get a bit smaller, that means that you did not slow down as much as did the vehicle ahead of you—and neither did all the vehicles behind you. What you have done is smooth out the flow of vehicles. Maybe a dozen vehicles behind you did not slow as much as the vehicle ahead of you, and potentially hundreds of following vehicles didn't have to slow down at all.

This doesn’t mean that you place yourself into a dangerous situation and ignore the fact that your gap is getting shorter. Not at all! But because you are then aware of the slowing down, you no longer have a built-in delay of any meaningful duration that will get in the way of your reacting to what the vehicle ahead of you does next. If that driver decides to stop, so will you. If he or she continues to decelerate as before, so will you. But you did not remain in lock-step synchrony with that leading car’s behavior, and as a result, neither did all the vehicles behind you. Your cushion of safety changes size depending on what’s happening around you and what you really need.

When the vehicle ahead of you begins to accelerate, so should you—but not as quickly! Allow your gap to get wider than you would normally want and close it up later, when traffic is moving smoothly again.

In essence, if you refuse to behave in lock-step synchrony with traffic ahead of you, you have introduced a shock absorber into the flow of traffic. The more drivers who act like you do, that is, the more shock absorbers in the system, the smoother the traffic flow will be for all.

The example given above described the situation with vehicles all moving at about the same speed; but the biggest payoff of this methodology is when they are moving (or not) at vastly different speeds.

Suppose you are riding on surface streets, and you notice that traffic ahead of you has stopped for a red light. Begin slowing down long before you get up close to the vehicle ahead of you (where you must stop yourself), and gradually approach that vehicle as you eat up time.

Many times you will find that the light has turned green, and the vehicles ahead of you have begun to move before you have had to stop, so that you can continue on your way, accelerating as necessary to regain or attain a two-second gap. Again, you have acted as a shock absorber. Again, all the traffic behind you has smoothed out. And again, your odds of being rear-ended have been diminished by your actions.

In addition, your gasoline mileage has improved and your brake pads will last longer.

You have also had an opportunity to practice your slow riding skills—feathering the clutch, keeping your hands relaxed, eyes up.

4. Lane control

Lane position should be chosen based on establishing escape routes, making yourself visible to others, staying out of the blind spots of other vehicles, and road conditions, among other things. What is often overlooked is the concept of “controlling your lane”. Though you may indeed be the smallest vehicle on the street, you can psychologically keep others away. For example, assume you are riding on surface streets in a city and are stopped at a traffic light preparing to make a right turn. You probably think you should be in the right track of your lane; but it’s safer to ride closer to the left track.

As the first illustration shows, sometimes drivers who see you in the right track with your right turn signal flashing will slide their vehicles into the lane beside you and try to share the lane—to get a jump off the line when the light changes.

Figure 35: Right turning – giving up lane control
When you’re stopped closer to the left track of your lane, you control the lane. That you have only two wheels is of no consequence—you own the whole lane that the other driver is trying to share with you.

If you were to change your mind and elect not to make that right turn, you would be in trouble.

Worse, should that sharing vehicle actually decide to make a right turn too, you could easily be forgotten (in his blind spot)—and he could drive right over you as he turns.

5. Intersections

The vast majority of city street vehicular accidents occur at intersections. The causes are extremely varied, and what you can do to minimize your odds of becoming involved isn’t obvious. But there are strategies that will reduce your risks.

a. Signal lights

Intersections present the most danger to you when signal lights change color. As mentioned earlier, a light changing from green to yellow usually presents you more threats from behind than from the side.

But when they change from yellow to red, or from red to green, the threats tend to come from both sides, and rarely from behind.

City traffic lights are pretty simple devices. They consist of only three different colored lights with some switches and timers. And while red and green are obvious, you’d think that the meaning of the yellow light wouldn’t take a rocket scientist to figure out. But most intersection accidents seem to happen in relation to that light. To remove any confusion regarding the yellow light, here’s a concept so obvious that it is probably already known to all:

- Yellow is either Red or Green.

In other words, the yellow light means either stop or go. Now all we have to figure out is when it means stop and when it means go.

When you notice that a light is yellow, and if you are able to stop safely before entering the intersection, yellow means “stop.” At all other times, yellow means “go, but use caution.” Please note that a yellow light never means “speed up”. Please also note that a green light also means “go, but use caution”!

Now you know the rules, but you should assume that nobody else does.

In other words, when you are waiting for a light to turn green and it does so, you should assume that someone is going to be in the intersection trying to stretch out the yellow as it turns red.

A head check is absolutely critical before entering an intersection when your light turns green, and so is a second confirming check.

The way to handle a light that turns green when you are first in line is to pretend that you are starting in second or third gear. Gradually enter the intersection, preferably after any other car beside you. Cross traffic will see the truck or the SUV, but they will often claim that they didn’t see you.

Handle a light that turns red the same way you handle a stale yellow: by stopping before you get to the intersection and keeping your front tire entirely out of that intersection.

If the traffic light is already green when you get to the intersection, proceed with caution, and manage your speed so that, if possible, you cross the intersection with a vehicle on your right side—preferably a large truck or bus.

b. Enter the intersection with a blocker

Of all the things that we learn being out on city streets with our bikes, one stands out as the all-time life-saver:

- If you can avoid it, never enter an intersection without another vehicle on your right side.
(Note, this advice assumes you ride in a country where people drive on the right side of the road.)

If you have to slow down in order to let a vehicle catch up with you on the right side, or if you have to increase speed a little to catch up with another vehicle, having one on your right side is as safe as it gets for entering an intersection.

Obviously this also means that if you are stopped at a traffic light and it turns green, you enter the intersection when the vehicle on your right does—no jack-rabbit jumps if you want to live. Better, have a bus or even an 18-wheeler on your right, anything larger than a small car.

It is also safer to have the vehicle on your right than on the left. The closer you can be to the center of the intersection when you go through it, the more air there is (on average) between you and someone that comes at you from either side.

This is another way of saying that if you have to enter the intersection by yourself, do it in the left-most lane.

c. Escape routes
You have just entered an intersection (at, say, 30 MPH) and notice that a vehicle is about to enter it from the left. That vehicle will not, cannot, stop in time—and unless you do something fast, you’re going to collide.

What are your options? What escape paths do you have?

If you apply the brakes instead of the throttle, you will most likely guarantee that collision. Thus, if the hazard is coming from the left, you are almost always better off accelerating in a straight line. That is your escape path and method.

Interestingly, if the hazard is coming from the right, you are almost always better off braking. If you can stop before your paths cross, you walk away.

Turning away from a hazard (or swerving) “feels” like the right thing to do. But if either severe braking or acceleration is required, you want that bike vertical to avoid loss of control. And, as described above, swerving into oncoming traffic is crazy.

Survival argues that if you can stop to avoid a collision, do so. Otherwise, if you can accelerate to avoid a collision, do so.

If you cannot accelerate enough to avoid that collision, apply the brakes! Turning or swerving to avoid a cross traffic collision is a poor choice, almost always.

d. Intersection turns
Absolutely every vehicle you see that has a human being behind the steering wheel, whether moving or not, is a threat to you when riding a motorcycle on city streets.

As you make left or right turns at intersections, you will pay most of your attention to those vehicles that are moving. Pay attention to those who are stopped and preparing to move. And, when you turn, don’t be lazy about it.

When you change lanes, do it one lane at a time. Signal, do a head check, do a confirming head check, then change lanes.

If you want to move more than one lane, then repeat that process for each lane you move.
When you are at an intersection and make either a right or left turn, you are making a lane change. **Do it one lane at a time!** Take the solid path, **not** the dashed path.

Three vehicles in this diagram can run over you if you take that red path. The one in front of you can make a left turn, the one coming at you from the left (coming out of the gas station lot) can “see you” and try to avoid you by going into the faster lane, and the car immediately to your left can decide to make a right turn while you are doing the same.

Similarly, when making a left turn, there are three vehicles that could run you over if you insist on being lazy and doing a multiple lane change instead of one.

Does it matter which one you end up under?

**e. Fastest possible 90-degree turn**

Let’s deal with a common misunderstanding or two now.

You’ve watched any number of car chases on television and in movies over the years, and you’ve seen cars make four-wheel sliding turns at intersections many times.

You also probably know that most city streets have posted speed limits of 35 MPH or less. What you may not know is how wide their lanes are.

In most jurisdictions, any car lane that is at least 10-feet wide must have lines painted on the street to designate lane boundaries.

Residential neighborhood lanes are sometimes only 9-feet wide and may, therefore, not have painted center lines.

City streets, on the other hand, have lanes that are almost always 11- or 12-feet wide, so they have lines.

Where there is regular truck traffic on the roadway, they are 12-feet wide.

Given that you’re riding an agile motorcycle and wish to make the fastest possible 90-degree right turn where the lanes are 12-feet wide, you might think you can duplicate the performance of stunt drivers who handled those cars. (You might consider whether you’ve been looking at live-action reality or some kind of animation, too, that distorts physics.)

Could you manage that turn and stay in your lane at 35 MPH? How about 25 MPH?

The answer to both of those questions is a definite **no!**

Some riders wonder why slow-speed parking lot practice exercises are meaningful, given that they usually travel at much faster speeds when they are riding their bikes. But are they traveling that much faster when they turn?
Here are some realities regarding that 90-degree turn:

- The width of a standard lane in the United States is approximately 12 feet.
- In order to make the fastest turn, you must select a path that provides the largest turn radius.
- To do so, you must carve a path from the outer edge of the approach lane, then as close as possible to the curb as your apex, and then out to the outer edge of the new lane.
- The largest radius possible, using 12-foot lanes, is approximately 40 feet.
- If you don't drag any hard parts of the motorcycle along the way, then your limit is determined by the amount of traction available. (On good streets with good tires, that could be upwards of .9G's of centrifugal force.)

Observe that the fastest possible speed through a 90-degree turn where the lanes are 12 feet wide is about **23 MPH**.

A speed of 35 MPH is **fast**!

Making that turn at 35 MPH is an impossible task for the most experienced motorcyclist in the world, let alone a newbie.

**f. Differences between left and right turns**

If all you had to do was ride in a straight line, almost anybody could handle a motorcycle.

But in the real world we have to negotiate turns with our bikes. While it is convenient to think otherwise, it is simply not accurate to believe that making a right turn is exactly the same as making a left one, except for direction. There are different risks and realities involved. For example, in all countries where we ride on the right side of the road, right turns are sharper than left turns, while the reverse is true in the other countries. That means that right turns are harder to negotiate than left turns at any given speed.

It also means that in addition to being harder to negotiate, if you mismanage the turn and go wide, you will find yourself in a lane of traffic that is running in the opposite direction about to crash into you head-on.

In a left-turn situation that you mismanage, you will find yourself off the road entirely. Which one is more dangerous is largely a function of chance.

The result of running off the road in a mismanaged turn may be no worse than taking a tumble, but it could also involve falling off a mountain.

While making right turns involves greater lean angles at any particular speed than a corresponding left turn, there is usually **more traction** available in a right turn than when turning to the left, because most roads are crowned.

While turning to the right, the road is cambered into the turn, while turning left, it is cambered away from the turn.

Left turns effectively provide you a narrower lane for use by your motorcycle, because a motorcycle must lean in order to make a turn. You cannot lean as far to the left within your lane when making a left turn as you might like without dragging your head or your left grip across the center line and into the path of oncoming traffic. Unless there is a retaining wall on your right side, motorcycles can use their entire lane width when making right turns.
Making a right turn at an intersection is far less dangerous than making a left turn at that intersection. The most obvious reason is that you don’t have to cross the path of any oncoming traffic to do so.

But turning left has two other dangers that are not present when making right turns:

1. The possibility that your side-stand is down; and,
2. The fact that your bike cannot lean as far in a left turn as in a right turn without dragging some part of the motorcycle against the pavement because most road surfaces are crowned.

One final thought: If you make a left turn across an oncoming traffic lane, your danger is not restricted solely to that oncoming traffic.

Before you actually make your left turn, you must do a head check to the left to insure that someone is not trying to pass you on your left! If you are struck by that passing vehicle, you are to blame, as you have performed an unsafe lane change!

6. Stuck signal lights

Signal lights in the U.S. are often triggered by sensors embedded in the pavement that detects the presence of a vehicle in a position to make a left turn. These sensors are not always adjusted properly, and sometimes they fail to detect when a motorcycle is sitting above them.

What should you do when you are the rider of that motorcycle? Experienced riders have offered sensible ways to handle a “red light is stuck” situation.

First, there are two types of signal lights: timed traffic signals (signals that follow a sequence based solely on time) and actuated signals (signals that alter their sequence based on traffic demand). Actuated signals are activated by vehicle detectors.

Several types of vehicle detectors are in use today in the United States. These include 1) video cameras that detect movement; 2) radar units that detect movement; 3) sonar units that detect distance to an object; 4) magnetic sensors that detect changes in the earth’s magnetic field caused by moving metal; and 5) loop detectors. Video cameras, radar, sonar and laser detectors are being used for various kinds of traffic control. Especially at rural intersections with fitful traffic patterns, signal lights may be video controlled. In most cities and states, however, loop detectors are used. A loop detector is the most popular device used to govern traffic signals, probably accounting for more than 90% of the detectors in use in the United States.

These work just like a metal detector. Typically, three or four turns of wire are placed in or below the pavement in a 6’x6’ loop. Multiple loops extend the detector’s coverage area.

Some riders wonder if their motorcycle is “heavy enough” to trip it. Does weight make a difference? No. Because the sensor is a metal detector, a vehicle’s weight doesn’t affect it. It reacts to only the presence of metal (or an electromagnetic field). Most of these loop sensors merely serve as an antenna known as a whetstone bridge. When a certain mass of iron interferes with the balance of the circuit, the circuit reacts.

If the electrical value of the antenna/bridge changes in any way, the voltage will be changed, triggering a relay to switch the lights. These sensors detect large masses of metal, and a touring bike surely qualifies. A sensor may be out of adjustment, however.

The sensitivity of a loop detector varies due to a number of parameters. It is affected by its front panel sensitivity setting, the number of turns of wire in the loop, the number of loops that are connected to one detector unit (the electronics of the device is called a detector amplifier), and the length of wire connecting the loop(s) to its detector unit.

Additionally, a loop can be incorrectly installed right next to concrete rebar, which tends to overwhelm any signal coming from vehicles above. It is also possible to put a loop too far below the surface of the pavement.

While you are sitting there "stuck at the light," one other thing to remember is that the traffic signal may forget you’re there.

In the case of motion detectors, the device’s memory must be turned on. (Also note that it does no good to roll up slowly to an intersection that employs a motion detector).

With loop detectors, because they detect presence, the memory in these units is often turned off. Turning it off prevents the signal from constantly changing for vehicles that have made a right-turn-on-red.
But if your bike sits there beyond the detection zone, the device will forget you, and you’ll wait and wait.

To outwit these witless devices, first start noticing where they are. Traffic intersections are often grooved so that detector loops can be buried. Grooves may run both perpendicular to and parallel with the direction of travel. If the paving contractor installs the wire loops after paving the road, you may see the saw cracks from loop installation. If you can’t see the loop, you can usually presume it is a 6’x6’ loop, centered in the lane and probably six to twelve feet behind the stopline painted on the pavement.

If a motorcyclist can’t depend on his bike to trigger a signal light to change, then the best place to stop for a signal light is probably three feet to the side of the center of the lane, with the front tire about six feet behind the stopline.

Before you decide to run a red light that’s “stuck,” here are a couple of other ideas you might want to consider (besides checking in your mirror to see whether other vehicles are coming which might solve the problem):

- Pass your motorcycle directly over the lines marking the perimeter of the sensor, not in the middle. Roll back a couple of feet to help the sensor "see" the bike. Depending on where other traffic is stopped or moving nearby, this may or may not be possible.
- After sitting through one cycle of the lights, some riders put their side-stand (or center-stand) down—the idea being that having actual metal touch the road helps.
- Position your bike on top of the "line" cut into the pavement, then hit the kill switch, reverse it, and restart your engine. On a marginally mal-adjusted sensor, this may create enough of a magnetic field to trip the light. (Or hit your starter button without turning your engine off to get a similar effect.)
- You can change your route to make a right turn at this intersection instead of trying to turn left against oncoming traffic or going straight through the red light. (This may mean that you have to make a U-turn down the road. If you do, make sure it’s legal.)
- If you know you must cross a dangerous intersection where this problem often exists and you have not been able to get it fixed by your local officials, consider changing your route or going around an extra block to avoid the intersection.
- If there is a "pedestrian button", consider getting off the bike and pressing that button.

If nothing else works, especially for a group of riders committed to a particular course of travel, wait until traffic clears, then run the red light carefully one at a time. You should wait through more than one full cycle of the red lights before doing this to be sure you are not perceived by other drivers or law enforcement as simply flaunting the law. Some states address this by allowing motorcycles to proceed cautiously through an inoperative signal light after coming to a complete stop. It’s usually no defense to a ticket that a rider believed the light wasn’t operating, when it was, or that the rider believed the light had a sensor when it didn’t. If you know of traffic lights that fail to change in response to a bike, the sensitivity of the detector is out of adjustment. This should be reported to your state highway department or to the government agency responsible for maintaining local traffic controls.

7. Gas stations

City streets provide access to gasoline stations. You’ll find vehicles randomly entering and exiting at any time, on ramps positioned in idiosyncratic places and at strange angles, and you will be one of those vehicles.

a. Gassing up

Your need gas, so you pull into a service station next to a pump. You put down your side-stand and lean the bike onto it. Presumably, you have already figured out that you’ll want the pump to be on your left side and that you should watch your step, because fluids on the ground can make it very slippery. What you do next could save your life. **Turn off your motorcycle.** (You may even do this before setting the bike onto its side-stand). If gasoline were to spill as you bring the nozzle to the tank or as a result of overflow, or as you take the nozzle out of the tank, you risk setting it ablaze. You should be concerned not just about a hot engine or exhaust pipes, but also any electrical system on the bike.

**Take your helmet off.** If your helmet is on your head, you cannot determine if a fire has started as easily as you can without it. Particularly if the helmet is attached to the bike...
with an audio system cord, you can’t evacuate the area quickly should a fire be detected.

Get off your motorcycle. For some reason this step seems to be ignored more often than any other. Maybe it “looks” good. Maybe it’s just too much work to get off when you’re tired. But putting fuel into your tank while you’re straddling the bike is dangerous!

If there’s a gasoline spill, your crotch will get wet. Then what do you do? Wearing gasoline-soaked clothes is uncomfortable, smelly, and dangerous.

Take off both gloves, then eliminate static by touching the filler cap with one hand and the pump hose with the other.

Fill the tank, but not to the top. Gasoline expands as it warms up. Some gas tanks are not sealed units. If you fill them to the top they can easily leak. Some motorcycles also have dual (side-by-side) tanks that are connected internally.

There is a “secret” you should know about filling these bikes: when putting gasoline into the higher tank, watch the level in the lower one.

Since you are on your side-stand, the bike is leaning left, and overflow from the higher tank will go to the lower one. With this kind of system you can’t fill the highest tank without overfilling the lower one.

Owners of these bikes tend to sit on them when they fill up—to keep the bike vertical so they can load as much gasoline as possible.

But it’s obvious why you shouldn’t: odds are good that you’ll stop somewhere and put your side-stand down before you have burned up enough gasoline to prevent leakage.

- Do not smoke within 20 feet of a gas pump.
- Keep your ignition switch in the off position any time your filler cap is off your tank. (Especially do not turn it on to use your CB.)
- Reset your odometer.
- Check your fuel valve: if it was already on Reserve when you arrived, put it back to On.

Earlier, we asked what you would do if gasoline spilled onto your crotch. The question should have been, what would you do if it spilled on any part of you or your clothes? This is very important. Here are specific suggestions. For spills,

- Drench with water!
- Then take that article of clothing off!
- Do not walk around if there is gasoline on your clothes! Static electricity can easily ignite gasoline fumes. Allow wet clothes to dry outside. If you happen to be at home, do not put these clothes into a washer/dryer!

If you can smell gasoline on your clothes, then there are enough fumes on them to ignite. If you happen to swallow gasoline, drink milk, not water!

b. Gasoline can be trouble

Usually, when it’s time to fill the bike up, there will be a gas station open somewhere nearby. Some riders prefer a particular brand because they have always had good and consistent performance from their gasoline and always use the same grade. Others don’t care, so long as it burns. Let’s consider the situation where there is a station just ahead sporting your preferred logo. You pull in, turn off the ignition, and fill up.

Q: Is that all I have to know?

A: Most of the time. However, if you fill your tank at this particular station, now, you are asking for trouble in the form of bad performance and even repair bills soon!

Even though you have purchased gasoline from this particular station many times in the past, and will no doubt continue to do so, today you’re asking for trouble. Today there’s not much room in the station, because there’s a tanker truck taking up a lot of space—or as you pulled in, you saw one leaving.

Q: Fresh gasoline is a problem?

A: In a way. There are a set of huge underground tanks containing gasoline, and water, and silt, and other materials.

The name brand station across the street has the same kind of underground tanks, receives shipments of similar grades of gasoline, and would be a far better place for you to buy gasoline just now, because a tanker truck is not sitting on its lot, nor has one just left.
Q: What's the difference?

A: Most of the time, when you purchase a tank of gasoline, the extraneous water and silt and other materials in those tanks have already safely settled to the bottom of those underground tanks. When you pump gasoline from them, you are getting virtually none of it into the tank on your motorcycle (or car). And despite the fact that your motorcycle has fuel filters and screens built into them, this is good, because you would rather not have your engine stall as a result of a clogged fuel line, or get poor performance because of trying to burn water.

But when those tankers add their loads to the underground tanks, the addition of fluids does a marvelous job of stirring and mixing up their contents. It could take an hour or so for the adulterants to settle back to the bottom.

If you see a tanker in the lot, or if one is just pulling out, go to another station for your gasoline.

8. Emergency vehicles

   a. Lights and / or sirens

When you hear sirens blaring while riding a motorcycle, you may find it somewhat difficult to determine the direction those sounds are coming from. Your response should include doing two things immediately:

   • Reduce your speed; and
   • Begin a scan for flashing lights behind you, on cross-streets, and far ahead.

If you can locate the sounds / lights as coming from behind you, move to the right—unless an emergency vehicle is in the lane to your right. Your objective is to allow that vehicle to have the greatest freedom of movement possible.

If the vehicle is in a lane to your left, or you cannot determine where it is, do not enter an intersection!

Even if it inconveniences others, stop your motorcycle right where it is and wait until you are certain of the situation and that it is safe to move on.

   b. Police officer stopping you

If the sounds and / or lights are directly behind you and remain there after you move to the right, the odds are that it is a police vehicle and you are about to receive a ticket.

   • Put on your turn signal to indicate you’re trying to stop to comply. Find a driveway to your right within one city block, and pull off the road in that driveway. Then move to an open area and stop your bike.
   • Turn the engine off with your kill switch, lower the side-stand, and lean your bike onto that stand.
   • Do not reach up and remove your helmet.
   • Do not dismount your bike.
   • Keep your hands on your grips and wait for instructions. Do not put your hands up into the air as a sign of surrender. Do not reach for your wallet.

Following this advice could save your life. Everybody makes mistakes, even police officers. But no matter which of you made the mistake, you are likely to get a ticket. You will get a lot more than a ticket if you forget the first rule about safety: always remain in control of your motorcycle ... and yourself! Sit on any attitude or aggression that might be lurking inside. As of the moment that policeman turned on his lights, he became the winner and you the loser. How you behave yourself can determine if the loss is merely a bit of time and embarrassment, if he simply issues a ticket or a warning, or time in jail, if you forget who has the authority just then.

Arguing, which is the closest thing to a fight that you should ever attempt with a law enforcement officer (using an attorney as your spokesman), must be reserved for when you are in court.

The policeman stopped you because he thought you did something dangerous, illegal, or at least suspicious; or because he saw something on your motorcycle that represented a threat to you, such as an equipment failure like a burned-out headlight or turn signal bulb. If you broke the law, that means that he is predisposed to be wary of you and is looking for any indication that you are a threat to him.

Wait for his instructions, and obey them. If he asks you for your license and proof of insurance, tell him where they are (“in my jacket”, “in my rear pocket”), and ask him if you can reach for them. No sudden movements on your part! Again, your helmet stays on your head unless you have asked for permission to take it off and receive that permission.

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you must be prepared to stop quickly and/or avoid vehicles making sudden lane changes.

In most states it’s now the law that you must slow to well below the posted speed limit (as much as 20 MPH under the limit) when passing emergency vehicles on the shoulder, if you’re in the lane nearest them; but you must move over a lane away from them if possible.

9. Construction zones
It seems that construction activity never abates on or around city streets. Whether or not there are construction-crews on a construction site, traffic cones, barricades, and metal plates will be. Deal with cones and barricades just as you would any other obstacles in the road: stay away from them.

But there are times when you cannot avoid those metal plates replacing the street surface which are often loosely positioned, and you’ll have to ride over them.

You will normally have plenty of traction available unless they are wet. If they are wet, travel over them with your bike as nearly vertical as possible and without any acceleration or braking activity. Be aware that they may be wet when it hasn’t rained; a heavy dew will leave a slick coating on them.

Metal plates are dangerous to you when you must cross them while turning. If the plate is near an intersection where you plan to make a right turn, don’t make the turn if you can avoid it. Take the next intersection. If that isn’t possible or a serious impracticality, make that right turn as slowly as possible and in the most upright position you can manage.

10. Why you are practicing on city streets
You’ve learned in this section that city street riding exposes you to a huge number of different kinds of threats, and that those threats are different from the ones you encountered during neighborhood riding.

These new threats come at you more frequently, at higher speeds, and from different directions than those in neighborhoods (including from behind). This is why it’s important to practice when you are riding alone. If you encounter other motorcyclists at this point in your riding experience, wave or nod at them if it’s safe, but don’t try to join them, and don’t encourage them to ride with you. Don’t depart with them from a stop. Make it clear that you’re riding alone.

The reason to practice alone on city streets is to gain experience in dealing with common threats while you are riding at speeds that require quick and decisive responses. You’re no longer distracted by thoughts of how to manage the weight of your bike or where your turn signal is located, so you have the time to deal effectively with this new environment and to separate the various threats as they come at you, deciding which require a response first, which later, and which not at all. Each time you encounter similar threats in the future, you’ll have a reasonable expectation of responding properly to it, and you’ll take less time to decide what that response should be. Your confidence increases as a result of handling threats with success.

C. Highway and freeway
High speed riding is not reserved for freeways and restricted-access roads. Many roads are posted with the highest legal speed limits in your state, including those far out in the country. Any road other than a freeway that allows you to legally ride in excess of 45 MPH should be thought of as a highway. Highways and freeways, however, provide different riding environments.

Highways are generally less congested than freeways, but, you may encounter slow-moving vehicles such as farm equipment on them, despite a speed limit that may be the same as the freeways in your state. Highways have widely spaced intersections or truck crossings, and they are often controlled by signal lights, making all that high-speed traffic come to a stop. Vehicles can, and a surprising number of them will, make U-turns on highways. Private roads and commercial driveways may enter directly onto a highway, whereas on a freeway they would open onto a parallel feeder road first; and where they enter, the subsidiary road may be controlled only by a stop sign.

A highway generally lacks a solid barrier between traffic moving in opposite directions though it may have a median. Finally, highways are not as well lit as freeways.

Freeways, on the other hand, are occupied by vehicles moving at greater sustained speeds, have no cross traffic of any kind, and no 90-degree exits or entrances. Side traffic funnels onto the freeway via a system of ramps and crosses it only via bridges or underpasses that don’t affect speeds on the main road.

You will find gas station islands on freeways in a few states which provide for a left exit instead of a right, and which have a run-up ramp to re-enter at a speed matching that of
the freeway traffic. And, despite what they’re called, you’ll find toll booths on “freeways” these days.

Be extremely careful around toll booths. Come to a complete stop to pay your toll no matter how hurried you are.

Be aware that oil has dropped from engines of hundreds of cars and trucks into the same patch of pavement where you’re trying to brake and then hold up your bike.

Have your change ready and know which pocket it’s in, so that you don’t have to fumble for it.

**Do a head check in every direction** before you proceed after you’ve paid the toll.

If your area has an EZ-tag system or a similar electronic permit for toll roads, invest in a tag or sticker that will allow you to avoid having to stop in a toll booth lane if you travel on toll roads regularly.

1. **Two-second Following Distance**

No matter your speed, whether it’s 30 MPH or 80 MPH, as a motorcyclist you must maintain at least a two-second following distance from the vehicle ahead of you.

Some riders have the mistaken impression that a two-second gap doesn’t provide enough distance to stop without hitting the vehicle ahead, if it makes a sudden stop.

They argue that it takes about 3.5 seconds to stop your bike if it’s moving at 60 MPH and if you achieve a deceleration rate of 0.8g’s, so “obviously” a two-second gap isn’t enough.

The problem with that logic is that the two-second gap is designed to provide you **reaction time**, not stopping distance. Let’s look at the case where you are travelling two seconds behind a car and both of you are moving at 60 MPH.

Since at 60 MPH you travel 88 feet per second, you have provided a safety cushion of 176 feet in front of you.

Then the car driver slams on his brakes and begins an emergency stop.

Assume this came as a complete surprise—an unexpected event—that you did not anticipate.

Finally, assume it takes you 1.6 seconds to begin an emergency stop of your own.

During those 1.6 seconds, the car travels 88 feet as it decelerates at 0.8g’s.

After another 1.8 seconds, it has come to a complete stop, 150 feet from where it began braking. It takes you another 1.6 seconds to come to a complete stop, 35 feet short of the car’s resting position.

Clearly the two-second gap was sufficient to allow you to stop without a collision.

![Figure 41: 60 MPH stop, both vehicles at 0.8g's](image)

In fact, so long as you are able to achieve a deceleration rate that is at least as good as the car’s, you will never hit that car unless your reaction time is greater than two seconds.

But is it reasonable to assume that it takes you only 1.6 seconds to react to an unexpected event?
Studies have shown that 70% of all drivers can begin braking in response to a threat in 1.6 seconds or less, when that threat is totally unexpected. That would be the case where the car ahead of you suddenly slams on its brakes. But when a threat is expected, such as when a green light turns yellow, highly skilled riders can begin braking in from 0.2 to 0.3 seconds.

This time lapse between when a threat presents itself to you and when you begin braking, for example, is called PDR for Perception/Decision/Reaction.

Most motorcyclists have a PDR of about one second in response to an unexpected threat. Using 1.6 seconds in this analysis is very conservative.

As more and more cars are built with ABS, those cars achieve deceleration rates of about 0.9g’s instead of 0.8, while motorcycle riders continue to average about 0.8g’s.

The two-second following distance rule still provides an adequate safety margin. However, arguments to increase that distance to three seconds are more popular now.

Again assuming a 1.6 PDR, if the car decelerates at 0.9g’s while the bike decelerates at 0.8g’s, the bike will still stop 18 feet short of the car.

Is there a way that to stop almost as quickly while using a 0.8g deceleration rate? Of course, and easily! Simply shave off one-tenth of a second of PDR time. You do that by simply covering your front-brake lever while you ride.

Most riders probably have been told not to do this by the Rider Coaches in their MSF or Rider’s Edge class. There’s a reason for this at certain points in rider training, but by and large, you should disregard this advice when it comes to your
own regular riding habits, if you want to shorten your PDR and stop faster in an emergency.

2. Deceleration rates
Throughout this book you have seen references to deceleration rates. Now we would like to provide a summary of that information to add perspective.

- A 0.6g deceleration rate is what the MSF BRC quick-stop skill test assumes a newbie rider can achieve, on an unfamiliar motorcycle. It is **unsatisfactory** braking performance for riding on public roads.

- A 0.7g deceleration rate qualifies a motorcyclist to ride on public roads.

- A 0.8g deceleration rate is the skill level of a competent rider. It is also the rate that most riders self-limit themselves to, primarily out of fear that anything greater could result in a stoppie or end-over. And, it is approximately the deceleration rate that an automobile will achieve when it’s skidding with all four wheels locked.

- A 0.9g deceleration rate can be consistently achieved by very skillful riders on the right surface. It is also the approximate best, and relatively consistent, deceleration rate for motor-cycles (and auto-mobiles) with Antilock Braking Systems (ABS).

- A 1.0g deceleration rate can be achieved most of the time by world-class riders on the right surface. It is also approximately the rate at which sportbikes will do a stoppie or end-over and, thus, it’s the maximum possible deceleration rate that a bike can achieve.

- A 1.1g deceleration rate can sometimes be achieved by the very highest skilled riders on exceptionally maintained motorcycles. The top ten documented stopping performance motorcycles each achieved this rate during well documented tests.

- A 1.2g deceleration rate was once achieved according to well documented data, though it was on a concrete road surface rather than asphalt.

3. Speed
Because highway and freeway travel involves high speeds, it is critically important that riders cover their front-brake levers while riding on these roads. At 60 MPH, that practice will reduce total stopping distance by almost nine feet. That difference could be the difference between a close call and a collision, and certainly reduces the speed of any collision that may occur, and thus the damage it causes.

Additionally, events that become threats to you as a rider are often a great distance in front of you. That means that you must increase your scanning distance significantly over what you use when riding at slower speeds. You must pay attention to the environment at least ten to twelve seconds ahead of you, as well as checking your mirrors often.

Your bike contains an enormous amount of kinetic energy when travelling at high speeds. Since kinetic energy (the energy possessed by a moving object) varies as the square of its speed, your bike moving at 60 MPH has four times the amount of energy it had when it was moving at 30 MPH, not twice. For that reason, accidents at highway speeds are never just “fender benders”.

Cars, trucks, motorcycles, and motorcyclists often get tossed into the air as a result of a collision at highway speed. The quadrupling of kinetic energy when you double the speed of an object explains why it takes four times as much distance to stop your bike when it’s moving at 60 MPH than it does if it is moving at only 30 MPH.

Obviously, then, it is imperative that you avoid collisions at highway speeds in every way possible. You do that by insuring you have at least a two-second following distance at all times, that you cover your front-brake lever, and that you become aware of any threats of collision as soon as possible.

Your safety gear will probably not save your life from impacts or from being crushed in a highway-speed collision. It will, however, protect your skin and bones from abrasive damage that follows the collision. To think that a helmet or leathers will keep you alive in a 60 MPH collision is extraordinarily naïve. Avoiding that collision is what will keep you alive.

It is also naïve to believe that swerving to avoid a collision at highway speeds is your first and best response behavior, should a collision appear to be imminent.
While a swerving maneuver may avoid a particular collision at slower speeds, at highway speeds it imposes the threat of loss of control, involves a change of lanes (unannounced to drivers behind you), and subjects you to the risk of other collisions—all of which to occur at highways speeds.

Further, the odds that a swerve will allow you to avoid the immediately threatening collision are relatively small.

There is absolutely no better first response behavior to a collision threat than to attempt to stop your motorcycle before that collision occurs. An emergency braking effort may not get you stopped before the collision, but it will certainly reduce the speed of impact if it fails.

Your odds of survival at highway speeds (as at slower speeds) are maximized with an emergency braking effort and almost forfeited with an emergency swerve effort. In case you failed to learn this earlier in the book, you cannot, you must not, brake and turn at the same time if you are aggressive with both efforts. That is, at highway speeds, you have a choice: either you emergency brake, or you emergency turn / swerve—never both at the same time!

4. Curves

The leading cause of motorcyclist deaths is the rider’s failure to negotiate curves. Either the rider tries to ride through the turn at an excessive rate of speed, or he or she comes to believe that the motorcycle is incapable of making the turn, even at the posted speed limit. Failing to turn more sharply, the rider runs off the roadway, or through a guard rail, or into an oncoming vehicle’s grill.

Many of these riders know that they must turn more sharply, but they believe that they’re not able to do that, or they are simply unwilling to try. They feel “the bike is fighting me.” As a result, they suddenly panic and freeze at their controls, or they try to direct-steer the bike, forgetting everything they ever knew about counter-steering.

There are no curves on public roads in the United States that require aggressive lean angles in order for a motorcycle to safely ride that curve. It staggers the imagination to realize that virtually all failure-to-negotiate-a-curve deaths are the result of simple rider error. Repeatedly we hear from those who have survived such incidents that, though they tried to turn more sharply, their bike “fought them”; and the harder they tried to turn it, the more the bike refused to cooperate.

Your motorcycle cannot fail to do what you tell it to do, because it always follows the laws—of physics. If your bike seems to be fighting you, it can only be that you are fighting yourself. When you press forward on the inside grip, the bike must turn more sharply in that direction (at counter-steering speeds). Thus, drivers who fail to negotiate a turn at or below the speed limit are not pressing hard enough forward on their inside grips—they are not counter-steering.

A RiderCoach observed recently that students who cannot manage turns during a BRC either go wide, or they hit their brakes and drop their bikes; but not a single one of them ever crashes because they turned too sharply—in other words, used too much counter-steering input. Fear gets in the way. Fear of falling is so strong for some riders that they prefer to ride off the road and into a tree, instead of pushing the inside grip to lean their bikes just a little more, in order safely to make a turn.

This book can’t help a person who is terrified while riding a motorcycle. However, we can tell reasonably competent new riders how to handle a motorcycle that needs to turn more sharply, and we can tell them how to deal with their reluctance to do so.

The secret is not a secret at all. Just do it! Forget about things like the maximum lean angle your bike can handle, or traction, or how it looks to others, or fear, or anything else. Just do it—push harder on the inside grip and get safely through the turn, then figure out why you were having trouble. You don’t have to be an intellectual in order to control a motorcycle. You do need to respond to a threat by doing what has to be done.

Any curve on a highway can present a newbie rider with this kind of a problem. But there are some big curves on freeways, particularly relative to on- and off-ramps, that cause newbies problems because of their design. They are called decreasing-radius turns and are often found at clover-leaf intersections. These are actually great learning environments for riders in that they require you to adjust your speed before you start onto the ramp, press forward on your inside grip as you enter the turn, then press harder and harder as you progress through them.

Let’s now look at the case where you have entered a turn too fast and you find yourself unsure about being able to negotiate the turn at that speed. You must turn more sharply
still to complete the turn, but there are a couple of other things that you can do as well to make the effort more likely to succeed. You can slow down while you apply more forward pressure on the inside grip.

Yes, you can simultaneously turn and brake at highway speeds. You cannot be aggressive with either, however.

Did you know that 30 is half of 45? Absurd, you say? In this context, this means that your traction demand with a 30-degree lean angle is half of what it is with a 45-degree lean angle.

Sometimes credibility must be established by overcoming predisposed biases based on experience. Here is such a case.

If you are leaned over at 45 degrees in a curve, then you are experiencing exactly 1.0g’s of centrifugal force. That is a fact.

However, if you ride a Harley-Davidson, the odds are that your eyes glazed over when you read or heard that, because not once in your life have you ever been leaned over anywhere near 45 degrees in a turn.

Most Harley-Davidson motorcycles drag their pegs or floorboards when they reach about 30 degrees of lean angle. You have never experienced centrifugal force anywhere near 1.0g’s while riding your particular motorcycle.

You have also heard (and read here) that you must never aggressively apply your brakes while at the same time your bike is aggressively leaning into a turn, because you simply don’t have enough traction to do both at the same time. But many experienced Harley-Davidson riders know better.

Why? Because when you are leaned over at a 30-degree angle while in a curve, you are experiencing 0.52gs.

That’s half the centrifugal force putting a demand on your available traction as compared to when you are riding a curve with a 45-degree lean angle.

In other words, if you never exceed a 30-degree lean angle on a bike in a turn, you have the ability, at the same time, to brake aggressively.

A deceleration rate of 0.8g’s is aggressive. It is not quite enough to do a stoppie on most bikes, but it is approximately the rate of deceleration you achieve when you lock your car brakes and cause it to do a four-wheel skid. It is aggressive.

Remember the Pythagorean Theorem?

- The sum of the squares of the sides is equal to the square of the hypotenuse.

That’s the formula you use to determine how much traction you are consuming by the combination of braking and turning.

When you turn, you consume traction as a result of centrifugal force, and when you are braking, you consume traction as a result of braking force.

Since these forces are perpendicular to each other, the result is a vectored sum. If, for example, your tires can provide traction sufficient not to skid until they experience a horizontal force of 1.0g, (let’s not quibble here. Gravity is not a force, it’s an acceleration. Weight is a force. Let’s just use common shorthand.), then whenever the combination of sideways (lateral) force and braking force exceeds 1.0g’s, the tire will skid.

But you don’t simply add those forces up to determine their total—you combine them using the Pythagorean Theorem. Thus, if a bike is leaned over at 30 degrees, then its tires are experiencing a lateral force of 0.5g’s; and if, at the same time, it is aggressively braking at a deceleration rate of 0.8g’s, its tires will not be skidding.

\[ 0.5^2 + 0.8^2 = 0.25 + .64 = 0.89 \]

Since the square root of 0.89 is 0.94, the traction demand is 0.94g’s. That’s below the 1.0g’s worth of traction available, so you do not skid.
Some experienced riders get glassy-eyed or go into denial when certain safety facts are explained, because they can't do the math; but if you don't believe you can stop in time, you won't try to do so. (If you don't understand this, you must either educate yourself to follow the mathematics involved here and in the other proofs, or accept it on faith.)

Based on this, any time that a Harley-Davidson (or any other bike that doesn’t lean over more than 30 degrees) isn’t dragging a peg or floorboard, then its rider can at the same time be aggressively braking—so long as that does not involve a deceleration rate in excess of 0.8g’s.

(This also assumes that the tires on the bike are of “normal” quality and that the roadway surface provides at least a Coefficient of Friction with those tires of at least 1.0.)

Please pay attention here, especially Harley-Davidson riders. This does not mean that you can jump on your rear-brake pedal while in a curve!

There is yet another thing that you can do to help make that tight turn. It is the first thing you should do if your bike is dragging a peg.

Lean your body (not the bike) into the curve in order to lift the peg off the ground.

Here is a diagram that should make that concept clearer.

On the left a motorcycle is about to drag a peg in a turn; and on the right it shows what happens if the motorcyclist leans his or her body into the turn. (It lifts the peg off the ground).

The dashed line to the left of center shows the lean angle of the motorcycle’s CG while the dashed line to the right of center shows the lean angle of your body’s CG.

One last point about curves: get into the habit of downshifting once before you enter any curve. That puts your transmission in the right gear for rapid acceleration and for effective engine braking, should you need either.

5. Deer

Every state has a population of deer, though in the far western U.S. it’s not as dense as in eastern and central states.

The deer population of the U.S. is currently estimated to be about 30 million. They aren’t as common in desert environments for lack of water and cover—but they’re there. They run an average 30 MPH and can reach top speeds of above 40 MPH. This means they can run alongside your bike for long stretches before they jump in front of you, for no apparent reason at all. When you’re riding at twilight, at dawn, or after dark, this is one of a rider’s most serious threats.

The roads on which you will most likely find deer are away from cities and heavily traveled roads, but not always. At the edge of many towns are farms or homes with gardens and animal feed. These attract deer. Remember, if you see one deer, you’re likely to see another is in that same area.

State Farm Insurance Company has published the following chart which shows you the odds of having a deer collision in any one year by state.
Many motorcyclists are victims of deer collisions, and that means many motorcyclists die because of those collisions, for it’s extremely difficult to maintain control because of both the impact and the surprise factor.

Combine highway speed and the unexpected appearance of a deer running across the road in front of you, and you have a huge potential for tragedy. Not only do riders run into deer into the roadways with some frequency, they can also be knocked completely off their bikes by deer that attempt to jump over them and fail, taking the rider down. Highly experienced tour riders with top-notch braking skills have been killed by hitting deer. If the roadway you are riding has trees or large bushes that obscure your sight-line to the side of your vehicle, there’s deer potential on that ride.

Your first indication of the presence of deer is often a brief reflection of your headlights from their eyes. Do not ignore that seemingly insignificant early warning signal. Even if it’s just a feeling that there might be deer in the area, trust that your subconscious mind has processed some indication of their presence. Slow down!

If a deer should appear ahead of you on the roadway, bring your bike to an aggressive stop. You cannot figure out in which direction that animal will move from moment to moment. Don’t spend any time trying before you react.

A deer’s instinctive response to threat is to change direction of travel, quickly and often. In other words, it is pointless to try to swerve around a deer instead of trying to bring your bike down to the slowest speed possible as quickly as possible. If you hit a deer at 5 MPH, you can walk away from the impact. Even though you’re going to be concentrating on dealing with that one deer that crosses your path of travel and then scampers away from you, or with seeing it dodge a collision with you and run, remember there will very likely be another right in front of you a fraction of a second later.
There is absolutely no evidence that deer whistles serve any useful purpose other than to lighten your wallet (though not by much). Nevertheless, many riders have them mounted on their bikes—just in case. Similarly, loud pipes and honking horns do not seem to discourage them from jumping out in front of you on the road. Loud noises certainly cause a fright reaction in the deer, but that reaction is not predictable in terms of which direction the animal will run.

Your safest way to deal with potential deer strikes is to stay off the roads when in the country at dawn and dusk.

The second best strategy is to keep your speed well below the posted speed limit when you are riding on those roads at those times, and keep your brake covered the whole time.

CB radio transmissions sometimes provide early indications of deer traffic ahead of you, as truckers are very helpful in broadcasting such alerts. If you have a CB, you should dial in Channel 19 instead of Channel 1 when riding on country roads. (Channel 1 is often used by motorcyclists to talk with other motorcyclists.)

6. Passing other vehicles

Highways and freeways provide more travel lanes than any other public roads. That means that you will experience a great many instances of cars passing other cars without making lane changes.

Situational awareness requires that you always know when another vehicle is approaching from your rear in any lane. That means you must scan your mirrors while riding. However, since most threats will present themselves from your front, most of your scanning time must be devoted to that forward scan.

A system some riders use is a 10-second rule: scan ahead in the far distance for three seconds, then scan in the immediate area in front of you as you travel for three seconds; glance to each side for one second, then scan in your mirrors for traffic behind you for two seconds, one second to each side. Repeat, meaning you do this six times per minute, if this discipline works for you. If you get into this habit, it will soon be an unconscious process.

Drivers of the vehicles around you have no excuse for not being aware of you. But drivers of vehicles that you are going to pass cannot be presumed to be as observant as you have been. On freeways, cars will often attempt to make a lane change from the lane on the right into a rider’s lane—without looking first, without signaling first, and without having any doubt that the lane is clear for them. They constitute your greatest threat on a freeway ride.

Whenever you are about to pass a car on your right, you should cover your horn button as well as your front-brake lever. Do not be in the least bit bashful about providing a brief toot on that horn to be sure that the driver is aware of your presence, if you aren’t very confident that he or she knows where you are. Stay as far to the left in your lane as you can be without your left grip overhanging the lane on your left. Manage your position so that you do not pass a vehicle on your right when there is a vehicle on your left—you may need that lane as an escape route.

If, after surviving one of these close calls, you cannot avoid giving the offending driver a one-finger salute, arrange to have that finger amputated and give up riding motorcycles. Never lose control of your motorcycle—or yourself!

7. Merging with Traffic

You must learn how to merge with traffic properly under three conditions:

- Entering the freeway or highway;
- Exiting the freeway or highway; and
- When lanes ahead of you disappear.

a. Entering a freeway

Entry to a freeway often involves a curved path or a short, nearly parallel ramp that feeds into a merge lane which shortly thereafter ceases to exist. Thus, you are required to gain speed in the merge lane as you signal a left lane change, and to adjust your speed and position in order to merge without conflict. A low-powered motorcycle may find this much more challenging than others.

But your problems as a rider start before you enter that merge lane. Because it may be curved and may even be a decreasing radius turn, do not attempt to accelerate to freeway speed while on that ramp. You will find that achieving a speed 20 MPH below freeway speeds is perfectly adequate for almost any entry ramp and subsequent merge.

Losing traction while in that curve is certainly not the only threat posed to you while in it; there could easily be one or more other vehicles ahead of you that for one reason or another slow down or come to a stop before they enter that merge lane.
You may find vehicles in the entry merge lane are actually slowing down ahead of you and moving to the right, to exit the freeway, just as you are trying to increase speed and move left onto it.

Stopping while you are approaching or in the entry merge lane is simply bad riding practice and can get you rear-ended. If for no other reason, you should avoid stopping as you enter a freeway if at all possible, as it means you must then rapidly accelerate from a dead stop using only what’s left of the merge lane ahead of you.

Though caution and conservative behaviors are almost always your best bet on public roads, that doesn’t mean you should be less than assertive in claiming the lane to your left when entering a freeway. Your speed must be approximately that of the cars to your left, so all that is required is to find a safe suitable opening and merge. Drivers of those vehicles on your left expect nothing less.

b. Exiting a freeway

Often a freeway will provide a lane for use while exiting that freeway. But frequently, that exit lane is merely an extension of an entry merge lane. That means that you must merge to the right as you prepare to exit the freeway, and you may find that there are rapidly accelerating vehicles already using that lane. Obviously this is yet another example where situational awareness skills play a big part in determining how successful you will be while riding.

You should attempt to maintain your freeway speed as you enter the exit ramp from a freeway, reducing speed immediately upon gaining access to that ramp.

c. Disappearing lanes

Though it’s almost always the fast lane, lanes can disappear on either side of a freeway. The proper way to deal with this is to merge into the adjacent lane long before it’s necessary.

Here, your most significant threat will be when you are not in the lane that disappears, but next to it. The threat comes from other vehicles riding in that disappearing lane who have decided to ride it to its end and force/merge themselves into the adjacent lane then. This, they believe, allows them to get ahead of as many other vehicles as possible. Pay a good deal of attention to what is happening in the disappearing lane as you are riding in the adjacent lane, especially as it ends. Position yourself in the appropriate track of your lane so that it’s clear that your space is occupied; a driver who sees that gap but doesn’t see you may try to pull into it. If other vehicles are merging to their right, you want to be in the left track as you slow down. If others are coming in from their left, you want to be in the right track.

If someone doesn’t see you or simply cuts you off by force, give that last minute driver the right-of-way and let him gracefully merge into your lane instead of making it an “I dare you” moment. You will lose every time if you don’t.

d. Hills

As opposed to riding through twisties or “canyon carving,” the experience of dealing with hills at higher speeds is common for most riders wherever they live. The natural terrain rises and falls in most U.S. states, and threats here include what you can see and what you can’t.

What you can see on most highways in the U.S. is an enormous number of trucks. They will often be traveling slower than other traffic, usually in the right lane; but as they overtake trucks that are moving even slower up a hill, they will make frequent passing maneuvers, meaning a slow-moving vehicle will suddenly block the faster lane. The drivers of other vehicles may be frustrated by miles of this, they may decide to tailgate, and chances are good they will attempt to race past as soon as the lane opens up. Don’t pull out to pass a truck unless you have checked in your mirrors and with a headcheck that your lane is clear and no one traveling faster is about to go by.

Managing a ride on a freeway filled with trucks will teach you how to use that quick acceleration a motorcycle is famous for. You’ll want to “schedule” your passing maneuvers so that you always pass when just coming out of a valley and starting uphill, in order to use the naturally-occurring, lengthy slowdown of the truck to get past it. Don’t pull out and try to pass when you’re both going downhill, as the truck’s speed may get so high that you have to go dangerously fast in order to get around it; or you may have to tuck back in behind it at a point when you didn’t intend to, if there are oncoming cars.

Despite how it may seem with some long-distance truck drivers, passing maneuvers are not a race; they’re a series of surges, a rhythm of fast and slow. Don’t lose your patience.

Ascending a hill, heavily laden trucks may come to a crawl. Once they reach the crest of the hill, however, they may accelerate dramatically coming down the other side. If
you’re riding in this kind of traffic, be vigilant with your mirrors. Don’t pull out until you’re sure no one else is trying to pass, and be prepared to yield ground to other vehicles if they find themselves in danger and need to cut back into your lane. Once you’ve passed a truck, put plenty of distance between you so that its driver won’t catch up with you or have to pass you on its next downhill run. Don’t ride in a trucker’s blind spot, and be aware that the driver has his own difficult tasks to accomplish, especially on bad roads or in dangerous weather, and carrying loads of different sizes and weights.

In especially mountainous states, a “run-off lane” exists on the inside of hills where trucks have lost control in the past or experienced trouble braking. These lanes end shortly after they branch off the main freeway and are only for trucks to use in an emergency. They should be ample proof that trucks don’t always slow down as expected. On hilly roads, don’t take it for granted that an 18-wheeler will be able to slow or stop quickly when it’s approaching you from the rear. If you have to brake, allow plenty of space in front of you as a cushion, be sure your brake lights are activated (if you use engine braking, flash your lights by squeezing your brake lever, too), and watch your mirrors.

What you can’t see in hilly terrain is what’s in front of you and will soon be within close range if it’s a threat. If you’re traveling along a fairly straight road that has a series of hills, try to position yourself in the right lane on a multi-lane highway, or move to the right track of your lane if you can’t.

If a vehicle comes over the hill already across the center line, you will have less chance of colliding with it head-on.

You will be unable to see what is stopped or moving slowly over the crest of the hill you’re approaching. A car or truck may be stopped in your lane waiting to turn, a crash may have occurred, or a pedestrian may be crossing, especially on rural highways.

Regardless of any law, a child or an animal may be poised to run into your path, or the road conditions may suddenly deteriorate without warning.

Though you may continue to ride at highway speed through hilly country, keep your brake covered and be prepared for something unexpected over the next rise. Slow down at the slightest indication of a threat, and at night, don’t out-ride your headlights when they are aimed at the sky.

8. Cross Traffic and Access Roads

Though freeways have no cross traffic, almost all other highways do. Sometimes they are called “truck crossings”; sometimes they may be big enough to have signal lights, but often they are simply an access road without any traffic control of any kind.

Obviously, those that are traffic-light controlled are handled like city street intersections. The other situations are perilous because of your speed. Any vehicle that attempts to cross your path will be moving slower than you are, normally; and anyone who attempts to enter the highway from an access road will require significant time to get up to your speed.

While you are on a highway, unless you’re approaching a signaled intersection with its light yellow or red, you have the right-of-way. That does not mean that you have a get-out-of-the-hospital-free pass, or that you will go to Heaven, no matter what. If you believe that having the right-of-way entitles you to abandon caution and aggressively take what’s yours, you should not be riding motorcycles. Cross traffic may not always be bigger than your motorcycle. If you imagine that because your motorcycle is larger than a bicycle, you will survive in better shape than the bicyclist you hit, don’t believe it. You should always slow down as you approach a road that crosses or provides access to the highway if there is a vehicle of any kind near the highway, whether it’s moving or not, and no matter how it’s powered.

9. U-turns

Country roads permit vehicles to make U-turns, if it’s safe to do so. You should approach any vehicle that’s parked to the side of the road, whether it has a blinking turn indicator or not, as if it’s about to dash across the lane you are using as part of its U-turn.

If you wish to make a U-turn on a country road, do it at an intersection, if it’s legal, and allow at least five seconds of distance between you and oncoming traffic (assuming the posted speed limit) from any blind curves.

In Texas, no one operating a vehicle is permitted to turn the vehicle to move in the opposite direction (make a U-turn) when approaching a curve or the crest of a grade, if the vehicle is not visible to the operator of another vehicle approaching from either direction within 500 feet.

In one such case, the bicyclist was thrown 30 feet and had serious injuries, but the motorcyclist died on the spot.
When you are riding on a public road, you own the lane you’re riding in from edge to edge. You are entitled to ride anywhere you prefer in that lane, so long as no part of your motorcycle crosses over into an adjacent lane without a signal. If you ride by yourself, move from one track in your lane to another from time to time, just to break up the pattern that other drivers see, and to vary the perspective from which you’re seeing traffic ahead of you and behind you. This also establishes a degree of lane control. If you don’t want someone to enter your lane, you can make your intentions apparent, even if you can’t control what the other driver actually decides to do.

When riding as a group of motorcyclists, motorcycles are staggered in one lane so that all riders have at least one-second of space between them fore and aft; and each rider still owns the entire width of the lane. When the group stops, two motorcyclists will end up next to each other briefly, but as the group takes off again, it will spread out to return to a staggered formation.

The only time that a lane is ever shared by a pair of motorcyclists is if both have agreed to do so, though it is a decidedly unsafe way to ride. For example, if you’re riding solo and a motorcyclist behind you decides to pass you while staying in your lane (an unauthorized, un-agreed-to sharing), your safety is compromised by that passing rider; and you have every reason to object. Control your outrage at that behavior. Here’s where never losing control of yourself is an important constraint, as the proper response is to maintain your speed and path of travel, and forget about it.

Group riding is discussed in detail later.

Lane-splitting is the practice employed by some motorcyclists to pass other vehicles on the roadway by riding on or close to the line between lanes. Unlike lane sharing, in lane-splitting the passing motorcycle extends across more than one lane, essentially riding “on the stripe”. It is a selfish and negligent behavior on the part of motorcyclists who justify its practice with arguments such as “it reduces congestion”, “it saves time”, “it better utilizes the pavement”, and “it’s legal in California.”

As to the argument that suggests lane-splitting is legal in California—not true! There is no law in California that stipulates that lane-splitting is legal. By virtue of the fact that there is no law that makes it illegal, motorcyclists are left to conclude that since it’s not illegal, it must be “essentially legal.” California Vehicle Code Section 23103\(^9\) describes Reckless Driving reasonably well, but says nothing about lane-splitting. The California Highway Patrol has tried to clarify the issue with statements about lane-splitting such as “Permissible if done in a safe and prudent manner.”\(^10\) Those statements make it abundantly clear that lane-splitting can be done in an unsafe and imprudent manner, and therefore it can be ticketed as an example of reckless driving.

A motorcyclist who engages in lane-splitting for any reason other than in an attempt to save own his life is acting in an unsafe and imprudent manner; and because you know that, with recklessness and with negligence.

There are very few motorcyclist behaviors that reduce the odds of their survival on public roads as much as lane-splitting. Do not lane-split if you intend to become a proficient and healthy motorcyclist.

D. Canyon carving

Canyon carving is just a description for riding on twisty roads that require frequent turns at relatively high speed. Any road that is cut onto the side of mountains or through hill country is a candidate. These pose some obvious problems for motorcyclists, as well as thrills and experiences denied them when riding on long stretches of super-slab where turning is infrequent.

The most serious problem results from the fact that about half of all curves you will enter are blind, meaning that you cannot see traffic in the oncoming lanes until you are well into and committed to a path of travel through the curve.

 Fewer riders cut the corner on twisty roads than those who misjudge their speed and run wide on those turns. That means that on blind turns to the left, you must avoid approaching the center line, even if it means that you ride a less than smooth “normal” path. Riding a late apex path provides you with the best visibility of oncoming traffic and with the best position for changing your path, should you encounter a vehicle crossing the center line.

\(^9\) http://www.dmv.ca.gov/pubs/vctop/d11/vc23103.htm
\(^10\) http://www.chp.ca.gov/html/answers.html
The dashed path shown in this diagram is a late apex path inside one lane, turning right.

Late apexing is particularly important for when you are making right turns, because it allows you to make substantially tighter path adjustments after point “C” in the diagram that anywhere on the dashed path.

The second most serious threat comes from other motorcyclists. Canyon carving invites hanging off; positioning the rider’s body toward the inside of the motorcycle in a curve, and lower than when normally seated on the saddle. The purpose of this is to lift the motorcycle’s inside peg away from the ground, so that the rider can achieve the highest possible speed.

There are no roads in the United States in which hanging off is required, if you are riding at posted speed limits. In other words, aggressive motorcyclists use this riding technique in order to ride at speeds substantially higher than legal on public roads. Some of these riders will be so interested in achieving the maximum speed possible through the curves that they will take a few of them too hot—too fast. That will put them over the center line or off the road. There is absolutely nothing that a speeding rider can do to avoid running into you just because he’s hanging off, if you’re in his oncoming lane or near the center line of your own.

Canyon carving is often done by groups of riders. If you participate in such a ride, you should know that you always ride in single-file formation on twisty roads—always. And nowhere is the advice to “ride your own ride” more important than when you’re in a group of riders playing “Follow Me” for a canyon carving adventure. Do not target-fixate on the motorcycle ahead of you. Keep scanning for trouble ahead, and check your mirrors to be sure no one is trying to pass you in a curve.

The third most serious threat comes from the fact that twisty roads are usually mountain roads or in hill country. As a result, you can expect to find fallen rocks and debris in the roadway and animals crossing at any time. Do not, not even for an instant, spend time sightseeing during canyon carving rides. You must be prepared to stop instantly. That means you should always cover your front-brake lever on such a ride, and abandon any notions of high-speed turning or swerving to avoid obstacles. Stop in an emergency. That is far better than trying to learn how to fly as you hurtle down the side of the mountain.

**IX. Touring**

Many motorcyclists enjoy riding their bikes on long distance excursions that can last several days or even several weeks. These trips usually involve hundreds and sometimes thousands of miles of riding. These are known as tours.

In order to manage such trips, riders require luggage capacity on their motorcycles. They equip their motorcycles with communications capabilities, windscreens, and many other “creature comforts” to reduce fatigue and boredom. Though almost any motorcycle can be used for touring, riders tend to choose larger touring motorcycles that are specially built to accommodate their needs for long trips.

Several changes of clothes, foul-weather gear, computers, extra pairs of gloves, some food and water, and a great deal more will be packed in the luggage on their bikes. Indeed, some will carry a cooking stove, an air-conditioner, a TV, an ice-chest, a tent, sleeping bags, and more. All of those additional items cannot fit in luggage facilities on a motorcycle, so these riders often pull a trailer with their bikes for that purpose.
Riders who want to take the whole family on a motorcycle tour with all their luggage may choose to add a side-car, or “hack”, where the kids and the dog can ride, too.

No matter how much you carry with you, or how little, if your ride takes more than a day to complete, it’s a tour.

Despite the many miles that are usually involved, touring is not an endurance test. There are rides designed specifically for men and women who wish to prove their endurance capabilities, but they are known as “Iron Butt” rides and they usually last no more than 24 hours, with some exceptions that become increasingly dangerous as the miles and hours increase. Endurance rides on public roads are, arguably, against the law in some states.

Tours, on the other hand, are sight-seeing adventures away from home.

Depending on just how much sight-seeing is involved, a typical tour riding day will cover anywhere from 300 to 600 miles. An experienced rider will schedule the longer mileage days toward the front of the trip and will average about 350 miles per day on the road.

Most tours involve using motels for sleeping facilities, but some are specifically camping in nature. A camping trip requires at least a tent, a sleeping bag, and food and liquids to be carried on the bike (or trailer).

On any trip that lasts three days or longer, you will probably get rained on while riding. Thus, a tour rider will almost certainly carry foul-weather gear with him. If it sprinkles, or the rain is expected to quickly pass, most tour riders will not bother to stop and don their foul-weather gear, but heavy rains are very different.

A. Riding in Wet Weather

Virtually every touring motorcycle rider both expects and experiences some rain while out on the road. It’s generally true that if it’s raining before you start riding, you should postpone that ride segment; but once you’re on the road for a long tour, that choice is no longer available.

In order to keep to a rough schedule or a “flight plan”, including arriving in time to keep motel reservations, attend scheduled events, or meet up with other riders, tour riders will start off prepared to deal with more variety in weather than when closer to home. But these plans will be changed without hesitation if safety requires.

In case of severe weather, such as widespread flooding, thunderstorms, and tornados, even tour riders will bite the bullet and stay in one city an extra day or even two, forgoing some part of their trip or even cancelling it if necessary.

When it’s drizzling (no depth of standing water on the roadway), most riders are perfectly happy to ride at or near highway speed. Traction is not a problem, but visibility often is.

When you are riding at 65 MPH and an 18-wheeler is doing 65+ MPH in the opposite direction in light rain, that 18-wheeler is kicking up a major rooster-tail. That wall of water is approaching you at 130 MPH! When you hit it, your visibility will be reduced to zero and stay that way for about five seconds. The water on your windscreen will not be merely on the outside—it will also cover the inside of your windscreen!

That same 18-wheeler when passing is going to do more than drop your visibility to zero. That 130 MPH mass of turbulence that you run into will abruptly slow your bike down! Indeed, your bike will lose a few MPH instantly, but you will not. Your body will abruptly move forward relative to your bike. Then, just as abruptly, you will move back to your normal position.

For both of these threats, do not freak out—expect it and simply ride it out.

Because rain and drizzle (and even mud) can collect on your windscreen and on your face shield (and possibly on your glasses as well), you will not be able to see through those layers of water. You must look over your windscreen until conditions change. If the windscreen is positioned properly, you need only “stretch” your back or neck to do that, but that effort is very taxing. You’ll find that you can’t do that for more than perhaps an hour before you must either stop or do something else to help you see. Stand on your pegs!

You might be tempted to stand on those pegs partially (lifting your butt off the seat a few inches). That will result in upper thigh cramps in about 10 minutes unless you have a backrest or luggage to lean your butt against. You must actually stand on those pegs and lean forward if you need to keep going—locked knees will save your thighs.
People who opt for extra-tall windscreens have no idea how disastrous that can be to their ability to see in the rain. A rider cannot see over an extra-tall one, because it comes well back over the rider's head and prevents him or her from standing on the pegs.

Altitude and cold are synonymous. If it's raining and cold, then if you're traveling to a higher elevation, you are best advised to stop for the night. If your direction of travel is to a lower elevation, you're probably best off to continue to a lower elevation.

No matter how well clothed you are, no matter how many layers you're wearing, if your hands get too cold then you will not be able to safely handle your motorcycle. Your fingers will not be able to squeeze the brake or clutch levers effectively or with subtlety. You must keep your hands warm to handle a motorcycle safely.

Wearing glove liners as your first layer, rubber (surgical) gloves as your second layer, and finally your riding gloves as an outer layer makes tolerable what would otherwise be impossible. Glove liners can be found in sporting goods stores in the hunting or snow ski sections. They may be made of a synthetic material or of silk and fit snugly on your hands.

Keeping your chest warm will greatly help in keeping your hands warm! Your body protects its chest cavity (core) by restricting circulation from your extremities (hands and feet), so keeping your chest warm is a major aid in cold weather, not just from a comfort point of view.

Cramps (remember how crouching on the pegs will destroy your thighs?) can be eliminated almost instantly by the consumption of Gatorade or a similar power drink. Carry water and, when riding in cold weather or high altitudes, carry this kind of liquid to restore your electrolytes. Stop often to warm up, and walk around to stretch your muscles. Take off your cold weather gear inside, then re-dress.

You cannot count on gasoline being always available when you need it while on a tour. A spare two-gallon container for gasoline can be mounted on a passenger peg in order to keep it from causing damage to clothing or other things in your luggage.

Mount a small ice chest or an object of similar weight on the other passenger peg to even out the load.

You may not need that extra gasoline, but if you're 50 miles away from the next station and find a fellow motorcyclist stranded on the road, it could save his life!

You should always carry a set of rain gear with you even if you don't or won't ride in the rain.

But the rain gear does not keep your feet warm. Rubber boots worn over riding boots will do that, even after the rain has stopped. On more than one occasion this has prevented frostbite when riding in very cold, winter wind.

It should be clear that tour riders and many commuters become accustomed to riding in rain, once they've prepared for it by carrying the proper gear and having the right attitude about it.

**B. Cornering in the Rain**

The next question you probably want to know the answer to is this: To what degree does water decrease available traction/ friction?

There are many variables to take into consideration, so there are no set answers to this; but there are some “rules of thumb” that we can talk about:

**On dry pavement**
- Your tire traction can handle up to about 1.1g’s of acceleration.
- When your traction demands exceed that amount, you skid, which reduces your tire’s ability to handle acceleration by about 25%.

**On wet pavement (not standing water or with water depth less than about 1/4 inch deep)**
- Your tire traction can usually handle up to about 0.8g’s of acceleration.
- When your traction demands exceed that amount, you skid, which reduces your tire’s ability to handle acceleration by about half.

**If riding through standing water or water deeper than about 1/4 inch**
- Traction available at speeds under about 50 MPH remains able to handle up to about 0.8g’s acceleration (though that number is debatable).
- When your traction demands exceed that amount, you hydroplane, which reduces your tire’s ability to handle acceleration to essentially zero.
Hydroplaning is more probable

- The faster you go.
- The wider your tires.
- The lower the air pressure in your tires.
- The deeper the water is.

This is true regardless of whether you are accelerating (in a straight line or while turning), or not.

Most likely your front tire will hydroplane before the rear one does, because you ride a single-track vehicle. That is, the front tire has squeezed most of the water off the roadway by the time the rear tire gets there. But those of you who have put an extra wide tire (perhaps even automobile type) on the rear wheel will find that you have changed that dynamic. The odds of the rear tire hydroplaning first goes up dramatically in that scenario.

One last thought: about riding in rain: water on a freeway (on any wide roadway, actually) drains to the right (in the U.S.); and that means that the depth of that water is deepest in the slowest lanes. That suggests that the odds of hydroplaning are about equal in every lane (slower movement but greater depth makes the slow lanes just as dangerous as the faster lanes.)

C. Heavier Weight Does Not Necessarily Increase Stopping Distance Or Time

There seems to be a continuing belief amongst many riders that stopping distance increases as a direct function of increased vehicle weight. Let’s put this issue to rest.

While it is true that a heavier vehicle requires more energy to brake to a stop than does a lighter vehicle, (there is, after all, more mass involved), that does not mean the heavier vehicle takes more time or more distance to stop.

This relates directly to rider behavior when carrying a passenger.

Let’s review how your brakes work. Regardless of type (disk or drum), your brakes work by pressing a non-revolving material against a revolving material and, as a result, converting the energy from the revolving material (via friction) into heat. The harder the materials are pressed together, the greater the friction and, as a result, the greater the rate of conversion—i.e., the more braking force applied, the quicker you slow down the revolutions of the wheels, and the hotter the brakes become.

Your brakes are also designed to radiate the resulting heat into the environment and, thus, to cool down quickly after they are no longer being used. This is a very important part of their design, because the braking material loses efficiency (due to reduced friction) with high heat. Indeed, if the braking material gets too hot, it can be permanently damaged. Heat can glaze or warp the revolving part.

Brakes on an 18-wheeler are substantially larger than those on your car or motorcycle. That is, brakes come in lots of different sizes—each with the ability to handle a range of energy conversion demands. The bike designers select brakes appropriate for your most demanding requirements. Your brakes are perfectly adequate to totally stop the revolution of your wheels, regardless of how heavy the bike is (until it is severely over-weight) or how fast those wheels are turning. Mind you, you can severely overload your bike with so many pounds of luggage and passenger, to the point that your brakes might not be up to the task of handling that demand efficiently. The MOM for your bike will tell you what that weight is.

Since you know that you can lock a wheel while the bike is still moving, you also know that the braking energy you apply to your brakes is not what limits how fast you can stop! That limit is determined by the amount of traction your tires have.

Further, since it takes more braking energy to stop (lock) a spinning wheel than to merely slow it down, and because a sliding tire (the result of locking your brake) has less traction than one that is not sliding, your normally functioning brakes are not what limit your stopping distance! That limit is also determined by the traction of your tires.

Traction, as we have discussed before, increases with weight. Thus, adding weight decreases your ability to skid the tire and, as a result, gives you the ability to stop more quickly while at the same time increasing the energy that must be converted to heat by your brakes. In effect, adding weight makes it harder to slow at the same time that it makes it more possible to do so.

If you so severely overload your bike that the brakes are no longer powerful enough to cause a skid, then you know that the increase in traction gained by that added weight has finally overwhelmed the ability of your brakes to function;
and, thus, your brakes become what limits your stopping ability (time and distance).

Weight affects your ability to stop in two ways:

- It takes more energy (braking force) to slow a heavier weight; and
- Traction increases as a result of added weight, such that more braking pressure can be used without starting a skid.

Adding weight essentially cancels itself out as an impact on stopping distance. You only need to apply your brakes harder in order totally to compensate for added weight.

You know this already, of course. For example, how could a car ever stop as quickly as a motorcycle? Or, how could a heavy Gold Wing or an Ultra Classic Tour Glide ever stop as quickly as a little 250cc street bike? But they do; the road designers don’t make special roads, signs, and signals for big bikes versus small ones.

Further, if you have taken an MSF class, you know that there is an exercise (and a skill test) that measures how quickly you can stop your bike while moving in a straight line. Your speed is computed by using a stopwatch and measuring your time through a marked interval. Your stopping distance is read directly from marks on the ground. If, for example, you are traveling at 20 MPH when you begin your braking, then you are expected to stop within 23 feet. Note: whether you are a 300-pound rider or a 100-pound rider, the results are the same! There is no compensation for weight. Now you know why.

Note that we’ve been talking about an emergency stop capability—or even normal braking the first couple of times. The heavier the bike, however, the more heat is created by using those brakes; and braking power diminishes with higher heat. Thus, while on a long mountainside decline, if the time interval between brake usage isn’t long enough to let the brakes cool down, then you’ll find that a heavier bike no longer has the braking power of a lighter bike.

That is why you use engine braking (riding in a lower gear) when going down a long decline. Don’t “ride your brakes”, or you soon won’t have any.

But, generally speaking, weight makes no difference to stopping distance, because your brakes are more than adequate to handle any normal range of weight for that bike.

It’s important that you understand and believe this, because in an emergency, if you don’t believe it, you won’t keep trying to stop in the time and distance you have when it’s a close call.

Though adding weight to a motorcycle does not change stopping distance or time, where that weight is loaded certainly does affect both.

For example, adding a passenger to your bike does not simply add weight. That new weight shifts the bike’s center of gravity toward the rear of the motorcycle and raises it. By moving the CG toward the rear, the rear brake can produce more braking power; but because the CG is higher, greater weight transfer occurs during deceleration, which then allows the front brake to produce more braking power.

Pulling a trailer, on the other hand, will certainly increase both stopping distance and time. That additional weight is not being carried by any braked wheel. (Motorcycle trailer wheels have no brakes.) For example, if you pull a trailer that weighs exactly the same amount as your motorcycle weighs (including you), then your stopping distance and time will double for any given amount of braking used. In other words, your braking efficiency, which is the ratio of the total weight that is directly carried by braking wheels over total weight, limits what deceleration rate you can achieve.

D. All Roads Are Not Alike

Those of us who tour with our motorcycles have learned something about the roads across the country that might not be obvious: they are all different.

They are made of different materials, and the quality of their surfaces varies considerably depending on how they are built, how long ago, and with what integrity of materials.

They might be pristine and immaculate in one place, only to become pot-holed war zones a few miles farther along.

The curves in one section of a road can be well-lighted, perfectly banked, and of consistent radius, while only a mile away a similar curve can be dark, with a decreasing radius, covered with “tar snakes”, and lined with roadside weeds higher than your head.

Why? It seems to us that what we are seeing is simply a manifestation of the very real differences in county and state
wealth in the U.S. and in the quality of their various maintenance personnel.

The U.S. Interstate freeway system is consistent in quality and design. The various smaller federal, state, and county roads are not.

The message here should be obvious: As you cross a state or county line, be ready for changes in road surface and quality. Slow down and experience the workmanship and care of the roads in a new county for a few miles before believing that you can take that next blind curve as fast as you have been riding. Many times you’ll see a change in the color of the pavement where road materials are about to change, and you’ll hear a different sound where your tires meet the new road surface.

E. Tires Wear Out but Brakes May Not

Tires wear, primarily as a result of the miles you ride on them. Some kinds of riding can wear them out faster than others. For example, if you do a great deal of canyon carving, the odds are that you will need to replace your tires after you’ve ridden fewer miles than if you restrict your riding to commutes and city road riding.

But brakes wear out as a function of how often you use them, not your mileage. Canyon carvers tend to aggressively use their brakes as they approach sharp turns, and people who ride in mountainous areas wear out their brakes with some regularity. But tour riders almost never use their brakes. You can travel for a hundred or more miles on a freeway without ever touching your brakes. You can’t ride a city block without doing the same. As a result, touring motorcycles have very long brake life.

Some roads are very difficult on tires. The Alaskan highway (often called the ALCAN Highway, because it traverses both Alaska and Canada), for example, eats tires. The road surface freezes and thaws frequently, causing the road to buckle and wear. Erosion accelerates in this climate, and road maintenance sometimes has to wait for better conditions. Tour riders who plan to ride that highway for any great distance often carry spare tires with them (more weight), because finding replacements along the way that fit a particular motorcycle can be very difficult.

X. Dealing with threats

Throughout this book we have described a huge number of threats that a rider is confronted with whenever riding a motorcycle. We have explained that many threats are so pervasive that, with experience, you quickly develop strategies for dealing with them. Those threats cease to be significant and certainly cease to be “unexpected”.

Indeed, with experience you will find that virtually all the threats described in this book will become “expected unexpected events”—still threats, but ones that you are equipped to deal with. The element of surprise will still exist when they present themselves, but the level of adrenaline running through your body in response will be lower, your reaction times will be quicker, and your confidence in properly dealing with them will be much higher, largely because you have done so in the past, successfully. Success reinforces more success.

But acquiring that experience is the problem you face as a newbie. How do you survive the unexpected events that become threats, without first having experienced and survived them?

You need two things to increase your odds of doing the right thing in response to any unexpected event:

- Time to decide what to do about it; and
- Reduced speed.

Fortunately, both are provided as result of immediately squeezing both levers. That slows you down and provides both time and reduced speed. You were told that very early in this book, before you were told to even turn on your engine. Now you fully understand why.

Of course, you haven’t practiced what needs to be done before encountering each new unexpected event along the way. But you can practice emergency braking. You can practice keeping control, and even regaining control, of your motorcycle. You know that you can do those things, and you know that you have become good at both. Squeezing both levers may not be the ideal solution or the only solution to a threat, but it’s a solution to most threats, whether you’ve experienced them before or not.

So, your first knee-jerk, not considered or debated, reaction to any threat should include at the very minimum squeezing both levers. Buy time and reduce your speed. If, despite squeezing both levers, you are unsuccessful in avoiding a threat, the consequences of the crash will be less severe. This may even be the difference between life and death.
XI. Rallies

Rallies are enormously fun experiences for motorcyclists. They provide opportunities to meet other riders of similar interests, buy all sorts of accessories and after-market add-ons and have them installed, demo ride new bikes, participate in poker runs, play on-bike games, and even find potential mentors to help you along in your riding career.

These are hosted by major motorcycle manufacturers, and by international, national, state, and local levels of various riding clubs.

Some events are so popular that they encourage tens of thousands of participants to attend, even to ride across several continents to get there. These rallies may be scheduled annually or less frequently because of the huge expense and management effort required to put them together. When major manufacturers of motorcycles and accessory vendors will attend, the contracts, planning, permitting, and advertisements to be coordinated will rival the Super Bowl. Law enforcement agencies will often have a say in the ride planning associated with these events and may close off entrance ramps to the local freeways to accommodate any big charity run the rally organizers will put on. Hotels and motels will be sold out ahead of time for months, if not years, and riders will settle for accommodations several hundred miles away each night just to be able to ride over and spend the day at the rally site. Most rallies, however, are smaller local events in which only a few hundred to several thousand riders participate.

No matter how large or small the event, you can be absolutely certain that you are not the least experienced rider in attendance. That means that, among other things, there are other riders there who are less well informed and less safe in their riding habits who will be on the roads on the days leading up to, during, and following these events.

That’s the single most important reason you might wish to reconsider attending a rally: too many bikes and too many riders, especially if it’s an away-from-home event.

At some notorious rallies, major parties are held. Lots of drinking occurs, which spells riders on the road who have been drinking. Crime isn’t uncommon—like having parts stolen off your bike, drugs used, traded and fought over in plain view, and outliers of many kinds with guns, chains, and knives, intoxicated and looking for trouble. For about one percent of riders, these stereotypes are appealing; they enjoy being “1%ers” because it implies that they’re dangerous, and they are. A few others just enjoy looking the part and go to these rallies so that they can go home with bragging rights about the other riders who were there. If you discover a rally is rougher than you expected when you ride into it, be aware that stereotypes are formed because some representatives of a group look, act, and think as their stereotype suggests. If you see trouble brewing, leave quietly. This is one situation in which that little voice inside your head should be heeded the first time it whispers, “Get out of here.”

Other big rallies are much more family-friendly and include events for all ages. Local events are usually better controlled and often allow no drinking on the event premises. The restaurants in town often supply coupons for free meals or discounted food and lodging to rally participants, which are given to riders at registration in a “goodie bag” that includes vendor material, maps, schedules, and so on. Small towns in the U.S. usually offer a warm welcome to small motorcycle rallies, if the riders are well-behaved. On the other hand, local events usually faithfully reflect a local set of customs and behaviors—the local riding culture, if you will. If, for example, the predominant group of riders who will attend such a local event consists of 1%ers, you can expect that anything goes. You’re well advised to stay away from them.

XII. Demo Rides

Suppose you go to a motorcycle rally and a manufacturer has shown up with some demo bikes to ride. You are “in the market” to buy a bike, so you decide to take one of those bikes for a test ride. Your co-rider wants to go with you on that ride. Good idea? No.

Why not? Earlier in this book, we discussed testing your limits. We asked you to agree that in order to “grow” riders must push limits, but that a responsible person will control his risks by testing no more than one limit at a time—and then by putting only his “toes over the line” rather than by stepping off the mountain.

We also asked you to agree that these limits include our personal skill level and preparedness, our environment, our equipment, and certain laws.

Vendors at rallies do not make a habit of letting people without a motorcycle endorsement on their license take a
spin on their bikes. The odds are that you have some riding experience behind you if you are at a motorcycle rally, but how relevant is that experience to the demo bike? Five years of dirt-bike experience does not relate well to handling an 800-pound touring bike out on the street.

No matter how many years of riding a two-wheeled motorcycle you have, that experience also does not relate well to handling a three-wheeled machine at any speed faster than about 10 MPH, and then only after instruction from a vendor representative. You don’t have to act macho to be killed on a trike or driving a hack, but it helps.

You may well have a great deal of experience (and skill) handling city street riding, but handling a motorcycle on a freeway requires very different skills and techniques.

Living and riding on the flatlands does not prepare you well for dealing with the streets of San Francisco or the mountains in Colorado.

Just because you can handle a Honda with “your eyes closed” doesn’t mean that you’ll be familiar with the controls and feel of a BMW.

If your only experience in carrying a co-rider is on a touring machine that is specifically designed for that purpose, then you should not assume that you are well prepared to carry a passenger on a sport bike.

If you intend to demo ride a new bike, do it solo first! Get the feel of that bike and of the terrain you will be riding it on. Many demo rides are escorted by manufacturer’s representatives, who are going to assume a certain skill level in the riders following them. The route you are supposed to ride during the demo ride may be pre-determined, as well. Learn how to stop and start on those steep inclines and declines with which you have no experience before putting a passenger on the bike. Adding a passenger should be the only variable you’re testing when you do it. Get to know the demo bike first. You will both come back from that demo ride alive and healthy if you’ll admit your limits and grow your skills and experience responsibly.

But there has never been a study which confirms that graduates of the BRC are in any way less likely to become involved in a motorcycle accident than riders who are not trained by professional instructors, and there’s at least one study that suggests just the opposite.

This book attacks the issue of lack of knowledge by trying to teach the newbie a broader perspective of what riding on public roads is all about and how to “ride smart”.

More than a few riders who have taken the Experienced Rider Course (ERC) provided by the MSF several times have reported that it was virtually useless in advancing their knowledge of motorcycling and how to survive the experience. Advanced Rider courses and track days are aimed at teaching riders how to get the best “performance” out of their machines and themselves. Translated, that means “how to go fast in the turns”, and how to do suspension set-ups. They also encourage (unintentionally) their graduates to ride very close to the limits of their skills and their motorcycle’s capabilities—a recipe for disaster on public roads.

There’s one way for a newbie to grow in competence and with relatively safely, and that involves an on-going education process provided through association with a mentor. Finding such a person is a real challenge, of course, since newbies have not had a long history of involvement with motorcycles and, thus, ready access to a good candidate may be rare.

Select a mentor (assuming he or she is willing) based on that person’s apparent broad knowledge of motorcycling, and his or her clear and obvious safety orientation. This is a person who actively speaks up about safety issues, and who openly disassociates from activities and people are not safe.

A mentor is the person of whom you ask how and why questions. This is the person you want to ride with yourself who will also introduce you to other riders or local riding groups that share your particular interests. There are few better ways to advance from newbie to competent status as a rider than with the help of a mentor.

XIII. Mentors

Education such as the BRC certainly helps a newbie when it comes to learning how to ride. At the very least it teaches the newbie the fundamentals of motorcycle control.

XIV. The Safety Mindset

Throughout this book, we’ve focused on some aspect of controlling the motorcycle or its dynamics. Though this discussion may seem not fit that mold, we invite you to
reconsider, because when we talk of control, this also means controlling yourself.

Putting your mind into the right “safety set” is a fundamentally important part of safe riding.

When you are riding local streets, you must scan for potential threats coming at you from your side.

You must consider the possibility that someone will run a stop light or sign at an intersection.

You must allow for the possibility of a pedestrian or a domestic animal entering the roadway ahead of you, or running out from in front of the parked car you are about to pass.

You need to consider such things as cars backing out of driveways, how long a light ahead of you has been green (is it “stale”?); whether it’s a school day and what time of day it is, in order to recognize whether or not you are traveling too fast for a school zone.

And you need to evaluate each and every left and right turn you are going to make for road surface quality and obstructions, proper speed, traffic signs, proper sight lines, and the often unpredictable driving behavior of others as you “negotiate” right-of-way. You can also expect to have to make an occasional start or stop on a steep hill.

In other words, you must adopt a mental model of your environment that is specifically designed to let you best deal with situational awareness issues. Call that your “local streets model”.

The moment you enter a freeway and begin riding at highway speeds, you need to activate a completely contrasting model.

Now you need to consider erratic lane-changing behavior, on- and off-ramp merging threats, the possibility of having to make an emergency stop or rapid slowdown from high speed, tailgating drivers talking on cell-phones, the wind and speed effects of truck traffic, and lane selection strategies to position yourself properly for upcoming road changes, turns, or exits.

But you need not spend much effort or attention looking for pedestrians or domestic animals, or people pulling out of driveways, and you do not have to deal with 90-degree right or left turns, or stop lights, or oncoming traffic with left-turn signals.

In other words, you need to adopt a very different mental model in order to deal with the realities you will be confronted with on those freeways. Call this model your “freeway model”.

When you are riding on country roads, you will need to switch mental maps to one that includes an awareness of the need to watch out for deer, or slow moving tractors over the hill, or poor pavement, or cars that have pulled off the road ahead of you who decide to make a U-turn just as you approach them.

You need to have adopted the “country road model” in your mind, or else you won’t anticipate those threats properly.

Riding in the dark requires a variation of each of those mental models, just as riding in the rain requires yet other variations. Riding cross-country in summer heat requires another one still.

What is common to all of the models is that they are selected based on known threat potentials. That is, you use them to increase your odds in dealing with the threats that tend to be unique to the situation you place yourself into. And with experience, you don’t even have to decide which model to use—when your engine speed changes from one pattern to another, your subconscious switches those models for you automatically.

That is one reason you seek experience—call it practice.

But one additional mental model is the “close to home model”. This one is not automatically activated unless you are aware of it.

Statistics are very clear about this. Most motorcycle accidents occur relatively close to home. And whether you go out on a hundred-mile ride, or a two-thousand mile tour, or a fifty-mile day ride, before you get home you must get “close to home” first.

When you do, you’re more fatigued than when you left. You probably have encountered and dealt with half a dozen “close calls”, or instances of crazy driver behavior, or any of the other threats mentioned above, and you survived them.
Now that the road is familiar, you have a tendency to unwind and settle into the familiar. And that leads to making mistakes when the unexpected happens.

Whenever you get within five miles of home, switch mental gears and perspectives.

Imagine that you have "only fifty miles to go" instead of "only five miles to go," in order to remind yourself to remain vigilant and apply the "close to home model".

Don’t let down your awareness of risks until the ride is completely over and your bike is parked.

Build your mental models with experience, shift them as often as your situation changes, and create and use a "Close-to-home model" for yourself.

XV. Carrying a passenger

Sooner or later you’ll want to take a friend or relative along with you on a ride on your pillion, i.e., to carry a passenger. It can be a wonderful experience for both your passenger and yourself as it is a sharing of great consequence. On the other hand, deciding to carry a passenger can be the very worst decision you ever make in your life. Still, the odds are that you will do it.

Despite your belief that you already a careful rider and that you would not do anything that might endanger your passenger, until you have become a competent rider (Phase 2), you are not ready to do so. We will provide a full discussion about carrying a passenger later, to help you deal with the many new responsibilities and skills required of a rider who elects to do so.

XVI. Group Riding

Whenever two or more bikes ride together, it’s called group riding. There are disciplines and rules involved that can make group riding much safer than if the group elects to ride without rules.

Like carrying a passenger, until you have become a competent rider (Phase 2), you are not ready to do so.

We will offer a detailed discussion about group riding later, to help you deal with the many new responsibilities and skills required of a rider who elects to participate in group rides.

XVII. Some Final Thoughts

Now that you’ve read the tips and explanations, gone to a range for parking lot practice that led to better skills one at a time, and learned about riding on public streets, it’s time for you to reflect about what you’ve accomplished.

Just consider all the many hours of practice you’ve done and the wide range of road environments you’ve traveled in along the way.

You’ll probably agree that some of it was rather intimidating, and some of the environments you were “forced” to ride in were not at all pleasant. Indeed, some of those environments you’d just as soon avoid in the future.

On the other hand, you survived it all. You learned a great many things about how to handle your motorcycle and how you handle yourself in a wide variety of challenges. And that is precisely what you’ve accomplished: you learned, and as a result, both your experience and your confidence increased.

That is a double-edged sword, however. This newly-earned confidence allows you to handle almost any unexpected situation you’re likely to encounter without losing time while you debate what you should do, or even whether you can manage the threat. That “found” time provides you new options to consider in dealing with future threats. It also reduces the stress levels you probably remember very well from your early riding career. But it can fool you, too. You can become over-confident and take on threats that you really are not yet ready to handle, because you will think you are ready but not know it for a fact.

Confidence is a very good thing, on balance. Maturity helps you find the line between being able and only thinking you are able, but confidence establishes the foundation for all future growth in terms of skill development. You are well on your way to becoming a fully competent rider at this point.

Your next step is internal. You progress from here to full competence when you commit to believing in yourself, your skills, and the predictable behavior of your motorcycle.

A. Beating the Odds

The National Highway Traffic Safety Administration (NHTSA) is responsible for reducing accidents, injuries, and deaths on America’s highways. It provides annual statistics which are extremely well documented in order to inform the public of
how successful or not they have been. There’s much to be learned from those statistics.

For example, there were just over 4.9 million registered motorcycles in the United States during the year 2001, and those motorcycles were ridden for a total of just over 9.5 billion miles in that year. Those are impressive numbers, until you recognize that they mean that the average motorcycle was ridden for only about 1,943 miles in the year.

On the other hand, there were nearly 129 million registered passenger cars, which accounted for nearly 1.6 trillion miles of travel in the same year, which means an average of about 12,311 miles per registered car.

Let’s add some more information from the NHTSA. There were 33.38 fatalities per each 100 million miles of travel on a motorcycle, while there were only 1.28 fatalities per each 100 million miles of passenger car travel. That argues that you are twenty-six times more likely to get killed riding a motorcycle than you are when riding in a car. In the years since then, the odds have gotten worse.

There were 632 injuries for each 100 million miles of motorcycle travel in 2001, while there were only 122 injuries for each 100 million miles of passenger car travel. This means that it is five times more likely that you will get injured riding a motorcycle than you are when riding in a car.

But on the other side of the statistics is the following: 74,000 motorcycles were involved in an accident in the year 2001 which is only 1.5% of all registered motorcycles; while there were 6,705,000 passenger cars involved in an accident in the same year, an astonishingly large 5%.

That means that the odds of your motorcycle being involved in an accident are substantially lower than of your car being in an accident; while the odds are overwhelming that if you’re involved in an accident on your bike, it will be catastrophic compared to being in a car.

At the very least, you must conclude that riding a motorcycle is substantially more dangerous than riding in a car. However, you know that a motorcycle is more agile than a car and thus should be able to avoid more of certain kinds of accidents than do cars. Our bikes can usually stop more quickly and can out-accelerate most cars, so there’s even more reason to wonder why riders don’t avoid certain kinds of accidents that cars cannot avoid.

Yet the statistics are not lying. They tell us that the more miles you drive your motorcycle, the higher the odds that you will be involved in an accident.

But must that be the case? Must it be true that your passion for motorcycles requires that you end up dead or injured in a motorcycle-related accident sooner or later? Of course not! So, how do you beat the odds?

Statistics are only true if the population behaves “normally.”

A substantial number of motorcycle accidents involve a rider who has been drinking. If on occasion you drink and drive, you are acting “normally” as to the statistics, and they’re more closely predicting what will happen to you. A substantial number of accidents occur when “luck” runs out, i.e., you drive through a yellow light and that garbage truck happens to turn left in front of you and runs over you in the intersection. But many, if not most, motorcyclists rely on luck to get them through a ride in just such a scenario.

To the extent that you rely on “luck”, you’re acting “normally” relative to the statistics. You are trying to insure that the numbers are self-fulfilling predictors.

What does make a difference in statistical outcomes is behavior that is at variance with “normal.” If the normal motorcyclist fails to cover his front brake while moving, those motorcyclists who do cover their brakes tend to beat the odds. If the normal motorcyclist rides his bike once a month and gets a couple of hundred miles of experience in the process, all of it as if he or she were a newbie each time, then those of you who take your bikes to a parking lot and practice braking or slow-speed maneuvers and who ride more frequently and obtain more experience and familiarity with your bikes as a result are acting “abnormally”. Your odds of surviving the experience improve as a result.

If an incredibly high percentage of motorcycle accidents occur within the first six months of ownership and within just a few miles of home, then those of you who have years of experience—not just years, but experienced years—are “abnormal”, and your odds of being in an accident are not the same as those predicted by normal statistics.

If a substantial number of motorcyclists died when their heads hit the ground without wearing a helmet, then it can be said that the statistics show what will happen to a “normal” population of motorcyclists, including a percentage
of those who do not wear helmets. If you **always** wear a helmet, you are acting “abnormally”, and your odds of survival improve. And if you **sometimes** don’t wear one, you are also behaving abnormally, but in this case you **substantially increase your odds of dying on a motorcycle** beyond the already dreadful statistics mentioned earlier.

It’s more dangerous to ride a motorcycle than it is to ride in a passenger car, and that’s a fact. The way to beat the odds is to **behave** in ways that decrease your odds of being involved in an accident or being injured or killed if you are in one. In other words, you must behave “abnormally”, i.e., ride defensively, intelligently, soberly, with learned (practiced) skills, with protective gear, and as if your life depends on it—because it does.

Relying on luck (odds) is simply stupid.

For those of you who are inclined to argue that the statistics don’t apply to you—that you are less likely to be involved in a motorcycle accident because you don’t **behave** like some you have seen on the streets racing through curves at well over posted speed limits, or weaving through traffic without use of signals, or any other unsafe behavior you care to describe—you **might** be right, but not necessarily so. All that it takes for the statistics to closely predict your odds of survival is that you closely match the cumulative average behavior of the entire population sampled by the statistic. It does not take “bad” behavior to match the odds; it just takes an “occasional” lapse of judgment to move you towards “normal” odds.

Actually, it doesn’t even take that. We already know that the average biker rides his motorcycle less than 2,000 miles per year; and that the higher the mileage, the higher the odds that you will be involved in an accident. That is, the higher the mileage, the more often you expose yourself to danger. So, assuming your other behaviors tend to reduce the odds of an accident, if you ride a lot of miles, that behavior increases your odds of an accident—possibly as much as you reduced the odds by your otherwise safer behaviors. You are already a very small part of the total sampled. There are others in that list who have never had an accident and never will. They, like you, are the counter-weight offsetting the behavior of those that clearly increase the odds of an accident. To the extent that your **cumulative** behaviors are safer than those of all others in the sample, your odds of survival without an accident are better than the statistics predict.

**B. That Inner Voice**

Whether you’ve been riding a motorcycle for days or for decades, a time may come when you find yourself wondering, "What on earth am I doing out here?"

Where and when this happens is important in figuring out what it means, if anything. If you are trying to stay on two wheels in high crosswinds with 18-wheelers passing you, a fleeting wish to be elsewhere is understandable. Wanting to "get the ride over with" isn’t an abnormal attitude even for the hardcore, if the landscape you’re looking at resembles a nuclear test site or if you’ve got a storm at your back. Sometimes, though, this question hits, and it just seems irrational.

For a newbie, there’s a sense of breathless amazement at going 50 the first time. It’s not unusual for new riders to wonder what on earth they are doing out there. When first learning to handle a motorcycle, whether it’s on motocross trails or in the middle of city traffic, it’s natural to be concerned for your own skin.

Riding a street bike is risky. Dropping a bike can be embarrassing if not painful, and the pavement is hard. Until the skills required to operate these complex machines become well-practiced, a rider might be asking "What am I doing out here?" several times in a day’s ride. But for a more experienced rider who knows her own limits and can better manage risks, this could mean he or she is riding too far, too fast—and a part of that rider knows it.

If a rider is frequently frightened but survives that feeling, perhaps the search for adventure has become reckless thrill-seeking—and the rider’s becoming dangerous to himself and others. One rider’s loss of control creates an enormous risk for a group. This is one reason the motorcycle clubs regularly discuss and practice group riding safety rules, especially with newbies, who are asked to ride toward the rear.

Once motorcycle touring gets into your blood, and you gain experience on your bike, your skill and confidence increase to the point that you want to seek out unknown roads and different scenery. Because you keep your bike well maintained and practice safety in the everyday details of riding, you learn to relax.
Fear is almost forgotten in the glorious fun, in the sights and sounds and smells and people encountered on a run, in the companionship of the "family" as you travel, and in the interest you generate in the people you meet. A bout of irrational, stark terror is rare—but it can still happen.

What should you do when you can’t shake a negative feeling? Are you losing your nerve? Are your riding days over? Without attempting some kind of "biko-psycho-analysis," we suggest that a crisis of confidence or intense fear while riding first calls for that rider’s attention. If the feeling persists for more than a few moments, or if the rider fears a loss of control, he should signal for a stop to regroup and refocus on what is going on. It should not be ignored.

Even in a moment of terror that comes out of nowhere, sudden movement on a motorcycle is not recommended. A street rider expects to maintain control at all times. So long as you don’t give up control, chances are you will be fine if you just keep on doing all the right things.

Many riders have experienced a number of moments of discomfort when riding that seemed unrelated to road, traffic, or rain. It may have been a memory, or an imagination running away. Many have ridden through those times, but couldn’t ignore how uncomfortable they were. They continued to question whether they needed to make a "head-check" stop, whether their riding skills were being affected, whether they could "breathe through it," and what was really nagging at them. Stopping "casually" before many more miles helped, but they didn’t want to let their paranoia take over and make sure they would crash.

After encounters with their demons of the road, they’ve looked back and tried to analyze the circumstances. They’ve realized a lot of things can cause their pleasure in riding to seep away, and their awareness of risk to grow irrationally.

These include not eating and getting low blood sugar, fatigue, dehydration, cramped muscles, riding an unfamiliar bike, starting out on a trip without understanding the route or the stresses it would take, believing they should do something differently to please someone else in the group, and not personally checking some aspect of their equipment.

Any of these things can cause extra stress in the midst of what can be a stressful sport. Dealing with some of these factors takes a change in habits; some, a change in attitude. To ride safely and keep enjoying it, across, say, a 400-mile day, confidence has to play a big part.

What about peer pressure to get through a bad ride or a shaky moment without "inconveniencing" the other riders?

Most of your fellow riders would tell you this: "If you’ve ever been ‘inconvenienced’ by having to follow a friend to the Emergency Room to see if she makes it, you can handle an extra five-minute break to keep a rider out of there."

Besides, motorcyclists expect help from each other along the road: a helmet placed on the ground by a bike’s front wheel is the universal signal that a rider needs assistance.

In your groups, as in many others, if a rider needs to stop for any reason—or no "rational" reason at all—that person will not be left to deal with a problem alone. Neither should a rider who has a crisis of confidence expect to be criticized. "Ride your own ride" puts the responsibility on each individual rider to exercise the proper degree of care and skill needed under the circumstances.

Group riding this way is not for everyone, but it has some definite advantages in the give-and-take.

Some riders are sensitive to pressure from peers to test their skills and try something risky. If you want to experiment, don’t take a dare. Do it in an environment you can at least partially control: on an empty parking lot, or in a quiet neighborhood, or on the training range at a Motorcycle Safety Foundation course.

Being pushed into riding longer, faster, harder, on a bike you can’t handle, or under conditions you find unsafe -- especially out in the boonies with other riders who don’t respect your limits—doesn’t set up good conditions for a successful end to your ride, or for learning, or for having fun, or for being uninjured and well enough to ride the next day.

When riders acknowledge and recognize those who take a safety course or perfect a new skill, this attitude encourages others to practice, to share what is learned, and to feel good about it.

"What on earth am I doing out here?" If it happens, the decision is yours: to ride or not to ride?

If you just can’t get to relaxed-but-aware, you may never enjoy yourself. If you have to stop to regroup emotionally and mentally now and then, don’t beat yourself up. Take a break, find a friendly backseat, or go to an event on four-wheels.
Attend to your needs, and don’t ignore the signs: if your blood sugar drops, a candy bar might be all you need to feel safe again. If there's no “real” reason for panic, perhaps you can ride through it by making no sudden moves, and trust your common sense to keep you safe. You may use “self-talk” to remind yourself you’re doing fine.

Finding a way back to the fun is one of the challenges of motorcycling that has involved real personal growth, for many. It has taught them courage and self-control to deal with their fears. Like the old farmer, you may find “I've had a lot of worries in my life, but most of them never happened.”

C. Excuses Are Worthless

A rider recently reported this anecdote:

I laid it down one time on purpose. I was entering a green light intersection about 30mph when I saw what turned out to be a drunk driver entering on my right intending to run his red light. I ran through 3 options in my head:

1) If I keep going he will T-bone me;
2) If I try and stop I will T-bone him;
3) If I lay it down and hit him with both of my wheels, I’ll have the whole bike between me and his car.

I took Option 3, destroyed my helmet on his A-pillar, and destroyed his left front fender / wheel / door, landed on my tailbone after flying over his car. Bottom line: totaled Harley, totaled Plymouth, totaled Bell helmet, cracked tailbone, opened up head, 10 days on a board in the hospital.

I never ride without a helmet now.

His “logic” was reasonable, though badly flawed, but worse by far, it sounded like he was making a recommendation to others to consider doing the same thing. This is the kind of story that a newbie must learn to filter and dismiss instead of believing. It is especially difficult for new riders to do this, given that the “story” includes a rational and obvious bit of good advice (always to wear a helmet).

This rider’s “option 2” was the only viable, and certainly the safest, choice he could have made. If you are going to crash, you want to do it at the slowest possible speed, and that happens only if you use an emergency braking maneuver.

“Maneuver” means that you squeeze the front brake hard, then harder, then harder still without locking up the wheel, and use the rear brake modestly, followed with less and less pressure so that it, too, does not lock up.

And it means that you keep your head and eyes pointing straight ahead, the bike pointing straight ahead, and you lean forward to lower the bike’s center of gravity. These are skills you’ve practiced.

So let’s look at the whole idea of “laying it down”. Do you wonder where a person learns how to lay a bike down on purpose? There are no classes, certainly not an MSF class, that teach a rider how to do that.

Yet, it seems, this rider knew just how to do it in an emergency situation. Isn’t that fantastic?

Let’s suppose that you really did want to lay down a bike while it’s moving at highway speeds. Which control would you use? There is no “lay it down” button on your motorcycle, so it must be one or more of the other controls.

Since the rider wants to end up with his wheels hitting the car ahead of him, the bike has to be made to turn 90 degrees from its direction of travel.

The only controls that you have to change direction are the handlebar itself. And, at highway speeds, you have no choice but to use counter-steering. So, it must be that you use counter-steering to lay a bike down.

But wait. When you change direction, you actually move in a different direction. If this rider merely pressed forward hard on, say, his left grip, then his motorcycle would have moved dramatically to the left, not just swiveled in place within his lane of traffic and switched the front end of the bike from pointing dead ahead to pointing directly to the left, which was what he intended.

But wait. If the rider actually moved away from the track he was riding in, and aggressively so, then wouldn’t that actually be a panic swerve? And if a panic swerve could be performed such that you would miss the collision altogether, why wouldn’t you simply do that instead of going further and ending up on the ground, when you “laid it down”?

The fact is that if you could use a panic swerve to avoid an accident, you would do so instead of “laying it down.”
This rider already claimed that that was not an option, because it was not on his list.

In order for you to end up on the ground, your tires have to lose traction. That happens, as you know, if you overuse your brakes. Skid marks are clear indicators when that happens. And the brake that is easiest to overuse is attached to the rear wheel.

It’s at least a coincidence that when you skid the rear tire, your bike’s rear end tends to yaw to one side or the other, particularly if you are also using the front brake. And the result can easily be that the rear tire, not the front one, is what slides out from under you, while you tend to stay in the same lane you were traveling in at the time. Surely it is more likely that in order to “lay a bike down”, you use the rear brake instead of counter-steering.

But wait. If you skid your tires, you’re no longer getting maximum stopping power from your brakes. Instead, you have reduced your rate of deceleration by about 25% from what it was just prior to the start of the skid.

Most riders would want to be slowing as quickly as possible when faced with a crash, and that means they would not want their tires to skid at all.

But wait. What if you could increase your rate of deceleration by sliding on the side of your motorcycle instead of on its tires? Here the problem is that steel (and plastic) have less friction when scrubbing against asphalt than does the rubber of a motorcycle’s tires.

So that a sliding motorcycle, on its side instead of on its tires, will slow even less quickly than if you simply skid your tires.

“Laying down” a motorcycle is not a deliberate event on the street. Instead, it is an after-the-event explanation, an excuse, for what happened which is designed to save face. Let your helmet do your face-saving.

D. Form vs. Function

Cash recently observed how, over time, form follows function (from an evolutionary point of view). Ask any biology student, and you’ll learn that you can tell what things an animal (indeed, any organism) can do based on the form taken by their bodies. It was earlier “determined” that a certain function more likely led to survival; and a specific form evolved to permit or enhance that functionality.

But form is not the same as function. Form follows function over a long period of time. In the immediate life of the specific animal, function is what counts.

This is also true of riders and the safe riding habits we hope all riders will adopt.

For example, we know that doing a “head check” is important before making a lane change or entering an intersection. We usually do just that. But have you ever found that your head check was really just going through the motions?

When we do a head check, it is not merely to turn our heads so that our eyes can see danger, but so that we will see danger if it’s there. That means we must not allow ourselves to be lulled into believing all is right with the world just because it’s supposed to be that way, and because we went through our routine as usual; and because we haven’t yet experienced a rip in our understanding that puts us better in touch with reality. Expectations dull our ability to react to what is not right and expected. We must fight against that by maintaining a relaxed awareness that encompasses everything around—seeing the way a child would see the world, without making assumptions.

Even experienced riders are not perfect. We do our best most of the time. We know what we should do, and most of us conscientiously try to do those things that tend to keep us out of trouble. We form habits that help reduce our risks, like wearing all the gear, all the time; doing regular maintenance checks on our motorcycles; and paying attention to whether we’re really 100% before we ride.

But habits are not awareness—maybe just the opposite at times. Don’t be lulled into thinking that because you’ve done everything right, you’re safe while you ride your motorcycle.

Motorcycling is not safe. You must be responsible for your skin, your skills, your passenger, and your life. Form is not enough. Function counts, form does not. If you insure that you and your motorcycle both function properly on every ride throughout Phase 1 of your riding career, you’ll develop abnormal riding habits that will improve your odds; and you’ll probably be able to keep riding until you start Phase 2. Remember, if you want to enjoy tomorrow’s ride, you have to survive today’s.

Ride smart and keep learning, dear readers. We’ll see you on the road.
Glossary

1%er/One-percenter

A pejorative referring to bikers who demonstrate a “gangsta” image in the way they dress and their lawless behavior.

Two-second rule

This is the minimum distance you maintain between your motorcycle and the bike immediately ahead of you (in the same track as you are in). When riding in staggered formation this means that you would maintain a minimum of one-second spacing between your motorcycle and the next bike in the group ahead of you.

‘Two-seconds’ becomes a distance when you measure how far your motorcycle moves in that amount of time. Thus, no matter what speed you are riding at, the minimum following distance automatically “adjusts” by using this concept.

ABS

An acronym: Antilock Braking System

Computer-controlled brakes that use sensors to determine when a tire on a wheel is starting to skid and respond by very quickly removing braking pressure on the affected wheel, then restoring that pressure in an effort to keep stopping power at its maximum (just prior to a skid). ABS responds to imminent brake lock caused by either excessive braking pressure or sudden loss of tire traction. Tests have shown that extremely skilled racers can brake slightly more effectively without ABS, but that the vast majority of motorcyclists are incapable of braking as effectively without ABS as they can with it. The fundamental safety advantage of an ABS is not that a motorcycle stops more quickly with it than without, but that it virtually eliminates rear-brake lock in panic situations.

Acceleration Rate

See g’s.

Air Horns

Used as a replacement or supplement for the traditionally weak “toot” or “bleep” sound of stock motorcycle horns. They usually come as a pair of horns, one providing a “C” note and the other providing a “D” note. These sounds react with each other and make the horn noticeably louder.

Alt-MOST

An acronym: Alternate Motorcycle Operator Skill Test.

This is a test designed by the MSF in collaboration with the National Public Service Research Institute. (Now called the PSRI, for Public Service Research Institute.) It is used in at least 29 of the states to determine whether an applicant is minimally qualified to obtain a motorcycle operator endorsement on his or her driver’s license.

The test consists of seven elements:

1. Left Turn
2. Controlled Stop
3. Right Hand U-Turn
4. Quick Stop
5. Obstacle Swerve
6. Stalling

The first six are usually combined into four test runs. “Stalling” is not actually a test; the applicant is simply observed to see if he or she can control their motorcycle without stalling it.

AMA

An acronym: American Motorcyclist Association

Anti-dive

A front-end design that tends to reduce the diving of a motorcycle while under heavy braking conditions. Once popular on many motorcycles, it is rarely found on contemporary bikes.

The problem with anti-dive is that it results in a higher center of gravity during heavy braking than would be true if the front suspension were allowed to compress more fully and that, in turn, results in more weight transfer rather than less. Especially relative to sportbikes, it is easier to do a stoppie on a bike with an anti-dive front-end than one without.
**Ape-Hangers**

Handlebars designed in such a way that when holding onto their grips your hands will be substantially higher than your shoulders.

**Apex**

Usually refers to the midpoint of a turn, but as it relates to driving a vehicle the meaning has become “the point on your driving line which touches, or comes closest to, the inner radius of a curve.”

Thus, “late apex” certainly refers to a point later than its midpoint.

**Armored Jacket**

A textile (mesh) or leather riding jacket which has reinforcements in the back, shoulders, arms, elbows and other areas to protect the rider in the event of an accident from road rash and modest bruising.

**ATGATT**

An acronym meaning: All The Gear, All The Time

A safety attitude which presumes that safety gear should always be worn when riding a motorcycle regardless of temperature, distance to be ridden or peer pressures that might discourage doing so.

**Bagger**

Like “dresser”, this refers to a motorcycle which has luggage capacity including at least a pair of saddlebags, and optionally, a top box or trunk, a pillion bag, tank bags, etc.

**Body-Steering**

The practice of using a shift of weight or leaning the shoulder on the side you wish to turn toward into the turn, instead of using direct handlebar input to cause a change of direction in your path of travel.

This is a very imprecise and limited means of controlling the bike’s direction of travel and is typically employed by riders who are not formally trained in the proper way to ride motorcycles and who don’t understand how counter-steering works when traveling above about 10 MPH.

**Bore**

When talking about an engine, its bore refers to a cylinder’s diameter. A cylinder’s bore and stroke define the engine’s displacement.

**BRC**

An acronym: Basic (Beginner’s) Rider Course

This is the entry level motorcycle riding class hosted by the MSF. No experience assumed other than having the ability to ride a bicycle.

**Bullet Bike**

Sportbikes come in various models that range from beginner models with relatively low power and speed potential to models with awesomely powerful engines capable of attaining top speeds well in excess of 170 MPH.

The medium- to higher-powered sportbikes are often called “crotch rockets”. The most powerful of these models are known as “bullet bikes”.

Examples of two popular bullet bikes are the Suzuki GSXR600 and the Kawasaki ZX9R.

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<tr>
<th>Gear</th>
<th>Maximum speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>75 MPH</td>
</tr>
<tr>
<td>2nd</td>
<td>102 MPH</td>
</tr>
<tr>
<td>3rd</td>
<td>125 MPH</td>
</tr>
<tr>
<td>4th</td>
<td>145 MPH</td>
</tr>
<tr>
<td>5th</td>
<td>161 MPH</td>
</tr>
<tr>
<td>6th</td>
<td>178 MPH</td>
</tr>
</tbody>
</table>

Table 4: GSXR600 Potential Speeds

<table>
<thead>
<tr>
<th>Gear</th>
<th>Maximum speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>76.5 MPH</td>
</tr>
<tr>
<td>2nd</td>
<td>101.3 MPH</td>
</tr>
<tr>
<td>3rd</td>
<td>126.4 MPH</td>
</tr>
<tr>
<td>4th</td>
<td>147.6 MPH</td>
</tr>
<tr>
<td>5th</td>
<td>163.9 MPH</td>
</tr>
<tr>
<td>6th</td>
<td>179.6 MPH</td>
</tr>
</tbody>
</table>

Table 5: ZX9R Potential Speeds
From the tables above, it is clear that both motorcycles are capable of attaining or exceeding the speed limit of any road in the United States while **in first gear**.

### Bungee Cord

Sometimes called “shock cords”, these are general purpose elastic restraining devices with metal or plastic hooks on their ends. They are used to secure luggage or small items to your motorcycle to prevent their falling off while traveling. Table 6: GSX-R600 Potential Speeds They are very popular because the hooks eliminate the need to tie and untie these restraints. They can be very dangerous if they break (usually the result of being cut, not stretched too tightly) or if they manage to get entangled in your wheel or rear drive train. The most common injury to a rider is severe bruising, but the loss of an eye is not unheard of.

### Cage

Just about any vehicle with more than three wheels. A Porsche 911sc, a Yugo, and a Jeep Wagoneer are all cages, as are pickup trucks. “Cager” refers to the driver.

### California Stop

Phrase often used by motorcyclists meaning to stop, typically at an intersection, without putting a foot down.

While probably legal virtually everywhere in the United States, some police officers will write you a citation for “failure to make a complete stop” if they observe that you do not put at least one foot down at an intersection. Furthermore, if you try a California Stop while taking a motorcycle riding test to obtain a motorcycle endorsement, at least in Texas you will fail.

Though this term is often used as described above, it may be more accurate when used to describe an intersection “stop” that is not actually a stop.

That is, if the bike is brought to very nearly a stop, then accelerated through an intersection, regardless of whether or not a foot is used to touch the ground, that is a “California Stop” and is illegal virtually everywhere in the United States.

See “Track Stand” to see a similar phrase used by bicyclists.

### Canyon Carving

A euphemism that means to aggressively ride on twisty roads to experience the unique thrill provided all single-track vehicles riders–leaning the bike at speed.

### Camber Thrust

When your bike is traveling in other than a straight line, it is leaned over. That changes the location of the contact patch from the middle of the tire to the side.

![Figure 48: Camber Thrust](image)

Because the tire profile is a curve, the distance from the inner and outer edges of that new contact patch to the center of the wheel axle is different. It is that difference that causes the tire to generate what is called a “camber thrust”—meaning an attempt to make the bike turn a tighter radius than it is currently traveling. (The outer edge of the contact patch is traveling faster than is the inner edge.)

### Case Guards

See “Engine Guards”.

### Center of Gravity

Usually referred to with the abbreviation “CG”, this is actually the location of the center of mass of an object. If the...
object were to be suspended from that point, it would have no tendency to pitch, roll, or yaw.

**Center-stand**

Some motorcycles have this stand, some do not.

On motorcycles that have this item, it is located along the frame of the motorcycle and when lowered, it generally raises the rear motorcycle tire off of the ground for maintenance purposes.

The center-stand should not be used during windy conditions or when the bike is covered, as the motorcycle is not as stable on the center-stand as it is on the side-stand.

**Centrifugal force**

A reactive force responding to Centripetal force. It is an inertial force sometimes called a “fictitious” force in that it feels like it pushes a mass outward from the center of rotation, but an inertial force (momentum) actually tries to maintain a direction of travel.

**Centripetal force**

A force that pushes a mass along a curved path. This force is always orthogonal to the instantaneous direction of travel, toward the center of rotation.

**Chicken Strips**

Chicken strips are only that part of the tire that has never been worn against the pavement. Chicken strips only appear on tires that have never been leaned over very far. Once a bike is leaned to the edge, the tire will no longer have chicken strips. A front tire may have a "chicken strip", while the rear has none, because the profiles are different, with the front requiring a bigger lean angle to wear to it edges.

**Chopper**

Usually a custom-designed motorcycle with an extended rake angle, ape-hangers, a stretched appearance, a custom paint job, custom chrome components, and often an over-sized rear tire.

Note that originally “chopper” referred to a motorcycle that had all unnecessary parts removed in order to enhance its speed capability through weight reduction, or merely to make it look “tough”.

**Chopping a Throttle**

This refers to rapidly closing, rolling off, or backing off the throttle to reduce speed. It is a phrase that seems to be unique to motorcycle usage—possibly with racing origins.

**Closing the Door**

An expression that describes what a “drag / ‘sweep’ / ‘tail gunner” in a group ride does when he recognizes that a lane is about to be lost.

Specifically, that rider will move into the lane that is about to be lost in order to prevent a vehicle from trying to pass the group so that the vehicle will not run out of lane and have to cut into the group of motorcycles.

**Coefficient of Friction (μ)**

The ratio of the tangential force (F)(driving, centrifugal, or braking) required to produce sliding divided by the Normal force between the surfaces (N) (weight) That is, $\mu = F/N$.

Static or Rolling Coefficient of Friction is when the two solid objects are not sliding, while Dynamic or Sliding Coefficient of Friction is when they are already sliding. The Dynamic or Sliding Coefficient of Friction is almost always lower than the Static or Rolling Coefficient of Friction, often by about 25%.

**Colors**

A vest or jacket with insignia on it that identified the rider as being affiliated with a particular organization.

Alternatively, flying your “colors” refers to the display of a flag on your motorcycle.

**Contact patch**

That part of a tire which is touching the ground. This is the only part of a tire that is flat and exists only because of gravity. The contact patch provides traction to keep your tire from skidding or sliding.

**Cool Collar**

A wrap for use around the neck used to provide significant cooling to a rider in very hot weather. The wrap is a cloth tube that either contains a bead-like material that swells when moistened and dries slowly, or contains an inner plastic tube which, in turn, contains ice and/or ice water.
Whichever design the cool collar takes, it works as a result of evaporation of the contained moisture.

**Counter-steering**

The **only** way a single track vehicle, like a motorcycle, can be directed to change its direction of travel when it is traveling at speeds faster than a person can run.

Counter-steering usually involves pressing forward on the handlebar grip on the side you wish to turn toward. Often described as “Push Right, Go Right” or “Push Left, Go Left”. However, by merely shifting your weight on the motorcycle (“body-steering”) you can cause small amounts of counter-steering to occur. Weight shifting to change the direction of travel of a motorcycle is imprecise and results in usually only slight amounts of direction change, whereas use of forward pressure on the handlebar grips is highly efficient and can cause any amount of direction change with little effort.

At slower speeds, you must use direct-steering, wherein you turn the handlebar in the direction you wish to go.

There is no choice in how you steer. Depending on your speed and the geometry of the front-end of your motorcycle, physics determines whether you use direct-steering or counter-steering.

**Crash Bars**

See “Engine Guards”.

**Crotch Rocket**

A sport bike. They are fast, agile and powerful, which makes it easy for a rider to get in over his or her head. Hence the “rocket.’

These bikes have a relatively short wheelbase as compared to the height of their Center of Gravity so that weight transfer during braking and acceleration is significant.

**Cruise Control**

An electronic version of the simpler mechanical device known as a “throttle lock” which is used to automatically maintain a rider’s speed. These are located on or near the right grip and provide the ability to lock in a particular speed, increase or decrease that speed, and disengage (turn off) the feature.

Note that application of any brake also automatically disengages your cruise control—which, because mechanical versions do not do that, is the single most important deficiency of a “throttle lock”.

**Note also that it is dangerous to use your cruise control when riding on wet pavement.**

**Deceleration Rate**

See g’s.

**Decreasing Radius Turn**

A turn in which the rider is required to use an increasing steering angle, or decreasing speed, as he progresses through it.

A decreasing radius turn is dangerous. Such a turn that does not have a decreasing radius is even more dangerous, because it is not obvious. Only a literalist should think that a “decreasing radius curve” necessarily involves a decreasing radius.

The problem with a decreasing radius turn is that you can find yourself going too fast to exit it safely, even though you were not going too fast for the first part of the curve. Unlike a constant radius turn, there is no one smooth line through this kind of curve which has a single apex to it that allows you to pick a single stable speed through it and maintain the same lean angle.

Three scenarios individually or if combined result in a curve that must be treated as if it is decreasing radius:

1. The early part of the curve provides a more positive camber (leans inward) than does the latter part of the curve;
2. There is a rising elevation in the early part of the curve and a falling elevation towards its end; and
3. The traction in the early part of the curve is better than towards the end.

Though each of the curves described above has a constant radius, they must be treated in the same way as a decreasing radius curve in order to negotiate them safely.

What this should tell you is that on any unfamiliar road, you should avoid trying to take the curves as fast as they look to be. Further, always plan to exit a curve some distance away
from its outside edge, so that you have some ability to “overshoot” your line when the unexpected happens.

**Delta-V**

This stands for “change in velocity”, otherwise known as acceleration.

Note that velocity is speed in a particular direction; it is not simply speed.

Thus, if you change speed or you change direction, you are creating a Delta-V. You are accelerating. Why is that important to know? Because acceleration consumes traction.

**Direct-Steering**

The only way a single-track vehicle, like a motorcycle, can be directed to change its direction of travel when it is traveling at slow speeds (slower than a person can run). It involves turning the handlebar in the direction you wish to go. Even “body-steering” is direct-steering at slow speeds.

At higher speeds the only way a single track vehicle, like a motorcycle, can be directed to change its direction of travel is by using counter-steering wherein you press forward on the handlebar grip on the side you wish to turn toward. (Often described as “Push Right, Go Right” or “Push Left, Go Left”.)

There is no choice in how you steer. Depending on your speed and the geometry of the front-end of your motorcycle, physics determines whether you use direct-steering or counter-steering.

**Do-Rag/Skull Cap**

Do-rags are cloth coverings used to cover the rider's hair and forehead in an effort to keep sweat from dripping into the eyes and to avoid “helmet hair” (sweat or static caused disarray).

For those riders who prefer not to wear a helmet, these are de rigueur. Do-rags are tied to the head. They can be worn under a helmet as well and, like skull caps, provide modest improvements in comfort while doing so.

Far more importantly, they provide a measure of sanitation improvement—especially when wearing someone else's helmet or a loaner helmet at a training center, because they can be washed after use.

Skull caps usually are smaller than do-rags and do not cover any part of the forehead. These are specifically used with a helmet and cannot be worn without a helmet as they are not tied to the head.

**Drag / Sweep/ Tail Gunner**

Each of these refers to the last rider in a group of motorcycles.

This rider is typically responsible for acquiring a new lane when the group changes lanes, rendering assistance to any rider who must leave the group, assessing the skill level of new riders to the group, and communications with the lead bike rider about traffic conditions behind the group. This rider is often the “safety officer” for that group.

This rider is specifically selected for the position by the lead rider of the group (usually called the Road Captain) and has authority within the group second only to the lead rider.

**Dresser**

A touring bike, or a standard or cruiser motorcycle which has been enhanced through add-ons to make it more comfortable for longer rides. Add-ons that result in a motorcycle being considered a dresser include windscreen, backrest, good-time radio, CB radio, and saddlebags. After attaching these add-ons to a motorcycle, that bike is said to be “fully dressed” (or a “dresser”).

**Drive / Front Sprocket**

The chain is driven by a toothed gear, called a drive sprocket, and the chain, in turn, drives a wheel (or driven) sprocket.

The drive sprocket is the smaller of the two sprockets and is often called the front sprocket, while the larger driven sprocket is often called the rear sprocket and is attached to the rear wheel hub.

**Duck-Walking**

The process of moving your motorcycle while straddling the saddle, using your legs for power instead of the engine.

**Dumping a Bike**

Similar to a “low-side”, but not the result of loss of traction and occurring, usually, at a speed of zero MPH. A bike is dumped when the rider applies brakes while in a very slow
turn, or is trying to get his bike up onto (or off) its centerstand, or is walking the bike and it gets away from him, or forgets to put the side-stand down and tries to get off the bike, or any of dozens of other “dumb” things that lead to losing control of the bike and its falling over onto the ground.

Note that when someone says he “laid it down,”' he is not talking about dumping his bike—instead, he is most likely saving face by trying to explain what happened when he locked his rear brake.

Dyno / Dynamometer

An instrument used to measure and document power. In particular, these devices may be found at some motorcycle dealerships and are used to determine the performance characteristics of individual motorcycles.

The fundamental output of a dyno run is a graph which shows engine torque and horsepower throughout its rpm range and, sometimes, a chart showing potential land speeds that the motorcycle can attain (discounting wind resistance) in each of its transmission gears.

Edge Traps

Any uneven roadway surface that can “capture” your tire when you attempt to cross over it, causing you to lose control of your motorcycle and end up eating asphalt.

Any surface that is at least one inch higher than the roadway you are riding on can trap your tires. This difference in height is not always between lanes.

For example, a curb is an edge trap. (If your tires are placed against a curb, you cannot simply drive away without leaning the bike substantially and duck-walking it.)

If you must cross over an edge trap, do so with as large an attack angle as possible. Turn away from the edge, and then turn toward it before crossing over.

EFI

An acronym: Electronic Fuel Injection.

Refers to a computer controlled fuel injection system that replaces carburetors in order to manage fuel/air mixtures with precision. An EFI eliminates the need for the choke on a motorcycle as well as its carburetors.

Engine Guards

Also called “Case Guards” or “Crash Bars”. A set of sturdy tubular bars, (usually chromed, and often with highway pegs) designed to protect the engine if the motorcycle falls over. They offer minimal protection to the rider during an accident, but may prevent broken cooling fins or scratched cases if the kickstand sinks into soft asphalt and the cycle topples.

Engine guards protect the bike. Leathers protect your legs.

ERC

An acronym: Experienced Rider Course.

Second-level motorcycle training hosted by the MSF. In this class you use your own motorcycle, as one is not provided.

You are expected to have had at least six months of riding experience on your motorcycle before taking this class.

Fairing

A plastic cowling affixed to the front of a motorcycle. These are designed to improve the aerodynamics of the bike, and provide the rider more comfort by shielding him or her from wind buffeting. A fairing usually includes a clear windsheen.

Fairings are either mounted directly to the frame of the motorcycle or to its front fork assembly.

In the latter case the fairing turns with the handlebar while the former design remains rigidly in place regardless of handlebar movement. Naturally, fairings attached to the front forks result in more wind affected steering input than those that are frame mounted.

The interior surface of many fairings, as it faces the rider, often performs the same function as a car's dashboard in that instrumentation, radios, travel computers, speakers, etc. are mounted there. This is particularly true of “dressers”.

Family

A group of riders is known as a “family” instead of a “herd” or a “flock.” When that group of riders which has been temporarily separated regroups, it is normal for the drag bike rider to announce that fact via his CB to the lead rider by saying: "We're family."
**Final Drive**

The mechanical components which transfer power from a motorcycle’s transmission to its rear wheel.

The most common final drive consists of a chain and sprockets. Some motorcycles employ a drive shaft similar to a rear wheel drive car’s. Newer Harley-Davidson and Boss Hoss motorcycles use a reinforced rubber belt and sprockets.

**Floorboards**

Used instead of pegs on many cruisers and touring motorcycles, these are pivoting plates upon which you flatfoot as you ride. Because floorboards make it almost impossible to get under a gear shift lever in order to up-shift, bikes that are equipped with floorboards are usually also equipped with heel-toe shifters.

**Foot**

A flat rock, wood, plastic, or metal object placed between the side-stand and hot asphalt.

When temperatures exceed about 90 degrees, it is dangerous to leave a bike on asphalt with only a side-stand holding it up. The surface area of the side-stand is so small that as the asphalt warms up the side-stand will sink into it and the bike will fall over on its side. So, if you are going to park on asphalt on a hot day you should put a foot under that side-stand.

If you are not carrying a foot with you, it is easy enough to make one by crushing an empty soda can.

**Force**

Any influence that causes a free body to change speed, direction of travel, or shape. A force has both magnitude and direction; thus it is a vector quantity.

Newton’s second law can be expressed as \( F = ma \) where “\( F \)” is Force, “\( m \)” is mass and “\( a \)” is acceleration. That demonstrates that weight is a force.

**Forward Controls**

When the gear shift lever and rear-brake pedal are in front of a vertical line from your knees, they are referred to as forward controls. Their position makes it virtually impossible to stand on the foot pegs.

**Friction Zone**

That part of the clutch lever travel from where the clutch just starts to engage until it is fully engaged.

**g’s**

The acceleration rate at which an object will fall if it’s in a vacuum and close to the earth. Gravity is an acceleration. Objects close to the earth in a vacuum will increase their speed at the rate of 32.17 feet per second every second.

This rate is sometimes described as “feet per second per second” or “feet per second squared”, and it is usually expressed as an abbreviated and rounded number: 32.2 ft/sec^2.

Any other acceleration or deceleration rate can be specified as a percentage of gravity.

Thus, for example, a deceleration rate of 0.8g’s means that an object is slowing down at 80% of the rate of gravity. Since gravity (or “\( g \)” is 32.17 ft/sec^2, this object is decelerating at a rate of 25.74 ft/sec^2. (That’s 17.55 MPH per second.)

**GPS**

An acronym: Global Positioning System.

A satellite oriented system, including computers and receivers, which provides for the determination of a very precise location (latitude, longitude and height) of an object.

Over time, if the device being tracked is moving, the system also provides for the determination of precise speed and direction of travel.

More and more touring motorcycles are being built with a GPS navigation system being built-in and add-on devices are available for any other motorcycle.

These navigation systems provide color graphic screen presentations of street maps and both planned as well as actual travel itineraries. Some can even announce turns that are to be made in order to follow a planned itinerary.

**Gravity**

An acceleration that, near the earth, attempts to increase the speed of a falling object in a vacuum by 32.2 feet per second per second.
Group Riding Prime Directive

Never hit the bike in front of you.

GWRRA

An acronym: Gold Wing Road Riders Association.

An international association of Honda Gold Wing owners.

Hack

A relatively ancient term designating a motorcycle’s sidecar.

Sometimes, a motorcycle that has a sidecar is improperly called a “hack” as opposed to a “rig”.

Note that a motorcycle that has been converted into a trike by replacing its rear-end with the two-wheeled rear-end from a car is not known as a hack.

Handlebar

Generally, a tubular piece of pipe, coming in various lengths and angles to which the hand grips, clutch and front-brake levers, hydraulic master cylinder, mirrors, turn signal, headlight, and engine kill switch controls are attached.

The handlebar attaches to the top of the triple-tree.

It is sometimes described as the sixth control on a motorcycle, because it’s what is used to change the bike’s direction of travel.

Hanging off

Phrase used to describe the cornering technique used by a motorcyclist who races through a curve at high speed in which he positions his body to the extreme inside of and below the normal riding position.

This decreases the bike’s lean angle and allows higher speeds through the curve.

No public roads in the United States require a rider to hang off his bike if that rider is traveling at legal speeds.

In other words, if you see a rider hanging off on public roads, he is attempting to break the law on public roads. Used on a race track, this is the only way to maximize speed through a turn. When used on public roads, this is a sure indication of a squid pretending to be a racer.

Heel-toe Shifter

Instead of a normal gear shift lever, bikes equipped with floorboards are usually also equipped with a heel-toe shifter.

Down-shifting is accomplished by pressing down on the forward lever with the toe of your foot, while up-shifting is accomplished by pressing down on the rearward lever with the heel of your foot.

Helmet Hair

The condition of your hair after you remove your helmet.

It will be partially matted and partially sticking out at odd angles. Sweat has had its way with you.

High-side

When a motorcycle rider gets launched into the air and over the bike instead of simply falling down alongside a falling bike (see low-side). The motorcycle will almost always be thrown into the air following that rider and may fall on him.

This usually happens as a result of losing traction on the rear tire, then suddenly regaining it after the rear of the motorcycle has slid sideways a meaningful distance.

If there is only a momentary loss of rear-wheel traction, or the rear-end of the bike has not slid meaningfully to the side before traction is regained, loss of control of the bike usually does not occur and the rider is not tossed off the bike.

Highway Boards / Highway Pegs

A second set of foot pegs to use for stretching his or her legs. The pegs are usually well forward of the normal operator’s pegs, and thus not a good place for one’s feet when dealing with traffic or in demanding riding conditions. They are intended to serve as a way to stretch the legs when out on the open road—hence the name “highway” pegs.

HOG

An acronym: Harley Owners Group. Also, H.O.G.

A manufacturer-backed organization with some 1,300 chapters around the world. Chapters are usually associated with a Harley-Davidson dealership.

Many other brands have similar organizations.
**HP / Horsepower**

A unit of power. US standard HP is equal to 33,000 foot-pounds per minute.

**Hydroplane**

When a tire is lifted off the surface of a roadway by a body of water such that all traction is lost.

Hydroplaning occurs when the depth of water is ¼ inch or greater and the tire is moving at speeds of about 50 MPH or greater. Tire tread is supposed to be designed to shed water from in front of a tire, away from the center of the tire, in an effort to reduce the risk of hydroplaning. But the tread patterns on the front tire of contemporary motorcycles no longer seem designed to do this.

Speed, weight per square inch on the tire’s contact patch, width of the tire, depth of the water, and tread design are all factors in determining if hydroplaning will occur.

The higher the air pressure, the narrower a tire becomes, and the more weight per square inch of contact patch. Thus, a practical anti-hydroplaning strategy on your part is to insure that the air pressure in your tires is near the maximum rating printed on the sidewall of the tire.

**Integrated / Linked Braking**

When the front and rear brakes of a motorcycle are not individually and uniquely activated by only one control. For example, when applying the rear-brake pedal causes full activation of the rear brake along with partial activation of the front brake; or when applying the front-brake lever causes full activation of the front brake and partial activation of the rear brake.

**Iron Butt Ride**

A ride encompassing 1,000 miles to be completed within 24 hours in an event sanctioned by the Iron Butt Association. The IBA is a US-based organization dedicated to safe, long-distance, endurance motorcycle riding with over 20,000 members world-wide.

The concepts of “safe”, “long-distance”, and “endurance” are mutually exclusive in the eyes of many experienced riders and some state legislatures, which have outlawed them on public roads in their state as illegal tests of endurance.

**Kickstand**

See “Side-stand”.

**Kinetic Energy**

The energy possessed by an object resulting from its motion.

Energy cannot be destroyed, but it does change form. The energy contained in gasoline changes into heat energy when it is burned, for example. The energy used to change your bike’s speed from zero to 60 MPH becomes your bike’s kinetic energy at that speed. Exactly the same amount of energy is changed to some other form (usually heat) when you reduce your bike’s speed from 60 MPH to zero.

Of particular note is that kinetic energy increases at the square of an object’s change of speed.

Thus, doubling your bike’s speed from 30 MPH to 60 MPH results in a quadrupling of its kinetic energy. That is why it takes four times as much distance to stop from 60 MPH as it does to stop from 30 MPH.

\[ E_k = \frac{1}{2}mv^2 \]

**Laid it down**

This is how some riders describe what has happened as a result of locking the rear wheel of a bike with excessive braking, whereupon it yawed out from under him resulting in a low-side. In other words, it’s an excuse designed to save face. (That’s what helmets do.)

**Lane-splitting**

The act of riding between the lanes of a roadway, typically faster than surrounding traffic.

In several countries this is perfectly legal riding (often called “filtering”) while in the United States it is illegal in all states other than California where it is not illegal if done in a safe manner.

**Late Apex**

One of various terms used to describe a path through a curve that is not simply “the smoothest”.

While “late apex” is a popular term, “delayed start” seems more appropriate.
Late apexing has several advantages:

- You are less likely to run wide.
- You have better visibility into the corner.
- There’s more margin for error if you make a mistake, for example if the corner turns out to have a decreasing radius.

To determine whether your apexes are too early you should be able to unwind the steering and add throttle at the apex and beyond. If you can’t add throttle or you still have to add more counter-steering after the apex, you’ve turned too early for the corner.

**Leathers**

Collectively, the various pieces of leather apparel a rider wears for protection. May include chaps, jackets, and pants. While the most obvious advantage of leathers is preventing road rash, another key function is to minimize the effects of bugs and debris. Leathers may be custom tailored, or "off the rack." They may also have additional armor in critical locations such as over the spine. They’re part of what is referred to as ATGATT.

**LEO**

An acronym: Law Enforcement Officer.

Might be a state trooper, provincial police officer, local police officer, or a representative of some other jurisdiction.

**Low-side**

When a motorcycle falls down because of insufficient speed while in a turn or because it loses traction—indeed, for any reason at all—and the motorcyclist falls along with the bike. This is far less dangerous than a “high-side” where the rider is launched into the air over the bike. Note that even if a “fall down” starts as a "low-side", if before the rider exits the bike some portion of that bike “hooks up” or “catches” the ground while sliding, it can become a high-side. This is the reason you must leave the bike when or before it hits the ground. “Holding on” or “riding the tank” when a bike falls down is good advice only in science fiction movies.

**Maxi-scooter**

Though most scooters are used for practical surface-street commuter vehicles, they are insufficiently powered for usage on highways and freeways. Larger engined scooters (those with engines of 500cc’s or larger) are quite adequate for sustained highway riding and are called Maxi-scooters.

**MIC**

An acronym: Motorcycle Industry Council.

This is a not-for-profit (501 (c)(6) (industry trade group) organization which is the principal lobbying arm for the manufacturers and distributors of the motorcycle industry.

**MOM**


‘Ask MOM” means, look in the manual–unless your mother owns the scoot, and you need her permission to use it.

**Momentum**

Represented by the symbol \( p \), is an inertial characteristic of a moving mass that attempts to keep that mass moving at the same speed and direction; that is, it opposes any drag forces. Momentum is calculated as the product of mass and velocity \( (p = mv) \).

Momentum is always calculated from the observer’s point of view.

For example, an 800-pound motorcycle traveling due north at 50 MPH has a momentum of 40,000 lbs. MPH traveling due north from an observer standing on the ground, but it has a velocity and momentum of zero from the rider’s perspective.

Note how similar momentum is to force. Indeed, Aristotle claimed that \( F = mv \) before Newton showed that \( F = ma \).

**MSF**

An acronym: Motorcycle Safety Foundation.

The Motorcycle Safety Foundation is a national, not-for-profit organization formed in 1973 and “sponsored” by the U.S. manufacturers and distributors of BMW, Ducati, Harley-Davidson, Honda, Kawasaki, KTM, Piaggio/Vespa, Suzuki, Triumph, Victory, and Yamaha motorcycles. While many think that this is a 501 (c)(3) not-for-profit organization, it is not. The 501 (c)(3) definition is reserved for education and charitable organizations.
Instead, the MSF is a 501 (c)(6) non-profit which is specifically a trade group organization whose sole purpose is to promote the well-being of the group’s members, not the safety of students.

Its goal is often thought to be to promote safe motorcycle operation in the U.S. Instead, its goal is essentially only to promote the business interests (motorcycle sales) of its “sponsors” (read: Owners).

Other countries may have their own version of MSF.

**Newbie / Newby / Noob**

Usually, anyone who’s just started riding motorcycles. Newbie can also apply to a state of mind that may linger for quite some time.

A person may consider himself / herself a newbie, even though he or she has been riding for years. Newbies are (hopefully) building skill and confidence. A smart newbie knows his / her limits.

**Offset**

When referring to your motorcycle’s front-end geometry, this is the distance between a line through the center of your steering stem and a similarly angled line drawn through the front wheel hub.

The offset is primarily determined by the width of your triple-tree but can also be affected by how your forks attach to the hub of your front wheel.

Offset is designed to produce the desired Trail in cooperation with the Rake Angle and diameter of your front wheel.

**Orthogonal**

Perpendicular. This term is especially used when discussing forces and vectors.

**Out-tracking**

When in a turn, your front wheel is instantaneously traveling in one direction while it is actually pointing toward the outside (relative to the curve) of that direction.

This results because of the “restoring force”, in a slight torque of the steering stem toward the inside of that turn. In other words, it is the bike’s way of trying to align the direction its front wheel points and its actual instantaneous direction of travel.

The result is that your bike attempts to go in a straight line; and you must, in almost all cases, maintain counter-steering pressure on the inside grip in order to continue along your chosen path.

![Figure 49: Out-Tracking in a turn](image)

**PDR**

An acronym: Perception, Decision, Reaction.

This is the amount of time a person takes to perceive a threat, then decide what to do about it, and then actually react to a threat.

It has been shown that 70% of all drivers have a PDR of 1.6 seconds or less when confronted with an unexpected threat, such as if the car ahead of them slams on their brakes.

It has also been shown that when the threat is expected—like when a rider sees a green light turning yellow—PDR times are at least one full second shorter.

Motorcyclists have PDR times slightly faster than automobile drivers, because it takes less time to react (move fingers to the front-brake lever instead of foot to brake pedal)

By simply covering the front-brake lever, PDR time is further reduced by a tenth of a second.
**Pillion**

This is a passenger “seat” on a motorcycle—usually just an extension of the rider’s seat—and is located directly over the rear wheel axle of the bike.

Sometimes, improperly, a motorcycle passenger is referred to as a pillion.

Unless there is a backrest or “sissy bar” on the pillion, it should not be used to carry a passenger! Instead of being a “seat”, these pillions are merely soft platforms for carrying strapped on luggage.

**PLP**

An acronym: Parking Lot Practice.

Practice in performance of slow-speed maneuvers.

**PM**

An acronym: Preventative Maintenance.

Refers to doing work on the bike (such as changing its oil) before wear or damage occurs.

**PMS**

An acronym: Parked Motorcycle Syndrome.

Refers to a certain anxiety caused, typically, by an extended period of poor weather such as winter in many parts of the country.

**Poker Run**

This is a traditional motorcycle event used to raise money for charity (usually). These are legal in most states but may not be in Texas.

The event starts at a registration table and usually involves a fee to participate.

The winner of the event is usually awarded 50% of the collected fees while the other half of those fees is donated to a charity (or used to support the sponsoring organization).

At the registration desk you are provided a map of the event course. On that map are designated stopping points at which you will receive a playing card (that you randomly draw). There will be five stopping points along the way so that you will, if you complete the course, have a poker hand. A frequent alternative to this methodology involves getting buttons or other unique items at each stop and then trading these items for cards drawn at the conclusion of the ride.

At the end of the ride, riders go back to the registration desk and either present a poker hand or trade the items acquired on the ride for cards to form a poker hand. Then, depending on the group’s rules, you may be able to throw away one or two cards and draw replacements (for an additional fee, of course).

Finally, your poker hand is recorded along with those of all others who have completed the run. When the event is over, the winning hand will be announced and presented with part of the collected fees, usually half.

**Poseur**

A pretend biker.

For someone who is into image, not riding, it is far cheaper to buy the clothes and maintain the look than to buy the bike and ride it.

**Precession**

All spinning objects evidence this phenomenon, a term usually referring to a spinning wheel.

When a torque is applied to a spinning wheel, such as when you change directions of travel, precession tries to lean that wheel in a perpendicular direction relative to that torque.

For example, turning a moving motorcycle to the right results in the front wheel of the motorcycle trying to lean to the left, in part, as a result of precession.

Precession accounts for only about 1/10th of the force trying to lean the front wheel.

It is often, though incorrectly, assumed that “gyroscopic” precession accounts for a motorcycle’s lean during its turns.

In fact, precession only provides one of the reasons that counter-steering is essentially effortless and smooth. (Out-tracking and centrifugal force causes the lean.)

Tests have been performed on motorcycles where the front wheel was replaced with a ski. Counter-steering remained in effect.
**Primary Drive**

This is the mechanism that transfers power from the engine to the transmission via its clutch.

**PTT**

An acronym: Push To Talk.

Refers to the button or switch lever used to activate the microphone and transmitter functions of a CB or HAM radio.

**Rake Angle**

The angle formed by your front forks relative to vertical. A typical Rake Angle is 30 degrees. The Rake Angle determines how efficient your steering is. A small angle makes for “quick steering” (sometimes called “twitchy”) while a larger angle makes for “slow steering”.

Another aspect of Rake Angle is that it is a fundamental component in determining Trail.

**Redline**

Refers to the start of a red area marked on a tachometer which designates an engine rpm speed beyond which the engine will begin to lose power—and ultimately self-destruct if the engine is allowed to run even faster or for a prolonged period of time.

**Restoring Force**

This is the force that is created as a result of how long the Trail of your front-end geometry is, the speed you are traveling, and the weight being carried by your front tire.

The Restoring Force tries to keep your front wheel pointing in the same direction as that pointed to by the body of your motorcycle. In other words, if you are in a turn, it is the restoring force that tries to correct your steering input and cause the bike to quit the turn.

This is not an academic idea! It is why, if you remove your hands from your handlebar, the bike will try to find a way to drive in a straight line with a vertical posture.

NOTE: There are times when your bike's front-end will generate a **negative restoring force**! (Especially when surmounting an obstacle or bump in the road.) In that case the force generated will try to cause any out-of-straight alignment to accentuate! The result, bikes being dumped when crossing railroad tracks.

**Road Rash**

What happens when exposed skin meets pavement. This is the reason to wear all the gear, all the time. Skin can be worn off all the way down to bone.

**Roll On / Roll Off the throttle**

Change the engine speed by turning the throttle. It helps to be specific: roll on the throttle means “give it more gas” while roll off the throttle means “reduce engine speed”.

**Scoot**

Slang for a motorcycle or motor scooter.

**Scooter / Motor Scooter**

Like a motorcycle, this is a two-wheeled, motor-driven, cycle which has two unique characteristics: an engine that’s attached directly to the rear wheel (being an integral part of the swing arm assembly), and smaller diameter wheels. By not having the engine attached to the frame, a scooter requires far fewer parts to convey engine power to the rear wheel. Thus, it’s typically much lighter than a typical motorcycle. The engine placement on a scooter frees up a great deal of space under the rider’s seat which becomes cargo space.

Most scooters, though not all, employ an automatic transmission so that there’s no need for a clutch lever. Instead, on the left grip is a brake lever. By standard, it controls the rear brake, while the right lever continues to control the front brake. (Some scooters reverse this configuration.) Thus modern scooters no longer use a rear-brake pedal. Because of this, all scooters manufactured in the U.S. must have applied for and received a waiver of design regulations which stipulate that the right foot must be provided a rear-brake pedal.

Most scooters are used as very practical surface-street commuter vehicles. They tend not to be adequately powered for use on major highways. Scooters with larger engines (typically 500cc’s or bigger) are called Maxi-scooters and are capable of sustained highway usage.
Short-legging

Refers to the situation where a rider attempts to put down a foot on pavement or solid ground when stopping a motorcycle but finds that no pavement exists where it was expected.

For example, if you stop near a puddle of water and put a foot down into it, you may short-leg if your foot doesn't stop where you thought it would, because the ground is farther away below the water's surface than you expected. This causes your bike to lean over farther in that direction, as if your leg were actually “shorter” on that side than you thought. A rider can also short-leg a bike on an unexpected slope or drop-off, such as a ditch concealed by trash or leaves.

Side-stand

Used on all street-legal motorcycles to hold the bike securely in a modest lean to the left whenever there is not a rider on it. These are sometimes called “kickstands” or “jiffy stands”.

Sissy Bar

Any vertical extension at the rear of a motorcycle, usually padded and shaped like a backrest, that helps keep the passenger from falling off the rear-end of that motorcycle.

Skid

When a tire loses traction (usually because of excessive brake usage) and the tire is dragged by the bike forward in a straight line—thus wearing off rubber and leaving a skid mark. A slide, on the other hand, is when a tire moves to either side instead of straight ahead.

Slab / Super-Slab

Multi-lane, divided highway, usually featuring limited access via merging ramps. Other names include: freeway, tollway, turnpike, autobahn, or expressway.

Slabs usually have high speed, high density traffic, with many drivers intent on getting somewhere in a hurry.

Slide

Similar to a skid, but refers to a tire that has lost traction, typically in a curve, and is moving laterally (to the side) rather than in-line with the body of the bike. A tire can skid and slide at the same time.

A slide does not necessarily result from excessive brake usage, though it certainly can. More often, however, a slide is the result of encountering a low traction roadway surface (such as sand or wet leaves) or excessive acceleration.

Slip Angle

The angular difference between the direction the contact is pointing and that of the wheel itself is called its slip angle. The contact patch is always pointing in the direction of actual travel.

Slow Ride

A common on-bike competition, often seen at rallies or safety events.

The riders compete by riding their own bikes down a designated straight line, while being timed. The rider who takes the longest time to complete the course wins. Any rider who puts a foot down during the event, or who rides outside the course, is eliminated.

Extremely good riders can be seen at such events beginning their leg of the competition by riding down the course, then stopping mid-course without putting a foot down. They will rest like that long enough for all the other riders to finish the race, then come in last and win.

A version of the "slow ride" may also be included in some safety classes or in parking lot practice, to enhance a rider's balance and slow-speed control.

Smoky / Smokey

A slang term for a law enforcement officer (LEO). It's derived from the cartoon character "Smokey the Bear," who is used to represent fire dangers. The character wears a hat that is similar to the hat worn by many LEOs, especially state troopers.

In a group ride, the hand signal for a "smokey" is a series of repeated taps on the top of the helmet from the lead rider.

This can suggest that the group is going to slow down, but it can also mean that the group should anticipate a lane change.
In Texas and many other jurisdictions, when an LEO has pulled a vehicle over on the side of the road, the traffic passing by is required either to change lanes to reduce the danger to the officer from passing traffic; or to reduce speed.

In Texas, the law states a driver must either vacate the lane closest to the stopped emergency vehicle, if the road has multiple lanes traveling in the same direction, or else slow down 20 miles per hour below the speed limit. (If the speed limit is below 25 MPH, the driver must slow down to 5 MPH.)

Note that this means dropping your speed not to 20 MPH below the speed you were going when you spotted the smokey at the side of the road or next to your lane, but 20 MPH below the posted limit.

**Sprocket**

A gear specifically designed with teeth made to engage chain links or belt cogs.

See “Drive Sprocket”.

**Squeezing Both Levers**

This is the act of pulling in on both the clutch and brake levers in a rapid and controlled manner. It is the desired automatic “panic reaction”, especially for newbies, whenever a rider finds that the bike he or she is riding is out of control. It may not “save” a bad situation in all cases, but is far preferable to freezing at the controls, which is what most new riders tend to do.

Note that the word “squeezing” is significant! “Grabbing a handful” of the brake lever is specifically inappropriate—ever—as it implies extremely aggressive behavior which can result in worsening an already bad situation.

New riders are advised that if they do not know what else to do, or are faced with making too many decisions for them to handle immediately, “Squeeze both Levers” should become their automatic and immediate response.

**Squid**

A motorcyclist who does absurdly unsafe things including (but not limited to) weaving in and out of traffic, speeding, pulling wheelies or stoppies, passing in places where visibility is limited, or hanging off while riding curves on public roadways.

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**Stoppie**

Bringing a motorcycle’s rear wheel off the ground as a result of hard braking.

![Figure 50: Stoppie](image)

**Stroke**

When talking about an engine, stroke refers to the distance its pistons travel within a cylinder. An engine’s bore and stroke define the engine’s displacement.

**Sweep / Drag / Tail Gunner**

See Drag/Sweep/Tail Gunner

**Swing Arm**

This is the part on (most) motorcycles that the rear tire (and many times the shocks, brakes etc.) are mounted to. It connects these components to the frame of the motorcycle.

This arm moves or “swings” in an up and down (or vertical) fashion, over road bumps or imperfections, hence the name.

**Tail Gunner / Drag / Sweep**

See Drag/Sweep/Tail Gunner
**Tank Slapper**

A description of what happens when a motorcycle's front-end goes unstable and results in the handlebar’s rapid and uncontrollable swinging between a full-stop right and full-stop left turn and usually ending up with a crash of the motorcycle. In many motorcycles this can actually cause dents in the gas tank - thus the name. It can happen at any speed.

This is caused by harmonic feedback that is insufficiently damped by a steering damper or loose or improperly torqued head bearings. The harmonic feedback is usually caused by roadway imperfections. Though not necessary to cause a tank slapper, a broken shock absorber or mismatched shock settings can do so.

**Target Fixation**

People tend to go where they're looking. The risk is that if a rider is looking at the grill of an on-coming semi or at the curb, he or she is likely to hit it. What's more, if one focuses his or her attention so narrowly, it’s likely there will be another threat that will appear as a rude surprise (maybe a parked car, or another corner) just a bit further up the road.

The best way to avoid target fixation is to look where you want to go. To break your attention from this condition, look not at the threat, but at the escape route.

**Throttle Lock**

A mechanical device that permits locking the position of the throttle to maintain a particular speed. These should never be used if the roadway is wet!

The electronic version of this device is called a “cruise control”.

**Threshold Braking**

This describes a rider who achieves a deceleration rate in excess of the deceleration rate resulting from skidding without locking the brake(s) on his motorcycle. It is called threshold braking because it approaches the rate at which tire slip is so great that the tire begins to skid. A close analogy would be braking a non-ABS equipped motorcycle and achieving a deceleration rate equal to or greater than what an ABS equipped motorcycle can achieve with that system actively working.

Since the maximum deceleration rate that can be achieved depends largely on the roadway material, condition of that roadway, and condition of a tire’s rubber, there is no specific deceleration rate that represents threshold braking.

If a bike’s tires and a roadway can produce a sliding (dynamic) Coefficient of Friction of 0.9, then any deceleration rate greater than 0.9g’s would properly be called threshold braking. Since on modern freeways, the rolling (static) Coefficient of Friction can be over 1.2, while on typical asphalt roads it is closer to 1.0, these represent the maximum deceleration rates achievable before skidding occurs. Very skilled riders can sometimes achieve deceleration rates from 0.1 to 0.2g’s greater than ABS equipped bikes can achieve.

**Throttle Rocker**

An attachment to the throttle that extends under the palm of the right hand and allows the rider to control the throttle (thus, speed) without having to use a firm grip with the thumb. In other words, the attachment is used to ease wrist and hand stress and diminish incidents of thumb cramps.

"Throttle Rocker” is one of many terms for this device. “Wrist Rest” is another term that means the same thing.

**Topbox/Top Box**

Cargo carrying capacity located behind the pillion—analogous to an automobile trunk—usually sufficiently large to hold one or two full-face helmets.

**Torque**

A twisting force. Torque, more properly called “moment”, causes rotational movement (called angular velocity).

In other words, torque (not horsepower) is what causes your motorcycle to accelerate by turning your rear wheel.

**Tourer**

A motorcycle specifically designed for long distance travel. Typically, these bikes have substantial “creature comfort” add-ons such as a good time radio, CB, fairing and windscreen. They always have softer seats (including pillion), luggage “bags” and a “top box”, larger gas tanks, and upright posture with pegs directly below the rider instead of “forward”.

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These bikes are larger and heavier than cruisers and as such are not nearly as comfortable or easy to handle at slow speeds or for local, short distance, rides.

**Track / Left-track / Right-track**

Refers to a logical division of a public roadway lane wherein that lane is divided into three equal parts. The left-track means the left third of the lane, while the right-track means the right third of that lane. (At approximately 30 inches wide, your handlebar is just under 1/3 of a lane wide.)

This is usually associated with group riding rules where the individual motorcycles tend to restrict their riding to either the left or right tracks, usually in a staggered formation.

Motorcycles are almost never ridden in the center of the lane because of poor traction conditions caused by accumulated oil on the roadway there.

**Trail**

When talking about the front-end of a motorcycle, this refers to the distance (on the ground) between the center of the front tire's contact patch and where on the ground the “steering stem” points.

This is the component of your motorcycle’s front-end geometry that provides steering stability.

More importantly, it causes your motorcycle to automatically try to steer in a straight line via Restoring Force.

The greater the Trail, the more stable your steering will be, the more difficult it will be to change directions, and the stronger the Restoring Force will be at any given speed.

Trail is a function of Rake Angle, Offset and the diameter of your front Wheel.

**Trike**

When a motorcycle is converted into a three-wheeled vehicle by replacing its rear-end with the two-wheeled rear-end of a car, the resulting vehicle is known as a trike.

Note that a motorcycle which has a sidecar added is **not** known as a trike.

The sidecar is often called a “hack”. Sometimes, improperly, a motorcycle with a sidecar is called a “hack”.

**Triple-tree**

The part of the motorcycle’s front-end that connects the two forks and the steering stem to the motorcycle frame.

**Vernier**

A secondary adjustment device providing the ability to perform “fine tuning”.

**Wear Indicator**

For tires, a wear indicator is cast as part of the tire. It is a small narrow "bar" which usually goes across the tread.

When the tire tread wears to a point in which this "bar" or wear indicator becomes visible, the tire must be replaced.

**Weight Transfer**

Upon acceleration or deceleration, weight is transferred from one wheel to the other. If you accelerate, weight is transferred from the front to the rear wheel. When braking, it’s transferred from the rear to the front wheel. The amount of weight transferred is a function of the acceleration / deceleration rate and the ratio of the wheelbase length to the height of the bike’s center of gravity.

**Wheel Traps**

See “Edge Traps”.

**Wheelie**

Bringing a motorcycle's front wheel off the ground as a result of hard acceleration.
Wobble

Annoying, and potentially dangerous vibration. Front end wobble may be caused by (among other things) an unbalanced or out of round wheel/tire, rain grooves in the pavement, unequal damping due to unequal fluid levels in the front shocks, or loose windscreen attachments. Rear end wobble may be caused by (among other things) an axle out of perpendicular to the swing arm, improperly secured or unbalanced load, or an unbalanced or out of round wheel/tire.

Also sometimes called “shimmy”.

Wrist Rest

An attachment to the throttle that extends under the palm of the right hand and allows the rider to control the throttle (thus, speed) without having to use a firm grip with the thumb and fingers.

In other words, the attachment is used to ease wrist and hand stress and diminish incidents of thumb cramps.

"Wrist rest" is one of many terms for this device. “Throttle Rocker” is another term that means the same thing.

APPENDIX A – Engine Guards

Some riders call them “crash bars”, some “case guards”, still others call them “engine guards”—but, until recently, no one “officially” has called them “leg guards” or “leg protectors”.

Most motorcyclists would not argue that they are not a good thing to have on a motorcycle, and many have added them to their motorcycles if they did not come stock.

So, it might surprise you to know the following facts:

* There is a genuine dispute in the scientific community as to whether leg guards do more harm than good.
* No government or agency has ever required them.
* No independent testing or professional organization has ever recommended them. (Until recently.)
* The motorcycle industry as a whole categorically rejects the need for leg guards.
* Honda's own testing on their use reached no definitive conclusions.

How can this be?

On May 30, 1995 in the United States Court of Appeals, Fifth Circuit, an appeal was heard in the case of James Satcher versus Honda Motor Company (No. 94-60492). In the written opinion of that court is found a summary which listed those facts.

It is an interesting read that describes a case where Satcher lost a leg in a motorcycle accident and sued Honda claiming that since Honda made the motorcycle without leg guards, they made a product that was defective and unreasonably dangerous in a crash.

Following are two paragraphs from that opinion that should cause you to wonder:

Honda presented two well-qualified experts, John Snider and Warner Riley, who opined that leg guards should not be used because their safety benefits are outweighed by their safety disadvantages, including the possibility of greater upper body injuries. For example, Riley explained that the problem with unpadded robust bars is that they can cause the cyclist to leave the motorcycle and land upside down, and that padded crash bars increase in-flight whiplash, which can result in a broken neck. They were also of the view that in this particular accident Satcher would not have benefitted from crash bars. There is a disagreement in the scientific community as to whether head impact increases when crash bars are used.

Honda itself conducted certain crash tests in the 1960's. One report concluded that at certain speeds crash bars are effective at reducing leg impact in an angled collision. However, it found that in broadside collisions "there seems to be an indication that each of the various body area impacts is greater in the case of motorcycles equipped with crash bars than in the case of those which are not," and that a commercially available crash bar "has no protective effect or it has a possible reverse effect in broadside collision[s]." This conclusion was disputed by Ezra as not supported by Honda's own experimental data. The report also noted that it was far from definitive.**fn4 A Honda chief engineer testified that "thus far we have created, tested, evaluated various experimental devices; however, we have yet to come up with a ... practical as well as effective device that would protect the leg."

So, consider the question again:
Since most riders believe that guards are not a bad idea, how is it that the facts presented to the court suggest otherwise? How could our perceptions be so wrong or misguided? Or are they?

[At this point I want to advise you that several motorcyclists have told me that their perception has always been that these guards are to protect the motorcycle, not the rider. They advise that “only non-riders” think they are any good at protecting rider or passenger.]

It’s clear to us that at least on the Gold Wings, the case guards (that wrap around the engine heads) provide very little in the way of leg protection. Motorcycles that have larger / wider guards (where you tend to mount highway pegs), therefore, must do something more. At least one thing they do is provide a measure of leg protection. Rear guards are designed to protect the bags, but they are obviously capable of providing some measure of protection to the passenger’s legs as well.

On many motorcycles none of these guards exist at all. Engine guards could easily be added that tend to protect the engine, but most riders who add them obtain guards wide enough so that if the bike is on its side, the leg is not crushed.

It is understood that none of these guards provide much in the way of leg protection in the event of an accident (at least from impact damage), but if they keep a laid down bike from crushing a leg, surely you would agree that is a good thing?

That same court case discussed “leg guards” and “crash bars” on police motorcycles:

Police crash bars are used in part to hold lights or other accessories needed on police vehicles. Their efficacy as a safety device is the subject of disagreement. Kenneth Harms, a former Miami police chief with experience on the motorcycle patrol and in investigating motorcycles accidents, believes that police crash guards, particularly those used on Harley-Davidson motorcycles, are effective in reducing injuries. Harms conceded that he had no scientific or engineering expertise in motorcycle design. Harley-Davidson has expressly recommended against the use of crash bars on its police motorcycles.

Once again you see a difference of opinion. A police chief says they reduce injuries, particularly on Harley Davidson’s, while Harley Davidson recommends against using them. Some of you now are prone to argue that what you hear in court consists of lies and misrepresentations—designed to benefit one side or the other. But neither side is telling lies. Rather, the manufacturers are so frightened of litigation that they are forced to take the position that engine guards are not necessary/important in protecting legs from injury lest they be sued by owners of all their products that were sold without them. Rather than telling lies, they view their own facts to their favor, and/or they are slanting their testimony with evidence that, in good faith, tends to minimize their liability.

That is a far cry from being unbiased and telling all there is to tell. But they have no obligation to do either, in court.

Not all motorcyclists believe that crash bars are better to have than not. The famous Hurt Study, for example, states:

Crash bars are not an effective injury counter-measure; the reduction of injury to the ankle-foot is balanced by increase of injury to the thigh-upper leg, knee, and lower leg.

Note that this was one finding of a study of some 900 reported accidents. Had the study designers known about all instances of leg injury caused from a motorcycle crashing on its side, their conclusions might have been different.

On the other hand, a relatively current study (February of 1995) performed in England by the Transport Research Laboratory (TRL) did reach very different conclusions:

Our research shows that properly designed leg protectors could reduce the severity of, or even eliminate, at least 25% of leg injuries without increasing injuries to other parts of the body. In some cases, they could save lives.

Contrary to the arguments of the major motorcycle manufacturers cited earlier, TRL went on to say:

An important factor in this research has been to ensure that if leg protection is to be of benefit not only must leg injuries be reduced, but the potential for injuries to other parts of the body, particularly the head, must not be increased. In all the tests the potential for leg injuries and head injuries has been carefully analyzed. At no time has leg protection worsened the potential for head injury, or injury to other parts of the body, and in some instances there has been a significant reduction in this potential.

Further, the British government has proposed a European Commission (EC) Initiative that may someday result in a requirement for these devices.
APPENDIX B – Weight Transfer (Newtonian Physics 101)

Riding a motorcycle with relative safety requires some skill, good judgment, reasonable health, well maintained equipment, the wearing of protective gear, legal behavior, and a fundamental understanding of the motorcycle’s controls and how to use them. Underlying that last item is a basic understanding of practical physics and the concept of cause and effect. Note that this list of requirements does not include exceptional math skills nor does it include being a mechanic.

This tutorial is aimed at providing you a basic understanding of practical physics. You will be able to answer questions like

- How fast can I ride through that turn without losing control?
- How do I avoid doing a “stoppie” (lifting the rear tire off the ground) when I apply my brakes?
- How much distance must I provide between myself and the car in front of me?
- What is weight transfer and can I manage it?

You will see several diagrams similar to the one shown on this page as an aid in your study of this material. They do not show details such as the motorcycle controls because this tutorial assumes that you already have a fundamental understanding of motorcycling. Instead, these diagrams show a loosely coupled system consisting of a motorcycle and its rider along with some details to demonstrate basic physics concepts.

The only part of that diagram that might not be obvious is a symbol, $\text{CG}$, that represents where the center of gravity of that system exists. You can think of it as a point location where in every direction from that point there is exactly the same amount of mass. In other words, if you were to suspend a motorcycle from its center of gravity, there would be no tendency of that motorcycle to move; it would not roll, pitch or yaw, because it would be perfectly balanced. Though this is usually called the object’s Center of Gravity and abbreviated with the symbol CG, it is far more accurate to call it the Center of Mass. Note that the point does not necessarily have to be located on the object itself. The Center of Gravity of your wedding band, for example, is a point that does not touch any part of the ring itself.

We start with some definitions.

**Mass**, represented with the symbol $m$, is how much matter an object contains. It is often thought of as being equivalent to the object’s weight.

**Speed** is how much distance an object travels in a specified amount of time. Typically, speed is denoted as ft/sec ft/s or fps (feet per second), mi/s or MPH (miles per hour), m/s or mps (meters per second), or km/h (kilometers per hour).

**Vector** is a quantity that is completely specified by a magnitude and a direction.

**Velocity**, represented by the symbol $\mathbf{v}$, is the speed of a mass moving in a particular direction. Any NASA observer has heard the expression “Delta-V”. It means a change of velocity. But please note that does not necessarily mean a change of speed. Even maintaining the same speed, if a mass changes its direction of travel, its velocity has changed.

Thus, the difference between speed and velocity is that velocity is directional (vectored.)
Acceleration, represented by the symbol $a$, is a change of speed in a particular direction. A decrease in speed is usually called a deceleration. Acceleration is expressed as a rate of change. When an object increases its speed 10 MPH every second, for example, then the acceleration rate is $10 \text{ MPH/sec}$. Acceleration rates are also expressed in terms of ft/sec/sec (usually written as $\text{ft/sec}^2$ or $\text{ft/s}^2$), or as a percentage of gravity as in $0.6g$'s.

Force, represented with the symbol $F$, is any external influence which tries to accelerate or deform a body.

Newton’s second law tells us that $F = ma$. Note how similar this is to momentum.

Gravity, represented with the symbol $g$, is an acceleration constant that reflects how quickly an object’s speed increases as it falls toward the earth, in a vacuum, if it is close to sea level. That constant is approximately $32.2 \text{ ft/s}^2$ or $9.8 \text{ m/s}^2$ or $21.9 \text{ MPH/s}$. Gravity is, in other words, an acceleration rate (near the earth).

When a motorcycle accelerates at $0.9g$'s, for example, it’s changing speed at $90\%$ of the rate of gravity. Since gravity is $21.9 \text{ MPH/s}$, then a $0.9g$ rate of acceleration would be $19.7 \text{ MPH/s}$. The motorcycle is increasing its speed by nearly 20 MPH each second at that rate.

Weight, represented with the symbols $mg$, is a force. It is a measurement of how hard a given mass is pressing towards the earth as a result of gravity. The symbols $mg$ demonstrate that weight is merely mass times gravity.

Momentum, represented by the symbol $p$, is an inertial characteristic of a moving mass that attempts to keep that mass moving at the same speed and direction; that is, it opposes any drag forces.

Momentum is calculated as the product of mass and velocity ($p = mv$). Momentum is always calculated from the observer’s point of view.

For example, an 800 pound motorcycle traveling due north at $50 \text{ MPH}$ has a momentum of $40,000 \text{ lbs}$. MPH traveling due north from an observer standing on the ground, but it has a velocity and momentum of zero from the rider’s perspective. Note how similar momentum is to force.

Indeed, Aristotle claimed that $F = mv$ before Newton showed that $F = ma$.

Newton’s three laws of motion:

1. Every object in a state of uniform motion tends to remain in that state of motion unless an external force is applied to it.

2. The relationship between an object’s mass $m$, its acceleration $a$, and the applied force $F$ is $F = ma$.

3. For every action there is an equal and opposite reaction.

Now let’s revisit that first figure and add some values so we can manipulate them and learn a few things about this motorcycle and rider.

$h = 31 \text{ inches} = \text{height of Center of Gravity}$
$p = 63 \text{ inches} = \text{(Not momentum! length of wheelbase}$
$b = 28.35 \text{ inches} = 45\% \text{ of wheelbase length}$
$p-b = 34.65 \text{ inches} = 55\% \text{ of wheelbase length}$
$\text{weight bias} = 28.35/63 = 45.2\%$

Let’s assume that the motorcycle and its rider weigh a combined total of 800 pounds and see how that weight is distributed when the bike is at rest.

First, we need to know that forces are always found as equal and opposite influences (Newton’s third law.)

That is, weight, for example, is a force pressing toward the earth so it is met with an exactly equal opposing force known as Normal resistance (straight up) where the earth presses upward from the earth.
But there are two contact patches where the motorcycle touches the earth, one directly under the axle of each wheel. Should the rider slide his body forward or slide it toward the rear, the Center of Gravity will also change its location. That is, the length of b will get larger or smaller. So you know that the location of the Center of Gravity determines how much of the total weight is carried by each tire.

Dividing b by p results is the weight bias; that is, $28.35 / 63 = .45 = 45\%$ weight bias, toward the front wheel. In other words, 45\% of the total weight is carried by the front tire and 55\% by the rear.

Since without the rider moving the Center of Gravity is closer to the rear wheel than to the front, more weight will be carried by the rear wheel. If b remains 45\% of the length of the wheelbase, then 45\% of the total weight is being carried by the front wheel and 65\% is carried by the rear wheel. It should be obvious that if the Center of Gravity was directly over the rear wheel, then b would be zero inches and there would be no weight carried by the front wheel.

While the Center of Gravity is exclusively determined by where that mass is, and therefore does not change location unless there is a change in the location of that mass, the amount of weight being carried by each of the contact patches changes as a result of acceleration caused forces. Weight is a force. Adding a downward force to the front of the motorcycle is identical to adding weight. For example, if the motorcycle had a wind wing on the front constructed such that air flow tried to force the front of the motorcycle down (such as found on Formula one race cars), then the faster the motorcycle was moving, the greater would be the load carried by the front tire.

When your motorcycle is moving and you apply your brakes, you are adding a resistive drag force that opposes the force of momentum trying to keep the motorcycle’s speed constant. The greater the braking force applied, the higher will be the rate of deceleration. So, for example, if we applied 800 lbs. of braking pressure, that would generate a deceleration rate of 1.0g’s, since the mass of the motorcycle and rider is 800 lbs. If we achieve a deceleration rate of 0.6g’s, the standard used by the MSF when teaching complete novices who may have no motorcycling experience whatsoever, then we must be applying 60\% of 800 lbs., or 480 lbs. of braking force to accomplish that rate. As you have two brakes on a motorcycle, that braking force must be applied through one or both tires at ground level, yet momentum acts as if it is sourced at the Center of Gravity, which we know is 31 inches off the ground. Since these forces are applied against each other at different heights, it should be clear that a clockwise torque is created about the Center of Gravity which transfers weight from the rear wheel to the front wheel.

The amount of weight transferred is computed as the product of the percentage of the height of the Center of Gravity compared to the length of the wheelbase and the deceleration rate and the total weight $[(h/p) * 0.6 * 800] = 31/63 * 0.6 * 800 = 0.492 * 0.6 * 800 = 236.2\ \text{lbs.}$ That is, 236.2 lbs. of weight has been removed from the rear wheel and added to the front wheel when this motorcycle is decelerating at a rate of 0.6g’s.

Therefore, 596.2 lbs. (360 + 236.2) of weight is being carried by the front tire and only 203.8 lbs. (440 – 236.2) of weight remains on the rear tire.

Let’s look at the case where we have achieved a deceleration rate of 0.6g’s. We will assume that 80\% of the braking force
is provided by the front brake. Therefore, the front tire provides $0.8 \times 480 = 384$ lbs, while only 96 lbs. ($0.2 \times 480$) of braking force is provided by the rear tire.

Since the rear tire still carries 203.8 lbs. of weight, it can easily support a braking force of 96 lbs. without skidding.

We will again assume that 80% of the braking force is generated at the front tire. Thus, the front braking force is $0.8 \times 800 = 640$ lbs, while the rear tire is providing 160 lbs. of braking force.

Now we calculate weight transfer. The amount of weight transferred from the rear to the front tire is $[(31/63) \times 1.0 \times 800] = 393.7$ lbs. Thus, the weight carried by the front tire is $360 + 393.7 = 753.7$ lbs, and only $440 - 393.7 = 46.3$ lbs. is being carried by the rear tire.

However, with only 46.3 lbs. of weight on the rear tire, it is not possible for that tire to support the 160 lbs. of braking force generated at that tire if we only get 80% of our braking force from the front brake – the rear tire will certainly be skidding.

Since 46.3 lbs. is only 5.8% of the total weight of the motorcycle, we know that the rear brake can provide no more than 5.8% of the total braking force.

We now change the assumption that the rider has used his front brake to apply 95% of the total braking force.

In other words, the front tire provides a braking force of 760 lbs, while the rear tire provides only 40 lbs. of braking force.

You will recall that a deceleration rate of 0.6g’s is inadequate braking performance in an emergency situation. However, even the most proficient motorcyclists in terms of braking skills can only occasionally achieve a deceleration rate in excess of 1.0g’s. Let’s see how that deceleration rate affects weight transfer and braking efforts for our example motorcycle.

First, we know that when we reach a deceleration rate of 1.0g’s we must be applying a braking force equal to the total weight of the motorcycle and rider. Thus, $md$ increases to 800 lbs. and the sum of the braking forces applied to the front and rear tires ($Ff + Fr$) must also equal 800 lbs. In other words, the amount of torque created by these forces increases and, as a result, there is greater weight transfer from the rear to the front tire.

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We now change the assumption that the rider has used his front brake to apply 95% of the total braking force.

In other words, the front tire provides a braking force of 760 lbs, while the rear tire provides only 40 lbs. of braking force.
Because of weight transfer, the front shocks compress while the rear shocks extend. These are not equivalent movements. The rear shock does not extend anywhere near as much as the front shock compresses. In addition, the rake angle decreases as the front-end dives.

Compressing the front shocks and reducing the rake angle effectively shortens the wheelbase.

A typical rake angle is 30 degrees. That means that for every inch the front shock compresses, the front-end lowers 0.87 inches and the wheelbase shortens by 0.5 inches.

The fact that the rake angle decreases as a result of the forward rotation of the bike during deceleration means that the wheelbase does not shorten quite as much as indicated, but we will use this analysis as a close approximation to reality in order to convey the concept.

If we assume that using a deceleration rate of 1.0g’s causes the front shocks to shorten by 3 inches, then we know that the wheelbase has shortened by approximately 1.5 inches. The height of the Center of Gravity remains essentially what it was before deceleration.

Once again we see that this motorcycle will skid its rear tire if it achieves a deceleration rate of 1.0g’s when “only” 95% of the braking force is applied through the front tire.

In other words, we must use more than 95% of the total braking force from our front tire. Forget anything you’ve ever heard about the front brake providing 70% of your stopping force! The front brake can often provide as much as 100% of your bike’s ability to stop your motorcycle.

We have already seen that a higher Center of Gravity means more weight transfer. Further, as the front-end dives, the result of the compression of the front shocks is a shortening of the wheelbase of the bike.

This, like raising the Center of Gravity, results in a higher weight transfer ratio, and therefore more weight transfer. As an aside, if your bike has an anti-dive feature [TRAC, for example] then more weight transfer occurs to the front wheel than without it because the Center of Gravity is held higher—the front end cannot dive.

In other words, the anti-dive feature increases the odds of sliding your rear tire.

If the rider uses only the rear brake, a weight transfer to the front tire will occur which will tend to compress the shocks.

Additionally, however, use of the rear brake tends to lower the rear-end of your motorcycle and lengthens its wheelbase, because the swing arm becomes more level. The net effect is to lower the Center of Gravity of the bike.

This neatly offsets the fact that the compressing front-end shortens the wheelbase at the same time. However, since there is a weight transfer, the rear-end gets lighter during braking, and that quickly limits how much braking power you can apply before the rear tire skids.

In other words, you must use the front brake for maximum stopping power.
You can now see that using your rear brake along with the front brake leads to less weight transfer than if you use only the front brake, and why using both brakes at the same time always results in maximum stopping power.

When a rider mounts his motorcycle, he both raises the Center of Gravity and moves it towards the rear. The heavier the rider, the more significant these changes to the Center of Gravity are. We already know that as the Center of Gravity rises, it causes more weight transfer during speed changes. This raising of the Center of Gravity is far more significant than is its shift towards the rear, because the height of the Center of Gravity is small compared to the length of the motorcycle’s wheelbase. What this means is that the heavier the rider, the easier it is for the rear tire to break away during braking.

Is there anything that can be done to mitigate this potentially deadly problem? You bet! During an emergency stop the rider should bend at the waist, and lean forward while squeezing the front-brake lever and pressing the rear-brake pedal at the same time.

This will cause the Center of Gravity to lower and move forward. A lower Center of Gravity is more significant than its slight movement forward. The rider can also, if his saddle permits it, scoot his butt toward the rear.

In summary, the weight transfer will be reduced with the rider leaning forward instead of sitting straight up in the saddle, the front shocks will compress less, and the wheelbase will shorten less—i.e., the likelihood of losing rear-end traction is reduced.

Additionally, you should always pack your saddlebags with heavy items towards the bottom. Every pound below the Center of Gravity lowers it; every pound above the Center of Gravity raises it.

**APPENDIX C – Traction Pie**

The MSF has, in the past, provided its students with a picture of the “traction pie” that looked roughly like this:

![Figure 58: Traction Pie](image)

A much better way to represent traction is by showing orthogonal force vectors and then how much of the total traction capacity these forces consume when you combine them. (Orthogonal merely means “perpendicular.”)

Consider the radius of the circle shown in Figure 58 to represent the total amount of traction your tires provide.

You can see that if you applied 50% of the amount of braking force the tires could handle at the same time the tires were experiencing 50% of the cornering forces they could handle, the total traction demand would only be 71% of the traction available.

These forces do not simply add up; they are perpendicular, or orthogonal to each other.

The illustration above shows that even if you applied very aggressive braking force (like 0.9g’s), the tires could still
handle almost 50% of the maximum cornering force at the same time, before the tires would skid or slide. At this extreme example of simultaneously braking aggressively and modest cornering pressure, you would consume slightly more traction than is available.

You would skid or slide as a result. There would still be some space inside the circle in the direction of the arrow showing combined demand (before it reaches the outer limit when the tire skids or slides) had the braking effort been 0.8g’s instead of 0.9g’s, and that is clearly an aggressive braking effort. In other words, to understand the total traction demand on a tire, you combine these forces to determine their total using the old Pythagorean Theorem: the square of the hypotenuse of a right triangle is equal to the sum of the square of its sides.

In these diagrams, the dashed line is the hypotenuse, which represents the combined traction demand from braking aggressively and cornering at the same time.

This is the reality that allows a rider to brake in a turn and maintain control. On a clean, dry, and level roadway made of concrete or asphalt, your tires can produce slightly more than 1g of traction before they will slide. Since normal braking never exceeds a deceleration rate of 0.5g’s, it never consumes more than 50% of the total traction available. (That changes, of course, if the roadway surface changes.)

APPENDIX D – Counter-steering Pressure Management

Counter-steering is much more about pressure management than controlling steering angle. It is about adjusting the amount of steering input you provide in order to reduce feedback pressure caused by trail (called “restoring force”). That is, when you “push right” you are adding steering pressure that causes the bike’s front-end to turn to the left and centrifugal force then causes it to lean and turn to the right. Your trail results in a corrective force (that “restoring force” I just mentioned) which is greater, by far, than the steering input you provided. And that pressure increases the tighter the turn becomes - radically. It then becomes your job to ease off your input so that the pressure remains only the modest amount you initially input. If you did not ease off, then the feedback pressure would endlessly rise as the bike made an increasingly tight right turn to the point that your lean angle would become more than the bike’s tires could support, or until you hard dragged some metal on the ground—in either event, resulting in a low-side.

As you change the steering angle (turn the handlebar), you “measure” feedback pressure and you ease off in an attempt to stop the increasingly tight turn. Your mind allows you to do that with ease! Your hands feel the feedback pressure and your muscles ease off in order to maintain the same amount of pressure. Sure, “push left” starts the bike going to the right, but your objective is to go to the left without going so far to the left that the bike loses traction. In order to do that you must ease off the amount of pressure you are providing as steering input.

Gently press left in order to gently turn left, harshly press left in order to “flick it” over into a left turn, absolutely push left (no “give”) in order to low-side on the left side. Your input is both directional (“left”) and pressure (“gently”) and of those it is the pressure component that is controlling.

The following graphic presents the case of a touring bike moving at about 50 MPH as it swerves from the right lane to the left; a distance of slightly more than nine feet—meaning, not quite a full lane of movement.11 You will see that it takes, because it is a casual effort, about three seconds to complete

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11 This data comes from a study performed by KEVA Engineering, LLC out of Camarillo, California entitled Rider Inputs and Powered Two Wheeler Response for Pre-Crash Maneuvers and authored by Varat, Husher, Shuman, Kerkhoff.
the maneuver. However, it takes only about one-half second of forward pressure on the left grip to cause the first change of direction, and thereafter the forward pressure on the left grip is eased off, then replaced with forward pressure on the right grip to stop the leftward change of direction and reverse it to a rightward change of direction. Note that the maximum lean angle (16 degrees) does not occur until more than one full second after the maneuver is started, which is long after forward pressure on the right grip has started!

The next graphic is designed to show that counter-steering is really all about pressure management and intelligent anticipation of need.

For example, after one-half second, only a few tenths of a second after the bike has begun moving to the left, the rider anticipates that he will have to reverse steering input direction by easing off the steering torque inducing pressure on the left grip.

![Figure 60: Changing lanes from right to left](image)
APPENDIX E – Restoring Force

This force tries to turn the front wheel in the direction of instantaneous travel. For example, as the above diagram shows, as long as you are not traveling in a straight line, the front wheel points slightly to the outside of the bike’s actual direction of travel. The front wheel points in the direction of the red arrow, while the bike is actually moving in the direction of the green arrow. The difference is called tire slip. What the restoring force tries to do is make the front wheel point in the direction the green arrow is pointing. (In the diagram below, move point B2 to B1.)

The length of trail is a function of the rake angle, the offset between the steering stem and the forks, and the radius of the wheel. Note that all steering attempts to pivot the front tire around point “C” on the ground, not the center of the contact patch. When the tire is pointing away from its direction of travel, the contact patch center is at red point “B2” and while it is pointing straight ahead, the center of the contact patch is at green point “B1”. The restoring force is merely an aligning force which pushes point “B2” toward point “B1”.

It is the restoring force that you feel, that pushes against your hand, as you press either grip forward to turn. And when you do cause the front wheel to turn slightly in the direction you have pressed (out-track), that force increases with more force than you have used—with the result that the handlebar comes back in the opposite direction.

As the front wheel’s steering angle returns past its starting position, that pushback pressure decreases. In other words, the way you manage a turn at counter-steering speeds is to manage the forward pressure you apply to the grip, and then to adjust your applied pressure in response to the pushback pressure it provides.

If all you did was to turn the handlebar a set number of degrees to the left and forced it to remain in that position, the bike would immediately fall down. You must allow the greater pushback pressure to turn the handlebar toward your pushing hand, by maintaining the pressure and then slightly easing it as the bike adopts the direction you actually want to go, not by forcing a new steering angle.

APPENDIX F – High-side Dynamics

More often than not, making a mistake while riding a motorcycle leads to misfortune. Sometimes the results can be no more than a bruised ego sometimes slight or serious injury and sometimes the consequences can be fatal. One of
the most deadly mistakes you can make is called “doing a high-side”.

When a bike is “dumped” or “laid down” (a misnomer), it falls down, gravity assisted, all the way to the ground and ends up on its side. At slow speeds this usually results in little or no damage to the bike or the rider. Even at higher speeds, given that the rider is wearing appropriate protective clothing; most damage is restricted to the bike. In either case, these are known as doing a low-side—meaning that the rider exits the bike by going in the direction of the fall: down.

Obviously, doing a high-side means that you exit the bike by being thrown up and over the high side of the bike. That, in itself, is not particularly deadly, but it happens that the bike usually follows the rider into the air and then it comes back down, often on top of him. Not too many people survive such an encounter.

So how does a high-side happen? What causes it and what can you do to prevent it from happening?

To begin with, a high-side starts when you use so much rear brake pressure that you lock your rear wheel. If you are in a curve, (or if you have also applied your front brake while going in a straight line, or if there is substantial road camber, or severely unbalanced loading of the motorcycle), this starts the rear end sliding/skewing away from the direction the bike had been moving because traction is diminished on the rear tire (it has become “sliding friction” - about 80% of what it was just prior to the skid) and that tire has begun to move faster (in the direction of bike movement) than the front tire (centrifugal force, among others, is having its way.) The automatic, and correct, driver response to this situation is to turn the front wheel in the direction of the slide. [Actually, the front wheel will turn in the direction of the slide by itself - your job is merely to let it.] This absolutely does not mean that the front-end actually is steered or turns toward the slide but that it will appear to be doing so. Without steering input the front-end will continue to point in the direction of bike travel while the rear-end slides to the side which makes it look like the front-end is being steered in that direction - and your job is not to fight it these dynamics. But now a rider can make a mistake that can result in death or serious injury simply by releasing the rear brake.

Let's look at what is happening at the instant a rear brake locks up causing the rear wheel to begin to slide and the instant that pressure is released on the rear brake. Let's assume a rider is in a gentle turn at the time. The bike is moving in the direction pointed to by the front tire at this instant. Note that the back tire is always “scuffing” a little as it tries to get into the same direction pointed to by the front tire.

As shown below, riding in a straight line is exactly the same as soon as the rear wheel starts to yaw to one side or the other of the front wheel track.

Now at this instant the rear brake locks and the rear wheel loses a significant amount of its traction (at least 20%). It begins to skew outward from the center of the curve (or its original path of travel).

The rider now allows the front wheel to turn in the direction of the slide. Meanwhile, the rear end continues to slide and is moving faster than the front end at this instant. The bike is trying to “lay down” and will do so if nothing else happens quickly.

But the rider, realizing that the rear end is sliding completely out of control, decides to release the pressure on the rear brake to try to drive out of the situation. When he does so, the rear tire, which is being dragged forward as well as to the side, is suddenly able to start turning again. This allows it to move in the forward direction much more easily than a moment before, and just as suddenly it regains traction (mind you, it lost only about 20% of its traction when it began to slide and it is picking up only that 20% or so of traction at this point.)

Whether the engine is driving the rear tire or not, because the bike is not simply “dragging/scuffing” the rear tire forward with it (because the tire is now rotating), the bike begins to move faster (actually, is slowing more slowly) in the direction pointed to by the front tire. At the same time, because full traction has been regained, the sliding movement of the rear end of the bike comes to an abrupt end. And what next happens is the high-side!

Whether the slide movement of the rear end is abruptly stopped because the rear wheel hits a curb, or because the tire has regained traction, the results are the same: centrifugal force, coupled with inertia, try to keep the center of gravity of the bike moving in the direction it was last traveling. Since the bottom of the rear wheel has stopped sliding, (all stopping forces are at the contact patch), clearly a torque is developed. The result is that the bike is violently
twisted in the direction of the earlier slide. The front wheel actually helps this twisting action because it has a bearing in its axle and the bike merely rotates using that bearing as an axis.

Naturally, both the bike and the driver will be thrown in the same direction.

The mistake, of course, was releasing the pressure on the rear brake. Said differently, if you are in a situation where the rear wheel is sliding out from under you, despite having allowed the front wheel to turn in the direction of the slide, then the safest course of action is to ride the bike into the ground—do a low-side. (i.e., do not release the pressure on the rear brake.)

Let me also add that there is one more thing that could have been done to avoid the high-side described here: always straighten the bike before you aggressively use your brakes when in a curve!

If the bike is moving in a straight line, particularly if the bike has any form of integrated braking, and the rear wheel brake locks resulting in a skid, it is still possible to do a high-side, but the odds of doing so are far less than when in a curve [the faster you are moving, and the greater the camber (slope) of the road, the higher the odds.] Still, the best decision the rider can make is to not release the rear brake if it is locked to try to insure that a high-side does not result.

Abruptly releasing the front brake when the rear wheel is locked and skidding can also cause a high-side because it will increase rear wheel weight and, therefore, traction. Nevertheless, the only possible way to “ride out” of this situation is to get the front end of the bike to go faster than the rear in the direction of the skid. Thus, a gentle relaxation of the front brake is a reasonable action to take. (Note, however, that with any form of integrated braking, this is virtually hopeless because so long as the rear brake is applied the front brake is also being applied.) Increasing front brake pressure, on the other hand, will almost certainly result in immediately laying the bike down on the low side.

Can a high-side occur if you do not release the rear brake pressure at all? You bet! If you have ever witnessed a “straight line” high-side accident you will remember that the skid mark was a straight line until the very end at which point it became a “J”. What that shows is that the rider successfully managed to keep his front wheel pointed in the direction of the skid until he had turned his wheel to its limit (a “stop” was reached.) When that happens, of course, he can no longer continue to turn into the skid and the direction the bike travels begins to abruptly change - the skid increases until it presents about a 90 degree tire face in the direction the bike is moving, which happens to present the largest contact patch “face” perpendicular to direction of travel and, thus, maximizes the odds that traction can be reestablished. This, then, is approximately when the bike stops its skid and violently snaps into the air.

Having seen that a rear-end skid requires that you gently relax front brake pressure and maintain rear brake pressure in hopes that the front wheel can be coaxied into catching up with the rear one (slow more slowly), what should you do if the front wheel begins to skid instead of the rear one? Exactly the same thing! Gently release the front brake and maintain the rear one. Thus, you do not have to make a decision based on which tire is skidding. The reaction is the same.

So, you already know that if you have a choice you should ride the bike into the ground rather than do a high-side. Furthermore, the dynamics will almost certainly result in a high-side even if you do what is corrective—allowing the front wheel to turn into the slide and feathering the front brake. Is it hopeless? Must you do a high-side? Not at all. It means that as soon as you know the attempt you are making is not going to work, aggressively use the front brake. This will force a low-side. (If you have any form of interlocked brakes you can also force a low-side by increasing rear-brake pressure because that increases front-brake pressure as well.)

No one advocates your actively low-siding your bike. But if you have ever seen the results of a high-side, you should kiss the ground that you have the ability to stop it by laying your
bike down. If you can do it, do it. If not, good luck to you anyway. In other words, if you are ever faced with this situation and are presented with the choice to have a high-side or a low-side, always opt for the low-side.

Some riders have argued that if you can release the rear brake quickly enough after it locks, you can avoid a high-side and regain control of your bike. This is true. However, you should understand what that really means. There is a difference between a skid and a slide.

During a skid your tire is not rotating at the same speed as the bike is moving and so you scrub off some rubber; but you are still fundamentally in control of your bike. The tire is still pointing in the direction of the bike’s movement during a skid.

During a slide, however, the bike is falling down and the rear wheel is moving laterally—to the side. You are no longer in control of your bike. If you release the rear brake during a skid, you will feel a modest “jerk” as the rear wheel regains traction and you continue on—under control. If you release the rear brake while in a slide, regaining control is far from assured, as the “jerk” becomes a severe “jolt”, or worse, a high-side.

So, the advice to not release the rear brake when it is locked refers to the situation where a slide has begun. For almost everybody this means never release a locked rear brake because a slide usually begins very quickly in the real world and most people cannot react quickly enough or even recognize that the rear tire is sliding. It is foolish in the extreme to pretend that you are the exception and can catch it before that slide has begun.

Though it is often thought that a high-side can only occur while in a turn, that is simply not true.

The diagram on this page shows some of the detail of an actual case of this happening.

APPENDIX G – 5 MPH is Not Trivial
Speed, it seems to us, is not taken too seriously by motorcyclists. Drivers of any kind of vehicle seem not to understand just how important small speed differences are.

Consider a common misunderstanding relative to speed. Let’s examine what that misunderstanding is and why it exists. Because a small speed difference is not a trivial matter. It can mean the difference between life and death.

When we are riding it is very normal for us to be traveling at just over the speed limit; sometimes as much as 10 MPH over the limit, usually closer to 5 MPH over, but in any event, consistent with the traffic around us.

One argument for doing so is that so long as there is a very low chance of cross traffic or an accident ahead, it makes almost no difference how fast we are moving relative to the...
speed limit so long as we are close to it. Instead, the speeds when we are coming to a stop in an aggressive manner—such as when we must avoid a deer that has jumped into the roadway ahead of us—is more important. But consider just how important it can be to ride just a little over the speed limit when it comes to that emergency stop.

A woman motorcyclist died when she collided with a car when she was moving at only 18 MPH. Eighteen miles per hour!

If the speed limit is 60 MPH and riders are traveling at 60 MPH, they can come to a complete stop in almost exactly 150 feet. (Assuming they achieve a deceleration rate of 0.8g’s.) If a deer is 150 feet ahead when they begin braking, clearly they would not collide with that deer, but if they are traveling at 65 MPH when they begin braking, then certainly they would hit it (if it did not get out of the way). How fast would the collision speed be in that case?

Many riders would guess, somewhere between 5 and 10 MPH.

You would probably survive a collision at such low speeds. But as it turns out, that guess is wrong. In fact, they would hit that deer at a speed of about 27 MPH. Twenty-seven miles per hour! This demonstrates the problem with a tendency to think in linear terms.

For example, let’s look at a graph that shows how long it takes to stop your motorcycle starting at various speeds and again assuming a deceleration rate of 0.8g’s.

Observe that the bottom line shows that you can come to a complete stop from a speed of 30 MPH in 1.70 seconds. Then notice that if we double the speed to 60 MPH, the second line, that it takes you exactly twice as long to stop (3.40 seconds). Clearly there’s a linear relationship between time to stop and speed.

But now let’s look at stopping distance instead of time.

Here we observe that it takes 37.5 feet to come to a complete stop starting at 30 MPH, but if we double the starting speed to 60 MPH, it takes four times as much distance to come to a complete stop (150 feet) instead of twice (75 feet). Obviously, stopping distance is not a linear function. Instead, it varies with the square of your speed. Why? Because when you double the speed you increase the kinetic energy of the moving vehicle by the square of that increase—and all of that kinetic energy must be scrubbed (converted to heat) by your brakes.

Now observe from the two diagrams that by increasing our starting speed by only 5 MPH to 65 instead of 60, it takes us only 1 quarter of a second longer to stop, actually 0.29 seconds, but in that quarter of a second we traveled an extra 26 feet!

Since as we brake from 65 MPH to zero MPH we must pass through 60 MPH, there can be no difference in the stopping time nor distance to stop between the last 60 MPH starting at 65 and the entire graph starting from 60 MPH. Therefore, that extra 26 feet of stopping distance came at the beginning of our braking effort, not at the end of it.

This is also obvious from the fact that we see that we can scrub a full 30 MPH in just 37.5 feet while it takes us an additional 26 feet of stopping distance to scrub just 5 MPH from a starting speed of 65 MPH.
So let’s now look at how fast you are traveling while decelerating from 60 MPH and from 65 MPH.

We can see that the green portion of the speed curves is identical, of course, because they show the deceleration from 60 MPH to zero in both curves.

The red portion of the top curve shows that the only difference, in terms of speed and distance between stopping from 65 MPH and 60 MPH is 26 feet and 5 MPH, and that it happens at the start of deceleration, not at the end.

Now we look at the bottom right of the chart and we see that when stopping from 65 MPH we are traveling at 25 MPH when we have crossed the 150 foot mark.

That is, we would collide with the deer at 25 MPH if we began braking at 65 MPH at a distance of 150 foot from it. Now you see why that “trivial” 5 MPH of extra speed is not so trivial after all. It can result in an impact that kills you.

Now some of will claim that the actual collision speed will be considerably higher than the chart shows, because if both vehicles noticed a threat at the same time, and if both drivers take the same amount of time to Perceive the threat, Decide what to do about it, and React (PDR), then the faster-moving vehicle will travel farther before its brakes are applied.

It will surprise you to learn that delayed start of braking because of PDR time is trivial compared to the extra 5 MPH of starting speed we discussed.

Here is a new chart to demonstrate that.

If we assume 1.0 seconds of PDR, then the bike moving at 65 MPH will travel 7 feet farther during PDR than will the bike moving at 60 MPH. (65 MPH = 95 feet per second, 60 MPH = 88 feet per second.)

Delaying the start of braking by 7 feet for the vehicle traveling at 65 MPH results in a collision speed of 27 MPH instead of 25 MPH.
APPENDIX H – Why Finding the Right Shift Point is Important

The following chart shows you why shifting at 6,000 rpm is far better than shifting at 5,000 rpm on this particular motorcycle. The top graph demonstrates that shifting at 5,000 rpm results in a loss of at least 5 ft/sec² of acceleration rate, as compared to shifting at 6,000 rpm.

In other words, the right shift point is where the engine torque is the same before and after the shift, not necessarily at the start of the “sweet spot” in the torque curve of the new gear.

Figure 68: Shifting too early
APPENDIX I – Front-end Geometry and the Restoring Force

What follows is not necessary to understand if you expect to be a casual rider. So long as you understand that crossing over vertical irregularities on the road requires that you be as close to vertical as possible and that you hit the irregularity as close to perpendicular as you can, then they should pose no meaningful threat to you.

We will look at two things that result from the fact that your front forks are not pointing straight down; that is, because there is a rake angle to those forks:

- How counter-steering is initiated; and
- How weave and wobble are diminished.

The diagram above represents your front wheel that you want to turn to the right. The diagonal dashed line represents your steering stem as if it were extended to the ground. Please note how this defines ground trail. (The diagram exaggerates how far forward of the contact patch the steering axis point is for clarity.) You initiate the right turn by turning the handlebar to the left.

When you turn the handlebar, you’re attempting to turn the tire about the steering axis at ground level, not about the contact patch. For example, as you turn the handlebar to the left, you are trying to get the tire to turn as shown above. However, since the contact patch is touching the ground and the axis is not, the contact patch cannot simply slide off to the right as shown. Instead, the body of the motorcycle moves in that direction via force at the triple-tree. You have, in effect, steered the front tire out from under the bike by steering the bike away from the tire. [At a dead stop turn your handlebar all the way to the left and observe how the top of the bike has moved to the right.]

As a result, gravity now tries to pull the bike down towards the right and that drags the front wheel with it and our travel direction has begun moving to the right. (For the purists out there this is not arguing that gyroscopic precession didn’t play a part–only that there is a rake angle, counter-steering would work even without gyroscopic precession.) [Note that because of the huge difference in mass between the relatively light front-end and the rest of the bike, when traveling at less than about 6 MPH you actually can make a significant turn of the handlebar and there is not enough centrifugal force to push the top of the bike away from the direction you are pointing to. Instead, the bike falls into the turn at these slow speeds and that is why counter-steering does not work at such slow speeds.]

Wobble and weave are diminished because when the wheel is pointing at an angle other than straight ahead the contact patch is not in alignment with the direction of travel of the bike; that is, a slip angle is created. A “restoring force” is applied to the contact patch by the ground which attempts to force that alignment. Thus, because of trail, the front wheel tries to go in a straight line. [This restoring force, sometimes called a “righting moment’ or “castor effect”, is a function of the length of trail. The longer the trail, the stronger it is. It is also a function of weight being carried by the front-end. The higher the weight, the stronger it is. Thus, braking increases the restoring force. This is primarily what “dumps” a bike when the front brake is applied during a slow-speed turn.]

Speed Bumps and RR Crossings

We have all ridden over speed bumps and RR crossings, and other than a mild bumpiness it did not seem like such a big deal. On the other hand, most of us have heard of or
witnessed a motorcyclist lose control of their motorcycle and end up on its side doing the same thing. What’s going on?

“Trail” is the distance between the middle of your contact patch and that point on the ground pointed to by an imaginary line running through your steering stem. It is created as a result of rake angle, offset and tire radius.

Because of trail, your tire develops a restoring force that attempts to keep your front-end pointing straight ahead. Three things increase the strength of that restoring force (known as the restoring force):

1. Lengthening trail;
2. Increasing the weight carried by your front-end (such as when braking); and
3. Increasing your speed of travel.

In the diagram below a front tire is about to run over an object on the ground simulating a raised RR track or an unusually harsh speed bump. What is important to note is that at the moment of contact between your tire and that bump your contact patch will be lifted off the ground (to be replaced by the tire riding on the bump) and at that time your tire will have created a **negative trail length**. In other words, at that time your steering axis will be behind your contact patch. **(All bumps shorten your trail or turn it negative.)**

![Figure 70: Negative Trail from Speed Bump](image)

So what? If you hit that bump straight on (at 90 degrees) you just ride up and over it and are essentially unaware of any steering control problems caused by doing so. As soon as you are past the bump you are back to normal trail. But please note that while the negative trail lasts for a short time and immediately turns positive, as you are rolling off the back side of that bump you will experience a time where your trail is unusually long (and therefore very strong.)

But, if your front wheel was pointing off at any meaningful angle when you hit it (you are in a turn) a totally unexpected thing happens—the negative trail, instead of trying to correct an off-center rolling direction, will try to accentuate that off-center direction. In other words, in the blink of an eye you will find that your front tire tries to make the turn tighter!

The subsequent reversal of trail to positive again is so strong a change that unless your steering head damper is working properly you can end up in a wild side-to-side tank slapper fight with your handlebar and possibly end up on the ground.

One more thing. If you hit a second bump, as you will in the case of a RR track, and if that happens in almost the same interval of time that it took you to recover from the first bump, unless your steering damper is properly adjusted, you will experience a profound loss of control, because you will be causing an “in phase” reinforcement.

That is, you will have happened to “tune in” to the harmonic dynamics of your front-end. This is the real reason for a steering damper—to disrupt any rhythms (“de-tune”) that could cause a pendulum effect on your front-end.

Clearly the message here is to always attempt to have your front-end pointing dead ahead when you are about to hit an obstacle, and always be sure that your front-end damping system is properly maintained.

Further, if possible, stay off your brakes in this situation.

Note, the magnitudes shown here are slightly too large because trail is actually measured to where the steering axis intersects with the level of the contact patch.

And when you hit a bump your front shocks compress. That reduces the rake angle which also affects the length of trail.
What is it? What to do about it? Are they making new tires less safe?

Hydroplaning is the result of your tires moving fast across a wet surface—so fast that they do not have sufficient time to channel that moisture away from the center of the tire. The result is that the tire is lifted by the water away from the road and all traction is thus lost.

Of course the word “fast” is a relative term. Tread design, tread depth, weight of motorcycle, tire pressure, depth of water and even the consistency of that water—whether it is highly aerated or not, for example—all play a part in determining what speed the tire will begin to hydroplane. It is a pretty safe bet to assume that any speed in excess of 60 MPH is fast enough to support hydroplaning regardless of the other variables. This is not to say that at 55 MPH you are safe, however.

A formula that comes close to predicting the speed at which you will hydroplane, assuming at least 0.2" of water on the ground, is: 10.27 * Sqrt(tire pressure) which shows that if your tires hold 35 psi, hydroplaning can be expected at 60.76 MPH, while tires with 41 psi of air in them should expect hydroplaning at about 65.75 MPH. Another formula that is somewhat more accurate, though much harder to calculate, is: 7.95 * Sqrt(tire pressure * contact patch width / contact patch length). This formula shows that the wider the contact patch is relative to its length, the higher the speed required to support hydroplaning.

This is contrary to a general understanding that a wider tire is more susceptible to hydroplaning than is a narrower tire, yet this particular formula seems to yield a closer approximation of the threshold hydroplaning speed.

In any event, there are two absolutely essential no-no’s to remember should you experience the beginning of hydroplaning:

- Do not apply your brakes; and
- Do not try to steer in any direction but straight ahead.

The only thing you can possibly do to help the situation is to feather your clutch to moderate your speed without the possibility of drive train “snap” that would result from an abrupt change of the accelerator.

Hopefully there is a suggestion in there for you to work with. If you start to hydroplane, the odds are that you are going to go down unless you keep the front wheel pointed absolutely dead ahead, and unless it is of the briefest of durations.

While on this subject, we would like to make another observation about motorcycle tires. If you look at the stock front tire on many Honda Gold Wings you will see a Dunlop K177.

![Figure 71: Channeling water away from center](image)

If you look at the tread pattern, you will also see that the grooves are cut in such a way as to tend to channel water away from the center of the tire, if it is rotating in accord with the arrow stamped on the side of the tire. This seems to be consistent with what the Dunlop factory rep advised in his latest message to me on the subject.

However, if you look at the front tire tread pattern of the Dunlop Elite II’s (K491) they are aligned in exactly the opposite way.

That is, they tend to channel water towards the center of the tire. This cannot be the most effective way to diminish the odds of hydroplaning! Either the K177 or the K491 is safer on wet streets based on those tread patterns. (I believe that most new street bikes (other than Honda) come with tires treaded like the K491’s.)
If you start using these newer designs, perhaps you should lower your speeds in the future when the roads are wet, below what used to work just fine for you. Following is the response from the Dunlop Tire Corporation to an inquiry raising those concerns:

Our development and testing during the design of the Elite II front tire determined optimum overall performance was achieved with this pattern which includes wet traction and braking.

Dunlop Tire Corporation

Dunlop has not made a mistake with this design. In fact, braking performance is far more important than hydroplaning resistance. This is particularly true since we can usually choose how fast we drive on wet streets but we often cannot choose when it is necessary to stop quickly.

Hydroplaning Avoidance - Tire Air Pressure

If you know that you are going to be riding in the rain, you might consider adding 3 to 5 psi of pressure in your tires.

Note, do not inflate them in excess of the maximum pressure specified on the tire sidewalls.

The reasoning behind this suggestion includes two observations:

- Increasing the tire pressure makes its contact patch smaller. In other words, it increases the weight per square inch of the contact patch so that it takes more “uplift” by water to cause hydroplaning; and

- Just as increasing pressure makes the contact patch smaller, it also tends to spread out the tread grooves which, in turn, makes it easier to slough water away from the contact patch.

Perhaps it’s obvious, but to hydroplane you need a certain minimum depth of water under your tires. Thus, to the extent that you can reduce that depth, you can reduce the odds of hydroplaning.

How might you do that? By riding closer to the center of the lane than you normally do, because normal traffic actually cuts a trough into the pavement where the wheels ride.

Those troughs are essentially where we motorcyclists normally track our rides. Obviously water depths are higher in these troughs.
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