THE LEAGUE » SMART CYCLING

SMART CYCLING MANUAL

Most people remember the thrill and excitement of learning to ride a bike. Mastering the balance and control of the bike gives you a sense of discovery and freedom—with the additional benefit of being a healthy and fun activity.

Learning our **Smart Cycling** tips and techniques can help you get all the benefits of bicycling and stay safe while you're doing it. Whether you're just returning to the bike, getting in shape for a charity ride, or consider yourself a more experienced rider, you'll find information and advice in the Smart Cycling program that will make riding easier, safer, and more comfortable and enjoyable.

The League's Smart Cycling program includes this manual, a wealth of online tips and videos on our website, and a handy Quick Guide that summarizes some of the key points. However, there is no substitute for getting out on your bike and practicing these skills. We encourage you to contact a League Cycling Instructor in your area and take a Traffic Skills 101 or similar class with them. To find a class or instructor in your area, use the **Connect Locally** search at ***www.bikeleague.org.***

CONTENTS

PARTS OF A BICYCLE 2
LEVELS OF BICYCLING 3

THE BASICS 4
Choosing Your Bike 5
Bicycle Maintenance 9
What to Wear 10
Equipment 12
Helmet Fit 14
Rules for the Road 15
Bike Handling Basics 16
Shifting Gears 19

PRINCIPLES OF BICYCLING 20
Riding with a Group 21
Sharing Paths and Trails 22
Riding in Inclement Weather 24
Night Riding 25
Riding Long Distances 26

PRINCIPLES OF TRAFFIC LAW 28
Where Should I Ride on the Road? 29
Intersections 32
Rural Road Riding 37

BIKE INFRASTRUCTURE 38
Bike Facilities 39

HAZARDS IN BICYCLING 42
Crashes and How to Avoid Them 43
Types of Hazards 44
Five Layers of Safety 45
Hazard Avoidance Maneuvers 46

THE LEAGUE
OF AMERICAN BICYCLISTS

1612 K STREET NW, SUITE 308
WASHINGTON, DC 20006
202-822-1333 | 202-822-1334 *fax*

WWW.BIKELEAGUE.ORG

Designed by Johnny J. Hsu
Illustrations by Stephen Haynes
Cover & Left Photo by Maggie Smith

PARTS OF A BICYCLE

THERE ARE MANY DIFFERENT TYPES OF BIKES AND COMPONENTS CAN DIFFER FROM ONE KIND OF BICYCLE TO ANOTHER.

LEVELS OF BICYCLING

BICYCLING SKILLS VARY FROM SIMPLE TO COMPLEX, AND MASTERING THE SKILLS IN OUR COURSES BUILDS CONFIDENCE AND CONTROL. AS YOUR SKILL INCREASES, YOU'LL HAVE GREATER ABILITY TO TACKLE LONGER DISTANCES AND MORE COMPLEX TRAFFIC SCENARIOS.

Throughout this manual, you will find basic riding information to improve your bike handling skills. As your comfort level increases, you will find intermediate and advanced sections that focus on riding in traffic and traveling long distances.

This manual serves as a guide to help you ride in all conditions.

BASICS	STARTING	PAGE 16
	STOPPING	16
	STEERING	16
	SHIFTING	16
	SIGNALING	17
	SCANNING	17
INTERMEDIATE	RIDING IN A GROUP	21
	SHARING PATHS AND TRAILS	22
	RIDING IN THE RAIN	24
	CHANGING WEATHER	24
	RIDING AT NIGHT	25
	CITY RIDING	29
ADVANCED	LONG DISTANCES	26
	DRAFTING AND PACELINES	26
	CLIMBING AND DESCENDING	27
	HIGHWAYS	36

The BASICS

Photo by Lisa Beth Anderson

CHOOSING YOUR BIKE

When looking for a bike, there are many to choose from, so find one that meets both your needs and budget.

WHAT SHOULD I SPEND?

Bikes are available in a wide range of prices, from less than $100 to several thousand dollars. What makes one more expensive than another? As the price of the bike increases, so does the overall quality of the workmanship, materials and components.

WHAT KIND OF BIKE SHOULD I BUY?

To help determine what type of bike is best for you, answer the following questions.

WHAT KIND OF RIDING WILL YOU BE DOING?

WHERE WILL YOU BE GOING?

THE RIGHT BIKE FOR YOU

TYPES OF BIKES

1 ROAD BIKE

If you plan to ride on the road and want to focus on speed, consider a road bike. These bikes are designed for people who want to race, tour, and commute. They're typically lighter, have a dropped handlebar and thin tires. Manufacturers equip road bikes with different types of gearing based on their intended use.

2 MOUNTAIN BIKE

These are ideal for riding on unpaved terrain. They provide a heads-up riding position; have larger, lower pressure tires, and a wide range of gears. These components, along with suspension, allow for a comfortable ride on challenging terrain.

3 HYBRID/COMFORT BIKE

If you're going to ride in the city or on multi-use trails, hybrid bikes are a blend of road and mountain bikes. They typically have an upright ride and narrower tires. These bikes are generally more comfortable than road bikes and aren't capable of handling off-road conditions.

THERE ARE OTHER BIKES THAT ARE DESIGNED FOR SPECIAL USES:

4 ELECTRIC BIKE

Bikes with a battery to provide an additional power boost are known as electric, electric-assist, or pedal-assist bikes. These are a good option if you have physical disabilities, need extra kick to carry kids or cargo, or help going long distances.

5 RECUMBENT BIKE

These bikes place the rider in a reclined position. Recumbents come in a wide variety of styles and tend to be primarily for road riding. They can be useful for people with certain physical limitations from injuries or provide a different feel of comfort.

6 TANDEM BIKE

Bikes that are built for two riders are called tandem bikes and are available in the types of bikes described above. They're great for two riders of unequal ability or fitness to enjoy riding a bike together.

7 FOLDING BIKE

Folding or collapsible bikes are great for combining with bus, train, and air travel as they can be stored easily in a suitcase or bag. Most have small wheels.

There are a number of other types of bikes designed for specific purposes such as time-trials, triathlons, and cyclo-cross racing. Over the past decade, there has been an increase in the number of beach cruisers and fixed-gear bikes, too. These are great for particular uses but may not be where you want to start looking. It's important to visit a local bike shop and let them know what kind of riding you plan on doing.

Find a bike shop in your area at
WWW.BIKELEAGUE.ORG

PROPER FIT

It's important to have a bike that fits properly. Bike frames come in a range in dimensions, so find the frame that's best sized to you.

When straddling a road bike and standing just in front of the seat, there should be 1-2 inches of clearance between you and the top tube. For mountains and hybrids, there should be 3-4 inches.

A step-through bike has a deeply slanted top tube. To fit this type of frame, get on the bike and push one pedal down all the way. There should be a slight bend in your knee.

You may need to adjust the seat height by moving the seat post up or down. Make sure not to extend the post past the safety marking or have it so low that it's touching the frame.

Photo by Maggie Smith

ADJUSTING YOUR BIKE

SADDLE

While seated, you should have a slight bend in your knee when the pedal is pushed down all the way. If your hips rock when pedaling, the saddle is too high. The saddle should be level and not angled up or down. An ideal position for the saddle will align your knees with the center of the pedals when they are horizontal. Everyone's seat preference is different. The type of saddle you get depends on what feels best to you and the style of riding planned for that bike. A bike saddle should never cause sharp pain right away, but it's common for your body to take time to adjust.

HANDLEBAR

Select a handlebar that is comfortable for you. Depending on style, it usually should be about the same width as your shoulders. A dropped handlebar should be adjusted so that your elbows are slightly bent when grabbing the top of the bar. For a flat bar, position the handlebar so that your elbows are slightly bent with your hands on the grips and your forearms and wrists in a straight line.

HANDLEBAR STEM

The length and rise of the handlebar should be adjusted to the position that's most comfortable for you. Generally, the stem will be lower for more aggressive riders and higher for more casual riders.

BICYCLE MAINTENANCE

The steps for the basic bike check are:

ABC QUICK CHECK

Performing a basic bike check before your ride will ensure your bike is in good condition. Timely bike maintenance can prevent crashes.

AIR

To test the air, push on the tires to see if they give. If they do, they need to be refilled. Most bike pumps have an air pressure gauge on them. Match the pounds per square inch (PSI) number that is written on the side of the tire to the number on the gauge. While checking the pressure, take a moment to look for damage to the sidewalls or tread of the tire. If you can see loose threads, the tire should be replaced.

BRAKES

Look to see that the brake pads are not worn thinner than 1/8 of an inch. When you squeeze the brake levers firmly, there should be a thumb's width gap between the lever and the handlebar. If this gap is too small, the brakes need to be replaced. When the lever is released, it should snap back into position. Also, squeeze the brakes to make certain that, when applied, the pads are parallel and aligned with the rim.

CHAIN, CRANKS, CASSETTE

When checking the chain, turn the pedals backwards and look to see that it's clean and does not squeak. The chain should not have any rust. To check the cranks, wiggle both the left and right crank arms in your hand away from the bike frame. There should be no lateral movement. If they're loose, tighten the bolt. Look to see that the cassette, which holds the gears in the rear wheel, is clean and moves freely.

QUICK RELEASE

Your bike may have a quick release lever that is used to secure the seat post, wheels, and/or brakes to the bike. Check to make sure that all quick releases are securely closed. If the quick release is loose, hold the lever with one hand while gradually tightening the adjusting nut in a clockwise direction with the other hand. Tighten the nut until you feel resistance on the lever and then use the palm of your hand to close it.

CHECK

Before you set out, take a brief, slow ride to check that your bike is working properly and feels right.

IF YOU FIND DURING YOUR BASIC BIKE CHECK THAT ADJUSTMENTS ARE NECESSARY AND BEYOND YOUR ABILITY, VISIT YOUR LOCAL BIKE SHOP FOR HELP.

For more tips on bicycle maintenance, please visit:

WWW.BIKELEAGUE.ORG/RIDESMART

INTERMEDIATE

Crucial steps for smooth and functioning shifting:

DRIVETRAIN MAINTENANCE

The drivetrain consists of the chain, front chainrings and the gears in the rear wheel. A well-maintained chain can run smoothly for thousands of miles and will shift gears smoothly and efficiently the entire time. However, the chain is also exposed to a lot of dirt, sand, water, and other things that can reduce its efficiency and shorten its life.

The chain should be well lubricated—but not over-lubricated—at all times. This means you'll need to lubricate your chain regularly, especially after riding in the rain.

To lubricate the chain, take a rag in your palm and hold it around a portion of the chain. Lift the bike and turn the crank a couple of times while holding the rag firmly around the chain. You should notice the chain becoming cleaner.

Apply one drop of chain lube to each link. To do this easily, turn the cranks just as you did when you wiped them clean and place a little drop at each gap where two links overlap. You don't need to use a lot—you'll wipe away the excess anyway. When you've lubed all the links, turn the cranks again to make sure the lube settles properly. Remove any excess lube on the outside of the chain using the rag.

There are a variety of lubricants available at your local bike shop. Remember to never lubricate a chain with grease. Grease doesn't penetrate the chain and collects dirt and grit on the outside.

Photo by Maggie Smith

WHAT TO WEAR

There's no need to go out and buy special gear. You can ride a bike in your everyday clothes. You can keep the chain and its grease away from your clothes by simply rolling up your pant leg or using a leg band.

When riding in the cold, wearing layers is the best way to control your body temperature. You may find that you get warm after you've been on the bike for a bit, so it's important to give yourself options. Gloves and ear warmers are particularly helpful when trying to stay warm.

Riding in the dark or in the rain requires special effort to see and be seen. In addition to bright lights on your bike, you should wear bright clothing. Steer clear of dark colors. Clothing with reflective material is also recommended.

Wool is a great choice for most types of riding as it can be soft, thin, and breathable. It provides insulation even when wet and typically doesn't retain odors as much as synthetics. There are a wide range of options, from professional to performance.

Once you start riding more frequently, or take longer rides, you'll want to check out some of the specialized clothing that's available for biking. Products like padded shorts, Lycra shirts, and bike gloves have a specific purpose and can help make your riding more comfortable and enjoyable.

BUSINESS ATTIRE

Many companies now produce comfortable bike clothing that transitions easily from bike to work or casual environments. But if you're commuting by bike—which is a great option in many communities—you may want to carry a change of clothes, especially if you're riding more than a few miles each way. One useful tip is rolling up your clothes, rather than folding them, to reduce wrinkles. You can easily carry a change of clothes in most bike bags or backpacks, and if you're riding in wet weather you can always put your clothes in a waterproof bag.

Some people will bring a week's worth of clothing to their

Photo by Dmitry Gudkov


Photo courtesy of Fuji Bikes

office over the weekend, or one day of the week, and ride the rest of the time. Others use local laundry services near their work. You will quickly find a system that works for you.

RAIN

If you do any amount of riding, at some point you're going to get caught in the rain. This doesn't have to be a negative experience—in fact, it can be quite fun at times. If you know you're going to ride in the rain, having a good, breathable rain jacket and waterproof pants will help keep you dry (also warm in colder months of the year) and can be worn over your regular clothes. It makes sense for your rain jacket to be a very visible color, as rain and snow affect drivers as well as bicyclists.

LONG RIDES

For longer recreational rides, and certainly for racing, there's a wide variety of specialty clothing to help make your ride more comfortable and efficient.

Gloves are important for two reasons: They help to distribute handlebar pressure across your palms, preventing blisters and nerve compression, and they may protect your hands in a fall. There are fingerless styles and full-finger gloves for cold weather. Be sure to get a pair that fits your hands snugly.

Jerseys are typically made of technical fabrics that pull moisture away from your skin. Depending on what fabric you choose, it can either help keep you warm or cool. Jerseys usually have pockets on the back to carry food, tools, money, or other items you want to keep accessible.

Cycling shoes help you transfer power to the pedals efficiently and may allow you to use clipless pedals. They generally have a stiff sole that resists bending. They allow you to ride longer and stronger, while preventing foot fatigue and soreness. They may not be the best choice, however, if you're going short distances with significant walking in between riding.

By cushioning your sit bones and reducing chafing in sensitive areas, cycling shorts add comfort to your ride. Choose traditional tight shorts with a padded insert, or find a pair of casual, loose-fitting cycling shorts with padding on the inside. It's best not to wear underwear under your cycling shorts, as the seams are in all the wrong places and the material may chafe.

Sunglasses offer protection from wind, grit, and ultraviolet light. Look for glasses that wrap around your field of vision, allowing a good peripheral view. Lenses should be distortion-free and made of a high-impact, shatterproof material. Clear or amber lenses are recommended for cloudy or rainy weather.

MIRRORS

Some riders choose to use a rear-view mirror attached either to their helmet, eyeglasses or handlebar. The advantage of a mirror is that you can scan behind you without turning around and taking your eyes off the road in front of you for more than a split second. The disadvantage is that you lose the visual clue for other road users that the act of scanning provides, and a mirror still provides a limited view of what's going on behind you.

WHY DO CLIP-LESS PEDALS HAVE CLIPS?

Years ago, pedaling efficiency was dramatically increased by adding toe clips—a metal cage with leather straps into which you placed your foot—to the pedals. Once strapped in, you were able to pull up as well as push down on your pedals to generate power. In the mid-1980s, new pedals and shoes appeared that locked your feet to the pedals without the need for toe clips. They were then referred to as clip-less pedals, even though today you clip or "click" your shoes onto the pedals on most road bikes.

EQUIPMENT

The beauty of riding a bike is that you don't need a lot of special equipment or clothing to do it, and you can ride on almost any public road or trail. Regardless of the length of your ride, it's good practice to have a cell phone and some cash on hand in case of emergency.

BIKE LOCK

If you plan to leave your bike unattended for even a short amount of time have a good bike lock. For the best security, combine a cable lock with a U-lock. The cable lock will allow you to connect your seat and/or front wheel to the U-lock that is linked to your frame and bike rack. A heavy chain lock can provide this security by itself, but keep in mind they can be difficult to carry. Racks, brackets, bags, and backpacks are all good options for carrying your lock. You should never carry it on your handlebar as this may interfere with your steering and the balance of your bike.

HOW TO CARRY GEAR

Having a carrying system enables you to combine errands with travel. A sturdy rack is a great component to help carry items when riding. Panniers are removable carrying bags that hang from the sides of a rear rack and are usually big enough to carry some clothes, documents, a few groceries, and other items. There are small packs that are designed to attach to the top of a rack. A simple bungee cord allows a briefcase, books, and other items to be secured without the use of a basket or bag. Front racks and baskets allow easy access to items. These do influence how the bike handles and steers, so practice riding with loaded bags. Backpacks and messenger bags are also a great option. You'll want to make sure the straps are snug so nothing moves unexpectedly and causes you to lose control of the bike. Saddlebags are good for storing very small items.

EXAMPLES OF CARRYING SYSTEMS

Front basket and rear panniers

Front panniers

Rear rack with bag secured with bungee cord

(Top 2) Photos by Maggie Smith, (bottom) Photo courtesy of Po Campo bags

LIGHTS AND REFLECTORS

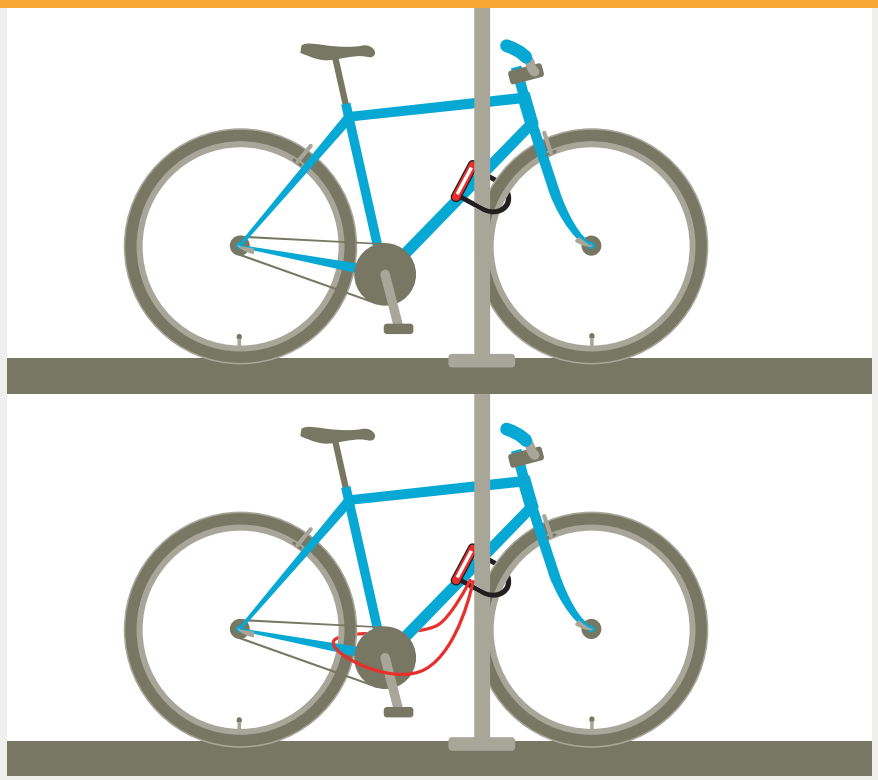
Riding in the dark or rain may happen unexpectedly, and some lights will get overpowered by an automobile's headlights. This isn't the case with reflective tape and clothing, so it's recommended to incorporate both.

Keep in mind where and how the light or reflector is mounted. Mount lights high enough on the bike to be visible. While the seat post is the highest part of the bike, and an excellent place to mount a taillight, be careful not to block the light with cargo or bags on the bike's rear rack. Rear rack-mounted lights are also good but subject to vibration that can break the mount. Mount reflectors low enough to be visible within the low beams of most motor vehicles.

Helmet-mounted lights offer flexible movement of the light beam. A white light mounted on the front of a helmet enables a more selective view of possible hazards in front or to the sides. The movement of a helmet-mounted light often causes motorists to question what they are seeing and then decrease their speed.

Remember to make your bike and body visible from the sides, as well. Reflective sidewalls on bike tires, as well as reflective clothing, can increase visibility.

BIKE PARKING



LOCKING YOUR BIKE

Regardless of where you store your bike, you should always lock it—even if it's just for a few minutes.

Use a U-shaped lock, a heavy steel cable lock, or a combination of the two. Secure both wheels and the frame to an immovable object. Theft can be deterred further by removing the front wheel, locking the brakes against the wheels, or shifting the bike out of gear so that it's difficult to start pedaling. Always take with you any accessories that can be easily and quickly removed, or fasten them in such a manner that prevents easy removal. Register your bike's serial number and identity with your local police department to aid in its recovery if stolen.

WHERE TO PARK YOUR BIKE

When parking your bike, it's best to lock it in a location that is either visible by security or where there's frequent pedestrian traffic. Some buildings offer unused rooms or closets, but if these aren't available, park your bike near the front entrance.

Don't let the absence of a bike parking facility or bike rack deter you from commuting to work by bike. Communicate your needs to your employer or building owner. Chances are they simply haven't been asked before and will be willing to help.

HELMET FIT

A bicycle helmet serves as protective equipment. It's potentially lifesaving, but only if it's worn correctly. Wearing a helmet improperly is the same as not wearing one at all.

For fitting a helmet:

1 TWO-FINGERS WIDTH BETWEEN EYEBROWS AND HELMET

2 SIDE STRAPS MAKE A "Y" BELOW THE EAR

3 LESS THAN 1/2" BETWEEN YOUR CHIN AND THE STRAP

Photo by Maggie Smith

RULES FOR THE ROAD

FOLLOW THE LAW

- Your safety and the perception of bicyclists depend on you.
- You have the same rights and duties as drivers.
- Obey traffic signals and stop signs.
- Ride with traffic and use the rightmost lane headed in the direction you are going.

BE PREDICTABLE

- Make your intentions clear to everyone on the road.
- Ride in a straight line and don't swerve between parked cars.
- Signal turns, and check behind you well before making a turn or changing lanes.

BE CONSPICUOUS

- Ride where people can see you and wear bright clothing.
- Use a front white light, rear red light and reflectors.
- Make eye contact with other road users and don't ride on sidewalks.

THINK AHEAD

- Anticipate what drivers, pedestrians, and other people on bikes will do next.
- Watch for turning vehicles and ride outside the door zone (the space where a motorist can open their door) of parked cars.
- Look out for debris, potholes, and other road hazards.
- Cross railroad tracks at right angles.

RIDE READY

- Before you ride, do your ABC Quick Check.
- Make sure your tires have enough air, brakes are working, chain runs smoothly, and quick release levers are closed.
- Carry tools and supplies that are appropriate for your ride.
- Wear a helmet.

BIKE HANDLING BASICS

GETTING ON AND OFF YOUR BIKE

There's more than one way to get on and off your bike. If you find that it's difficult to lift your leg over your bike, place one hand on your handlebar and the other on your saddle, and lean your bike toward your body. Once it's at a comfortable level, step over the bike with one leg, face the front of the bike, and raise the bike back to the standing position.

To get off your bike, place one hand on the saddle and keep the other on the handlebar. Lean the bike down towards the ground until you can easily step over it. Step over the bike so both feet are on one side and raise the bike.

If it's difficult for you to get on the bike, you may want to look into getting a bike with a step-through frame, which has a slanted top-tube. This type of bike was once referred to as a woman's bike, but is no longer considered to be gender specific.

STARTING AND STOPPING

When you ride confidently in traffic, you send the message that you belong on the road. One of the best ways to do this is to have a strong and quick start. To start riding, stand over the bike. Choose the pedal that is most comfortable for you and move it to an almost upright position. In one smooth motion, push the pedal down, ease yourself back onto the seat, and put your other foot on the opposite pedal. It can be difficult at first to find the second pedal, so it's important to keep practicing.

To stop, push one pedal all the way down and stop pedaling. Shift your weight so that the majority is no longer on the seat and instead on the pedal. You don't want to squeeze the brakes too hard, instead, squeeze both of the brake levers equally—this will allow you to come to a gradual stop. It's important to allow the brakes to do the stopping, not your feet. Once you have slowed to a stop, slide off the seat and put one foot on the ground. If you turn the handlebar slightly away from the side where your foot is on the ground, the bike will lean, making it easier to stand.

STEERING

Riding in a straight line is an important part of being predictable. Most people think the handlebar does all of the steering when riding, but it's actually your body that does a lot of the work as well. If started in motion carefully, a bike without a rider can coast all the way across a parking lot before it eventually falls down. If you turn by just moving your handlebar, you'll make turns that are wide and clumsy. The tighter and smoother the turn, the more you have to lean. Your goal is to use small motions to steer the front wheel as little as possible.

It may sound easy, but riding in a perfectly straight line can be difficult. The best way to practice doing this is to ride while looking up and ahead—try to avoid looking at the ground in front of you. Whenever you're riding, be sure to keep an eye on the road and what's happening around you.

Watch videos to improve your handling basics at: WWW.BIKELEAGUE.ORG/RIDESMARTVIDEOS

SIGNALING

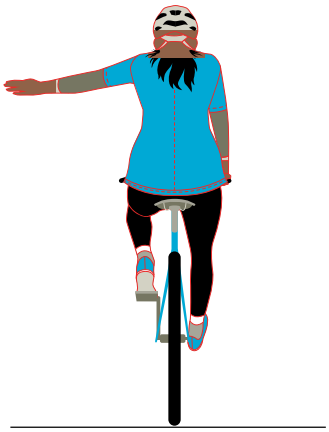
A large part of being predictable on the road is letting others know what you're doing before you do it. Communicating your intentions not only makes you safer, but it's also required by law. You should always let others know when you're turning, changing lanes, or stopping.

Before signaling or changing positions, scan behind you. This gives you information about the other road users. If you can't remove your hand from the handlebar to signal, it's important to scan as this will help communicate with other drivers that you're about to shift position. Signaling is usually done 100 feet before your turn and held for 2-3 seconds. Signal in advance of the turn in order to prepare other drivers and so both of your hands can be on the handlebar during the turn itself for maximum control.

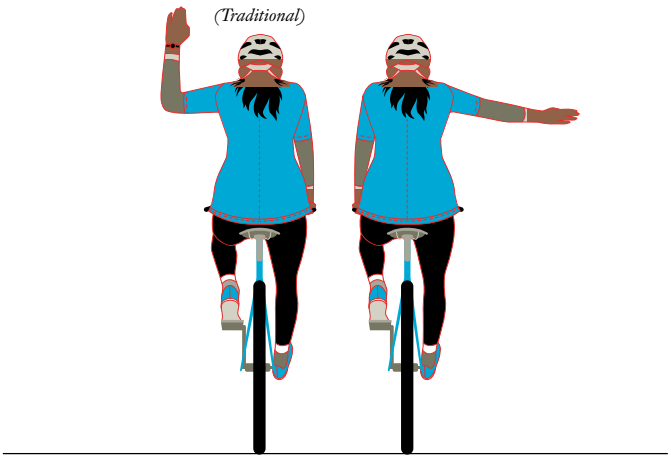
To let others know that you're going to turn left, fully extend your left arm out to the side. To signal your intention to turn right, fully extend your right arm out to the side. A more traditional style is to bend your left arm up at a right angle with your hand flat.

It's good practice to let others know when you're slowing or stopping. You can show this by extending your left arm out and at a downward right angle.

Stopping



Left Turn

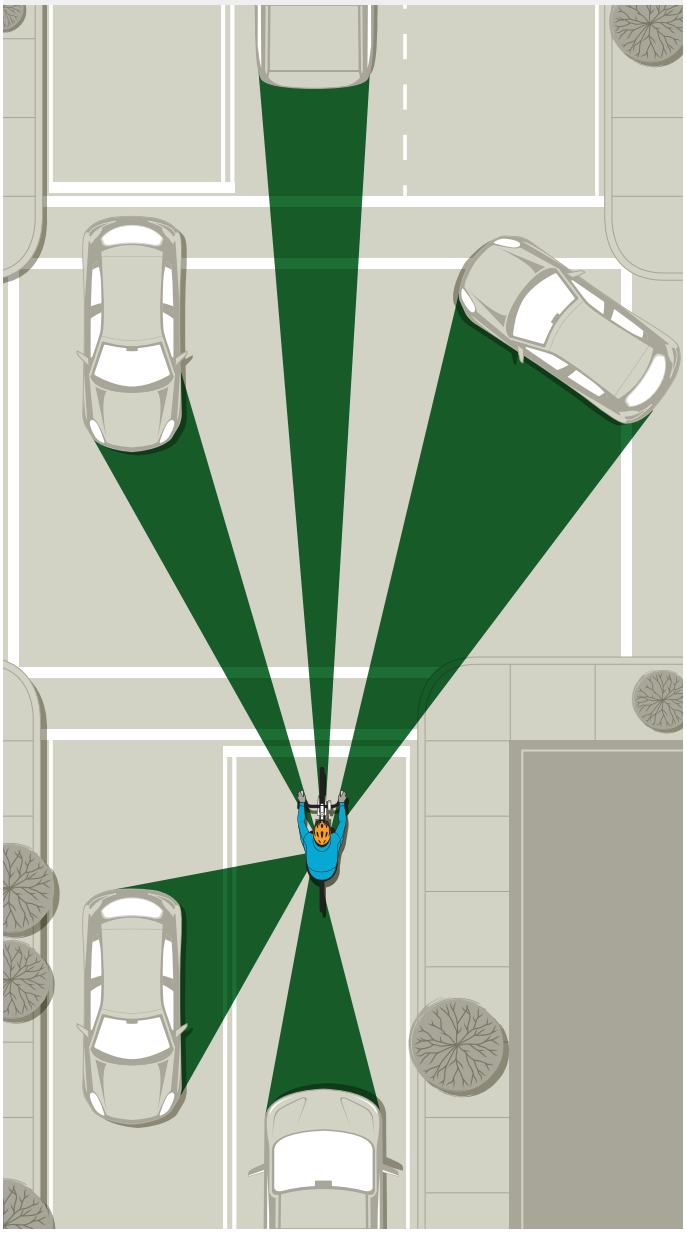


Right Turn

SCANNING

Scanning is simply the act of looking over your shoulder. Scanning successfully is a key part of riding anywhere. It's an easy and safe way to communicate intentions to others, and it also shows you what's happening behind you. Practice scanning so you can keep the bike moving in a straight line when you are looking behind you.

At first, it will be difficult to scan and maintain a straight line. One tactic that may keep you from swerving is to take one hand off the handlebar and place it on the back of your saddle as you scan. With practice, looking over your shoulder will become second nature when riding.

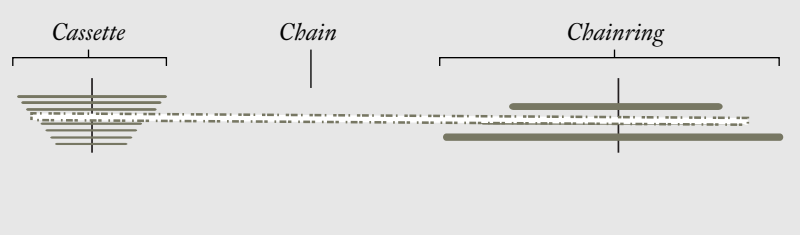


SHIFTING GEARS

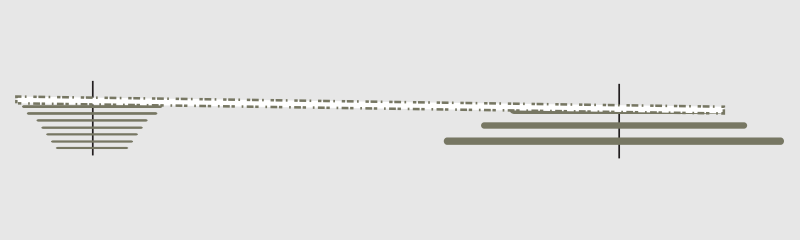
MOST BIKES HAVE GEARS, WHICH HELP THE RIDER TO EXERT NEARLY THE SAME AMOUNT OF PEDALING EFFORT ACROSS A VARIETY OF TERRAIN.

HERE'S WHAT YOU NEED TO KNOW ABOUT GEARS:

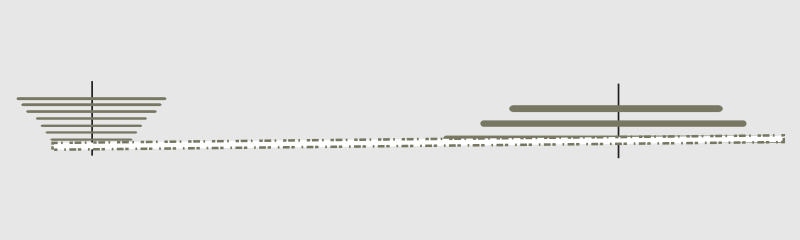
On flat/level ground, you'll want to be in the middle of your range of gears.



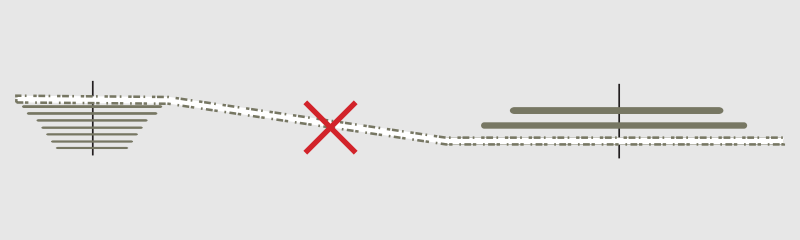
When it's getting harder to pedal (i.e. riding uphill), shift into an easier, lower gear. Each revolution will propel the bike a short distance, but it will take less effort to push the pedals.



When it's getting easier to pedal (i.e. riding downhill), you'll want to be in a harder, higher gear. Each revolution will propel the bike a long distance.



For best results, the chain needs to be in a generally straight line from the front chainring to the rear gears. If the chain isn't in a straight line you might be able to hear it complaining. If so, shift the rear gears to realign the chain.



AS THE CHAIN MOVES FURTHER AWAY FROM THE FRAME, THE EFFORT INCREASES.

GEAR SELECTION

Most road and mountain bikes have between 12 and 27 gears, and you may wonder how and when to use them all. Use those gears to maintain a steady, comfortable pedaling speed regardless of whether you're going uphill, downhill, or are riding on level terrain.

The number of times per minute that you turn your pedals one full rotation is known as cadence. Use gears to maintain a steady cadence, which for most people is between 70-90 revolutions per minute (rpm). When you're riding on a straight, flat stretch of road with your gears in the middle of the range (see graphic on page 18), you should be pedaling at a comfortable speed (rpm) with a moderate amount of resistance or effort required to pedal.

When in a higher gear, it's harder to pedal but the bike travels further for each turn of the pedals. In a lower gear, it's much easier to pedal but the bike travels a much shorter distance with each pedal revolution. Riding in too high of a gear will tire you out quickly as you push hard against the pedals; riding in too low of a gear will mean your legs are spinning too fast. In both cases, controlling your bike is harder than if you're pedaling at a smooth cadence.

CHANGING GEARS

Smoothly changing gears, or shifting, takes some practice. Most of your shifting is likely to be done with your right hand, which moves the derailleur across the back or rear gears. Your left hand changes which of the front chainrings you are using, and the change in gears is much more noticeable. The smaller chainring gives you a lower gear (easier to pedal) and the larger the front chainring the higher the gears (harder to pedal). Remember that moving the chain closer to the bike makes it easier to pedal; moving the chain away from the bike makes it harder to pedal.

WHEN TO USE LOWER GEARS

Going uphill is easier if you use lower gears to maintain a steady pedaling cadence. As you approach a hill, shift to a lower gear before it gets more difficult to pedal. If you leave it too late, you'll find it's more difficult to shift gears when you are pushing hard on the pedals. As you continue to climb, shift to lower gears.

If you're riding into a headwind, shift to a slightly lower gear to maintain cadence. Pushing a high gear into the wind will deplete your energy and hurt your knees. Remember, your goal is to keep pedaling at a comfortable, steady rate.

When you're carrying extra weight in your bags or pulling a trailer with a child behind, you will want to use a lower gear to find that comfortable pedaling speed.

Changing into a lower gear just before you stop or slow down will make it much easier to restart or get back up to speed again.

WHEN TO USE HIGHER GEARS

Shifting to a higher gear means you can maintain your cadence as you pick up speed going downhill. Even if you end up coasting downhill, shifting to a higher gear as you start to descend will make it easier to start pedaling at a comfortable speed once you reach the bottom and start to slow down.

Riding with the wind behind you can make a big enough difference that a slightly higher gear is needed to maintain your pedaling speed.

IN THE WRONG GEAR?

If you find yourself in the wrong gear going uphill, try standing up for a few pedal strokes to gain momentum. Then quickly sit down, ease up on the pedals for a second and shift to a lower gear. If that doesn't work, stop, dismount and change gears by hand with your back wheel off the ground.

If you're in the wrong gear going downhill and your legs are spinning uncontrollably, all you can do is wait until you slow down enough (or you can use your brakes) for your legs to catch up and then shift to a higher gear.

TIPS FOR SMOOTH SHIFTING

- *Shift gears while you're pedaling—but not when you're pushing hard on the pedals.*
- *Ease up slightly just as you shift, especially when changing the front gears.*
- *Anticipate the need to change gears and try to change just before you start to push too hard or spin too fast.*

PRINCIPLES *of* BICYCLING

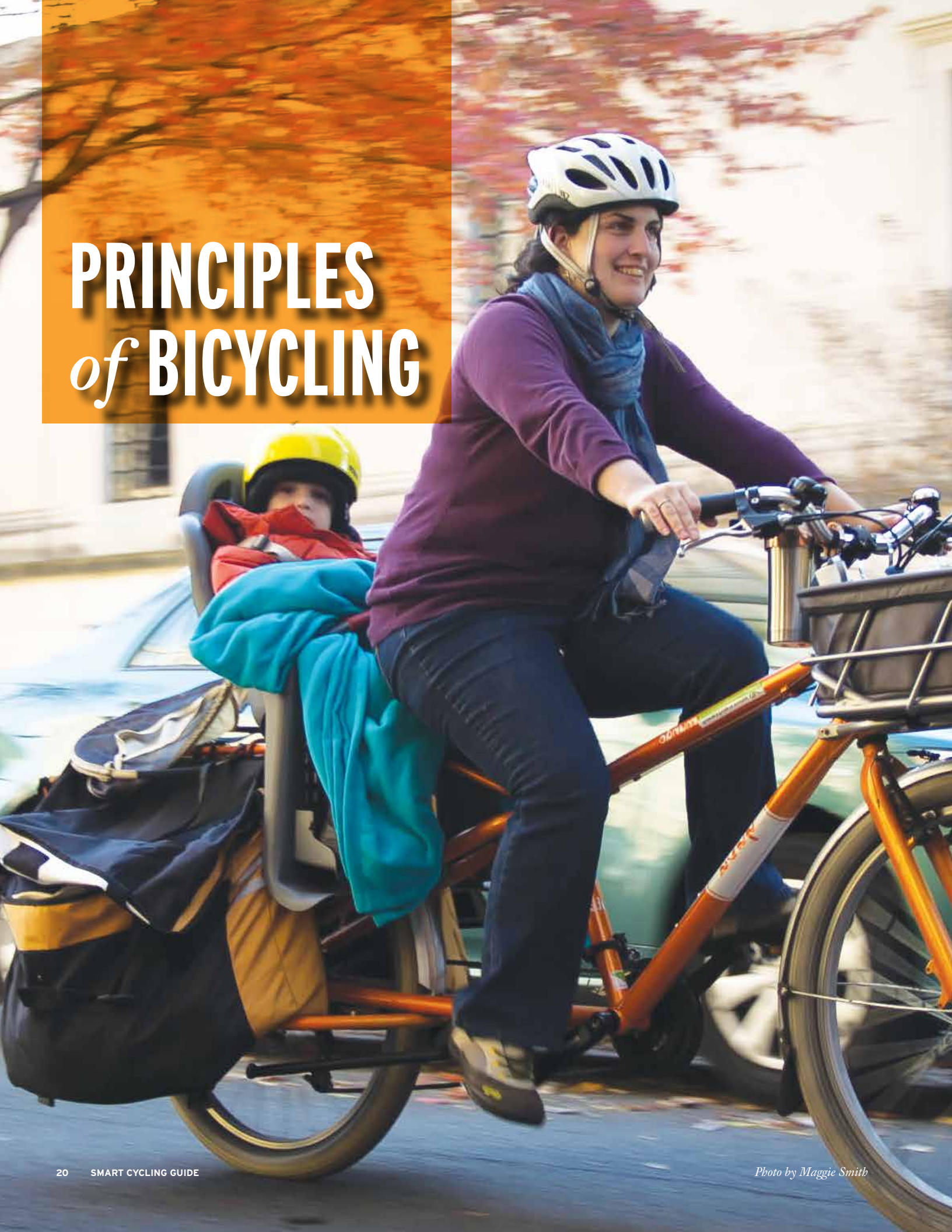


Photo by Maggie Smith

INTERMEDIATE

RIDING WITH A GROUP

Riding with a group can be a lot of fun and is a great way to explore new areas. This type of riding requires more attention to predictability than riding alone, since other riders expect you to continue to ride at a constant speed and position unless you tell them differently.

You'll find you need to communicate more frequently when riding in a group. Some common terms you may hear and should use when on a group ride include:

"On your left"	Indicates you are passing
"Hole/Bump"	Used to point out hazards to other riders
"Car back"	Lets others know when a car is coming from behind
"Car up"	Tells riders that a car is approaching from ahead of the group
"Slowing" or "Stopping"	Used when approaching an intersection

Some riders may say "Clear!" to indicate that there's no car at an intersection. This is a dangerous and should never be done as it encourages people to not think for themselves.

If the group stops along the ride, be sure to move off the road so you're out of the way of other traffic. Remember to think for yourself and look/yield as needed when getting back on the road.

Photo by Pamela Palma

Visit the "Connect Locally" search at
WWW.BIKELEAGUE.ORG
TO FIND A CLUB AND/OR RIDE IN YOUR AREA.

INTERMEDIATE

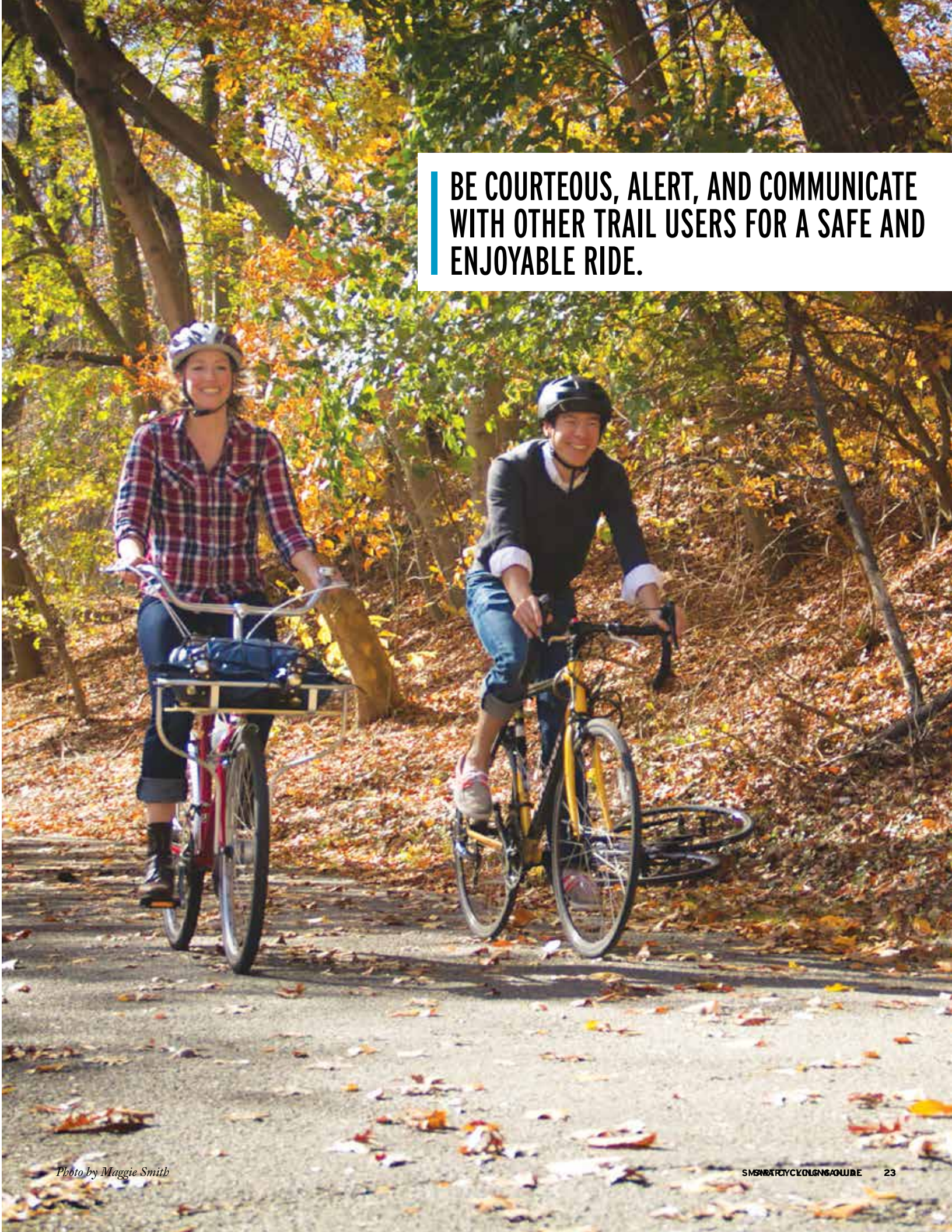
SHARING PATHS AND TRAILS

Multi-use paths are popular, not only for people on bikes, but also walkers, joggers, rollerbladers, baby strollers, and dog walkers. Paths can be congested, so it's important that everyone follows the same rules to have a safe and enjoyable time. Trails were not made for speed; that's best saved for the road.

TIPS FOR SHARING THE TRAIL:

- Be courteous to everyone and yield to all other trail users.
- Know the rules of the trail.
- Say "Passing on your left" or "On your left" to alert other users you're passing—and only pass on the left. Give a clear signal when passing either by using a bell or your voice. Warn far enough in advance that you have time to maneuver if necessary.
- The most dangerous part of a trail is usually where another trail or road crosses, so be cautious and yield to any crossing traffic.
- Always be predictable by riding in a straight line. Warn other trail users of your intentions by indicating when you are turning, slowing, passing or stopping.
- If you're riding while it's dark, be sure to use lights. Most trails are not well lit, so you'll need them—not only so others can see you, but so you can see the trail around you.
- When using bright headlights on trails (and roads) be safe and courteous by aiming the lights at the pavement and not up toward other users' eyes.
- If you're riding with others, do not use more than half the width of the trail. Depending on the size of the trail, this may mean that you have to ride single file.
- If you have trash, carry it until you find a trash can.

Visit the "Connect Locally" search at
WWW.BIKELEAGUE.ORG
TO FIND A CLUB AND/OR RIDE IN YOUR AREA.



BE COURTEOUS, ALERT, AND COMMUNICATE WITH OTHER TRAIL USERS FOR A SAFE AND ENJOYABLE RIDE.

Photo by Maggie Smith

INTERMEDIATE

RIDING IN INCLEMENT WEATHER

Depending on why and where you ride, chances are you're going to encounter a change in weather at some point. Here are some tips on how to ride with the changing conditions.

RIDING IN THE HEAT

When riding in hot weather, it's important to keep the body as cool as possible. Certain wicking fabrics help pull away moisture and keep the body's temperature down. Staying hydrated is also important, so be sure to have a water bottle on hand. Overexposure to the sun is dangerous; use sunscreen on your ears, nose, back of your neck and legs, and the inside of your arms.

Your tires will need special attention when it's hot. Air pressure expands with heat so reducing your air pressure will help reduce tube blowouts. Road heat will affect your brakes as well, so, when going downhill, brake lightly and often. Keep your bike cool by parking it in the shade when not riding.

COLD WEATHER RIDING

When riding in cold weather, you may be cold at the start of your ride, but it typically doesn't take long for your body to warm up. Wearing layers allows you to remove or add clothing as you ride. One of the best ways to keep warm is to wear gloves and have your ears covered.

Photo courtesy of Cleverhood

RIDING IN RAIN

You must be extra attentive to road surface conditions when riding in the rain. Wet roads can be slippery. Tar, grease, and oil accumulations mixed with rain reduce the traction of bike tires, and road hazards are even more dangerous when wet. Pay extra attention to the road paint and tape marking a bike lane, some of which may be extra slippery. Go easy on curves; reduce the speed and sharpness of your turns to reduce the possibility that your bike slides out from under you. Standing water and piles of wet leaves should never be ridden through. They can camouflage road hazards beneath.

When riding on wet roads, you may experience rain, spray, and grime from other vehicles. All of these make it difficult to see. Since visibility is critical, wear bright colors, use a bright headlight, and equip your bicycle with a red rear light. Blinking lights help alert other road users to your presence.

Staying warm is important, so choose a jacket that is waterproof and breathable, as well as clothing that will wick moisture away from the body and let sweat evaporate. Try to make yourself as comfortable as possible. A disposable shower cap makes a great helmet cover and will keep water from running through your helmet and into your eyes. It can be used to keep your saddle protected from the rain as well.

Fenders and mud flaps help keep the water on your wheels from spraying on you or the rider behind you. Brakes don't grip wet rims quickly, so it's important to plan ahead to stop and expect much longer stopping distances. Pump your brakes to squeegee the rims dry so they brake effectively. After riding in the rain, clean and lubricate your chain and derailleur.

INTERMEDIATE

NIGHT RIDING

It's important to adjust your speed while riding at night as street hazards and obstructions can be harder to see. Nighttime can bring a higher incidence of impaired motorists due to fatigue, poor night vision, and alcohol. Remember that wet roads reduce the effectiveness of headlights. Relatively dim bicycle lights may get lost in a mass of brighter lights, so never assume a motorist has seen you. Even if you have properly equipped yourself and your bicycle for optimum visibility, be aware that you still may not be immediately visible to motorists. Don't assume they can see you.

Be extra careful at intersections and when making left turns. Do not get caught in an intersection as the light turns red. Slow down if necessary, so you can stop on the yellow. If you must wait for oncoming traffic before turning left, stop before entering the intersection, not in it, as you would in daylight.

Most state laws identify a headlight and red rear reflector for riding from dusk until dawn. Dirty reflectors and lights lose effectiveness. What lighting you select depends on your riding environment (lighted city streets, dark rural roads, etc.) and conditions (rain, fog, etc.). Lights can be either battery or generator powered. Regardless of the type of light you select, remember to carry a spare or extra batteries. Not having a spare could make for a dark, dangerous ride. It's a good idea to take a nighttime test once you have your bicycle equipped as you would like. Have someone else ride your night-equipped bike with your personal visibility gear to see how easily they can be seen. Then make any necessary adjustments for optimum visibility.

Photo courtesy of Vespertine

REFLECTOR VESTS PROVIDE ADDITIONAL VISIBILITY DURING THE NIGHT.

ADVANCED

RIDING LONG DISTANCES

When riding long distances, technique is much more important than your speed.

DRAFTING OR PACELINING

Drafting is riding behind another person within 3 feet or closer to take advantage of lower wind resistance. It's an important skill that requires practice and permission of the people in the group. Practice with someone you ride with regularly—never draft someone you don't know. Be careful, as drafting can be dangerous, but it really comes in handy on windy days or days of long effort.

PACE

The pace you choose to ride is dependent upon your fitness level, your cadence, and your riding group. A steady pace makes you predictable when riding in traffic.

HOW TO SHIFT

Today shifters and derailleurs are more precise than ever. Even though your rear derailleurs are designed to shift while under full pedaling power, a slight reduction of force helps to complete each shift smoothly. Shift while pedaling, but not while pushing hard on the pedals. Reducing power before shifting is most important when shifting your front derailleur.

SHIFTING SMOOTHLY

Using the gears on your bike will enable you to ride more comfortably for longer distances and periods of time. Match the effort to the terrain and wind in which you're riding. Shifting gears helps accomplish this goal.

Photo by Dean Rodgers

HILLS

Riding in hilly or mountainous terrain can be both rewarding and challenging. Whether you're struggling up a long climb or flying down an exciting descent, there are some particular techniques that will make your ride safer and more enjoyable.

CLIMBING

Getting into a good pedaling rhythm is especially important for longer climbs. In the first part of the climb, work your way down to a comfortable gear to maintain a steady cadence. If the road flattens out for a section, shift up a gear or two. If you're in your lowest gear and the road gets even steeper, stand up on your pedals to get a little extra power in your pedal stroke. Standing on your pedals for a short period can also stretch your legs in the middle of a long climb, which can be a relief.

You will probably be the slowest vehicle on the road when climbing a hill or mountain. Keep as far to the right as is safe, especially at the crest of a hill where sight distances for other road users are shortest.

Lung capacity—and your overall comfort—will be helped by riding in an upright position. On a road bike, ride with your hands on top of the handlebar. Sit up as straight as possible on a mountain bike with a flat handlebar.

Remember to drink and eat during a long climb, and don't be worried about taking a break and catching your breath if the going gets tough.

DESCENDING

Going downhill fast is exhilarating and a welcome relief after a long climb. Get into your higher gears so that when you need to pedal your legs don't spin out of control. You can easily go as fast or faster than other traffic on downhills, so staying in control is critical. Remember, hazards are harder to avoid at high speed, and they appear more quickly.

Control your speed and stay within posted speed limits. You can get a speeding ticket on a bike. Overtake only when it's safe to do so.

Take the lane. If you're traveling the same speed as motorists, ride in the center of the lane so you can avoid debris on the side of the road and discourage overtaking. If the road is narrow and curvy, take the lane regardless of speed.

Lean into curves instead of steering, and remember to keep your inside pedal up so you don't hit the road by mistake. Leaning into a corner and slowly straightening up as you exit the bend will reduce the need for braking.

Brake before you enter a curve. Release the brakes just as you enter the curve and coast through the turn. Using your brakes as you turn reduces traction on the road and increases the chances of skidding.

Keep your hands in close proximity to your brakes at all times. "Feathering" your brakes by using one brake then the other can help prevent heat build-up on the wheel rim. Prolonged breaking can actually cause your tire to blow.

Watch out for debris, cracks, and other surface defects that can greatly increase the risk of skidding and falls, especially on corners and while braking.

If your bike starts to shake at high speed, grip the handlebar tightly and squeeze the top tube of the bike between your knees.

PRINCIPLES *of* TRAFFIC LAW

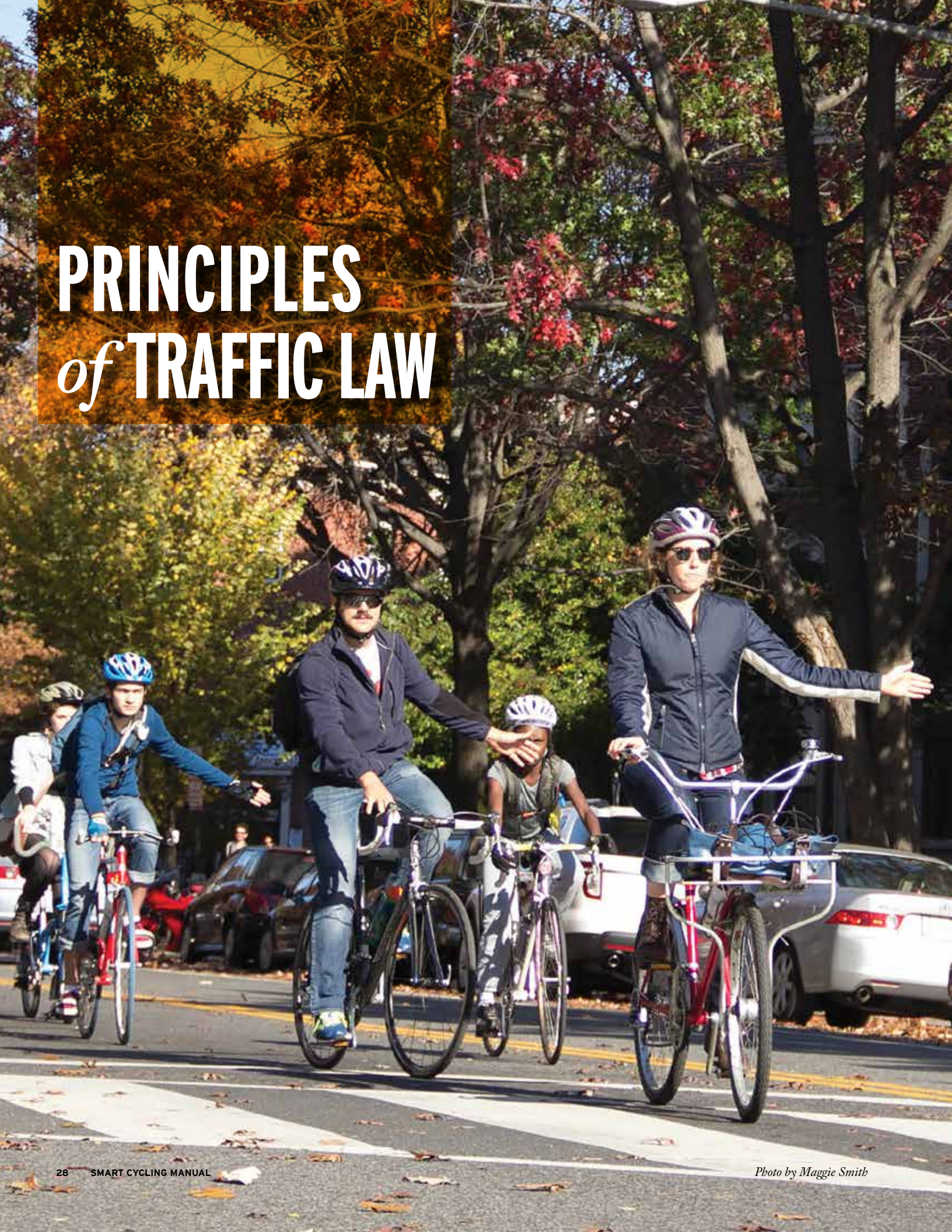


Photo by Maggie Smith

WHERE SHOULD I RIDE ON THE ROAD?

Bicyclists have the same basic rights and responsibilities as motorists. The law states that people on bikes should ride as far right as practicable but doesn't explain what that really means. It doesn't mean you have to ride in or along the gutter—in fact you should never ride there. Practicable means safe and reasonable. If you're on a road where a bike and a car can safely share the same lane, you should be able to ride with at least three feet of clear space either side of you—the curb or parked cars on your right and passing traffic on your left. This will probably place you just to the right of the center of the lane and may also vary with traffic speed. The faster the traffic, the more clear space you'll want between you and the moving cars.

If you don't feel there is sufficient room for the lane to be shared like this, you should ride in the middle of the traffic lane where other vehicles will have to wait until it's safe to pass you rather than share the lane. This is called "taking the lane."

When approaching a stop sign, be sure to place yourself in a position that will tell others where you're going. If you're turning right, be in the right portion of the lane. If you're going straight or turning left, place yourself in the middle of the lane. This will prevent those who are turning right from cutting in front of you. As always, be sure to scan and signal before changing positions.

SPEED POSITIONING

The slowest vehicles on the road are generally expected to be furthest to the right—that goes for farm machinery, big trucks, and people on bikes.

As a general rule, you should only pass other vehicles on the left, although slightly different rules apply if there's a bike lane, or if you're in slow traffic and the right lane is moving faster than the lane to your left.

If you are passing on the right by riding in a bike lane or shoulder, use extra caution as other drivers do not expect you there and you may be in their blind spot.

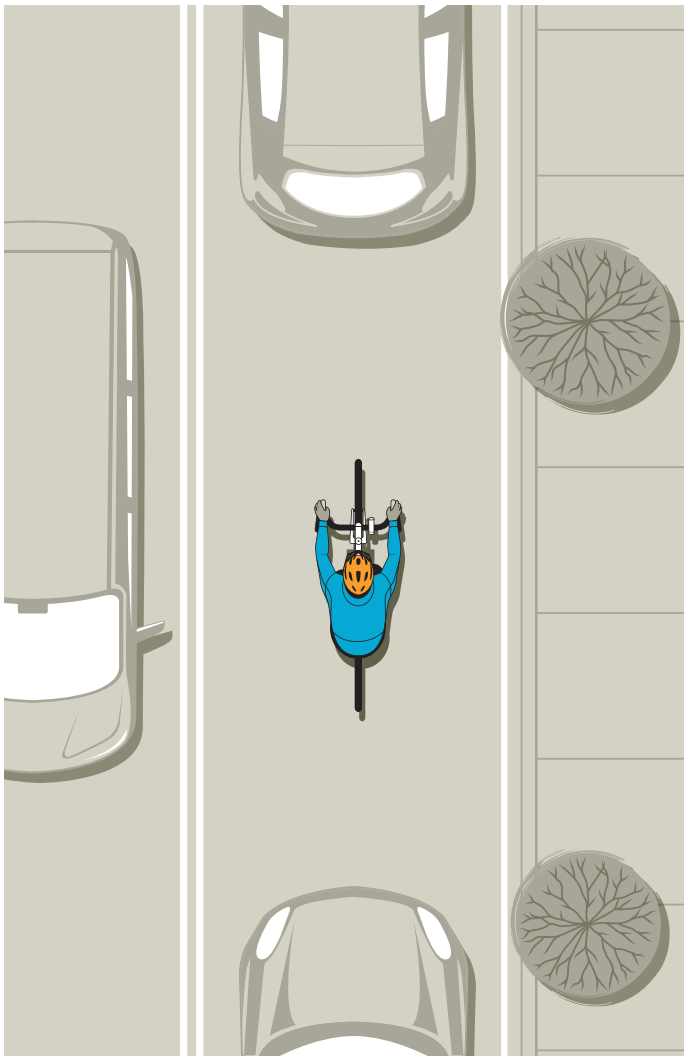
LANE POSITIONING

Always remember that you have a basic right to the road and you're entitled to the space on the road you need to operate safely. Most roads have lanes that aren't wide enough for a bike and a car to share the same lane side by side. That usually requires 14 feet or more.

On quiet residential roads with low speeds, that's not much of an issue. People on bikes are generally not traveling that much slower than other vehicles and there's often plenty of space for a car to safely move over into the left side of the road to pass a slower bicyclist. Be aware of the door zone of parked vehicles—be sure you're not in the path of any door that may open.

On busier roads with just one lane in each direction, you may have to be more assertive and take the lane by riding in the center of the lane. By doing this, you're communicating that motorists will have to wait behind you until it's safe for them to cross into the other side of the road. It can be a bit unnerving to do this at first, but it really has a positive impact on the way people share the road. Remember, we're still talking about lower-speed roads where traffic is moving up to 30 miles per hour. Controlling the lane on higher speed roads uses the same principles but is more challenging and takes more confidence.

Remember that if motorists can tell from farther away that they can't squeeze past you (when taking the lane), they'll be able to plan their lane change earlier, causing less frustration and increasing safety for both parties.



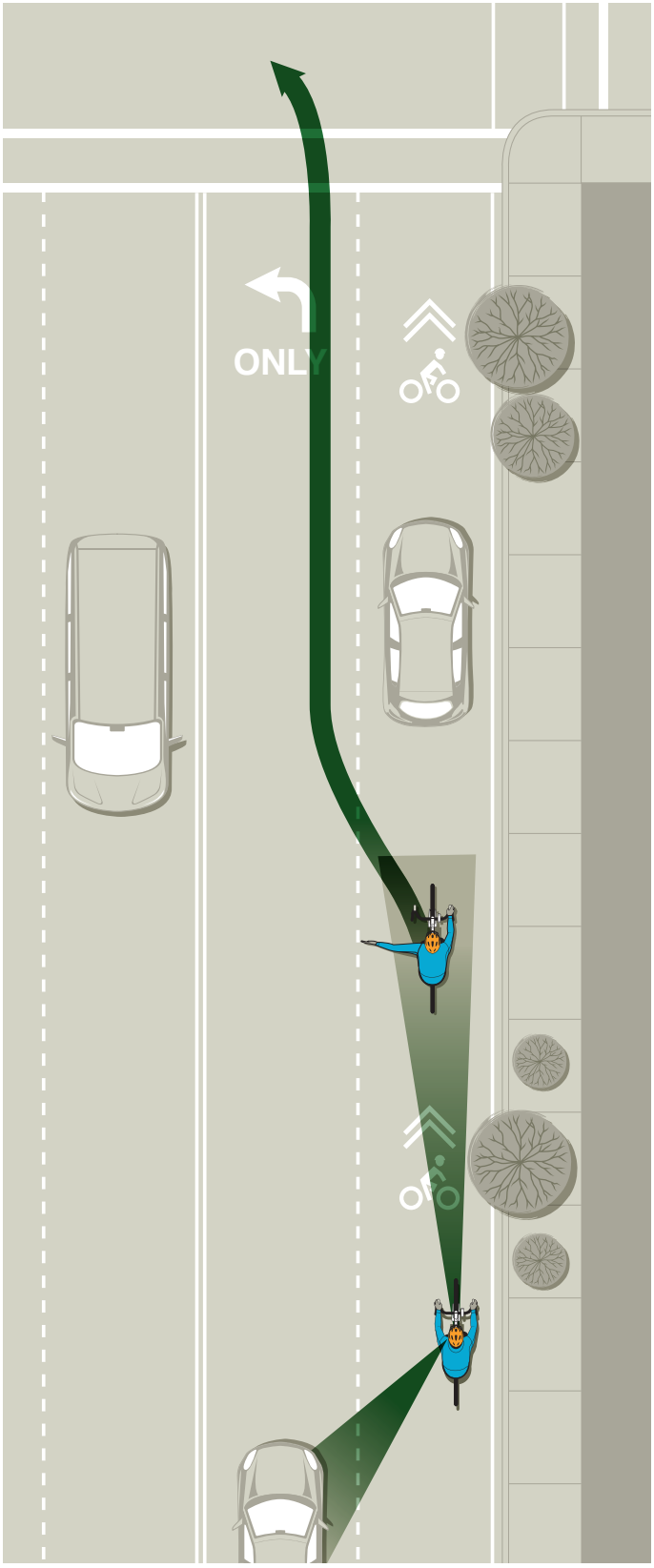
AS A GENERAL RULE, RIDE IN THE MIDDLE OF THE LANE AWAY FROM THE CURB OR PARKED CARS IN A CONSISTENT STRAIGHT LINE WHEREVER POSSIBLE.

CHANGING LANES

To change lanes—make a left turn or move out of right-turn-only lane—you must yield to traffic that's already in the lane you're trying to enter. Scan to see if there's a gap in traffic and signal your intention to change lanes. Moving to the left side of your travel lane can also indicate to other road users that you're planning to change lanes. If it's clear, move smoothly into the appropriate lane position in the new lane. If there's traffic in the lane already, you'll have to wait for a gap. Sometimes a driver will see from your scan and signal that you're trying to change lanes and will let you in—but don't rely on that courtesy.

On busy roads, you may need to start scanning well before you need to turn or change lanes so you can be prepared to move into the gap when one appears. If you're familiar with the road, you can sometimes learn when gaps are created by traffic signals behind you, but you still need to scan and signal just to make sure everything is clear.

You may need to cross more than one lane to get in position for your next turn or move. Ideally, a gap will extend across more than one lane and you can move across multiple lanes to your destination. If that's not possible, you may need to change lanes one at a time following the same scan and signal routine for each lane change.



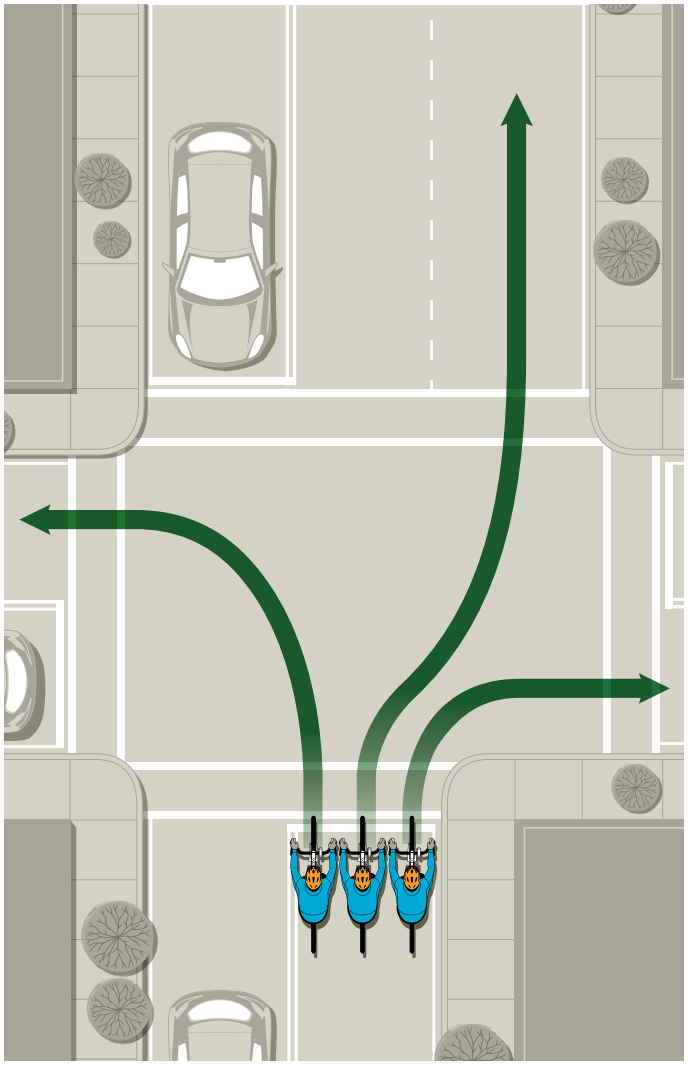
INTERSECTIONS

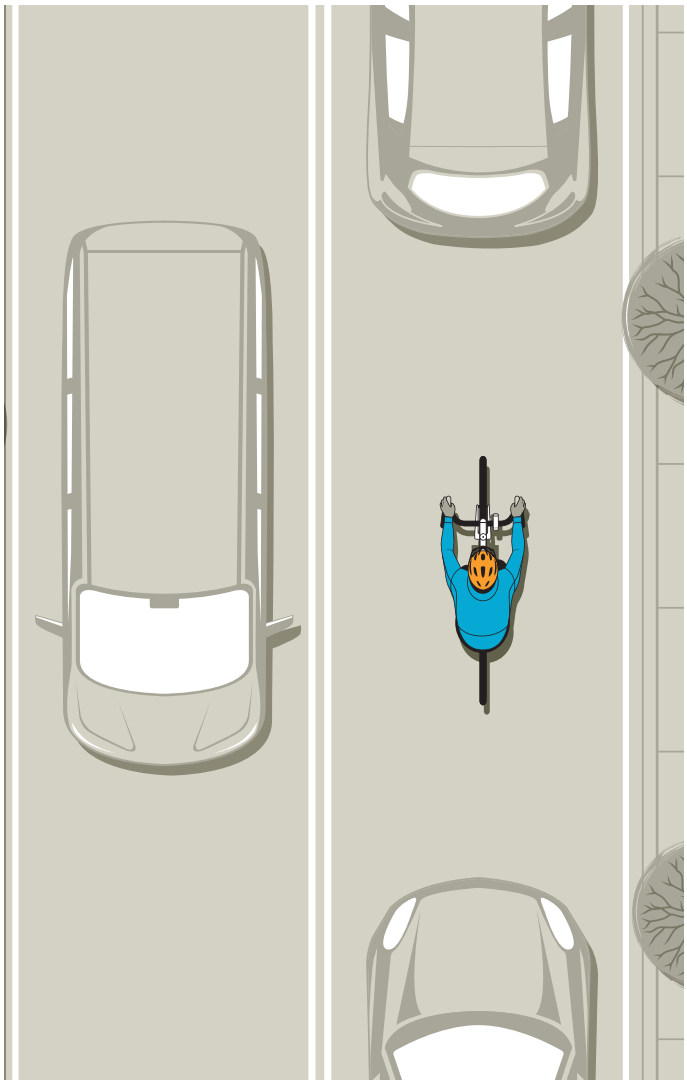
Many crashes involving cars and bikes happen at intersections, so it's important to know how to reduce your risk at these locations. You want to be very visible at all times and, through your positioning and behavior, let other road users know what you're doing and where you're going.

THE MOST IMPORTANT PART OF RIDING THROUGH INTERSECTIONS...

INTERSECTION POSITIONING

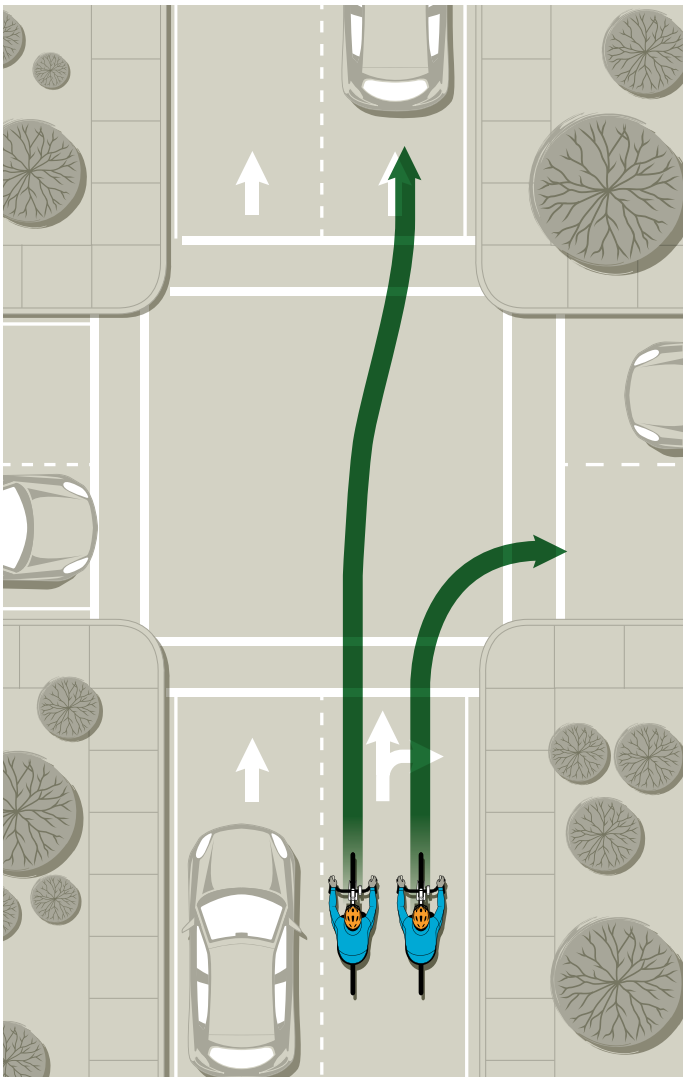
Your position on the road at intersections is critical. As a general rule, you want to be in the rightmost lane that is going in the direction you want to go. If at any time you feel uncomfortable at an intersection, you can always get off your bike and navigate as a pedestrian.





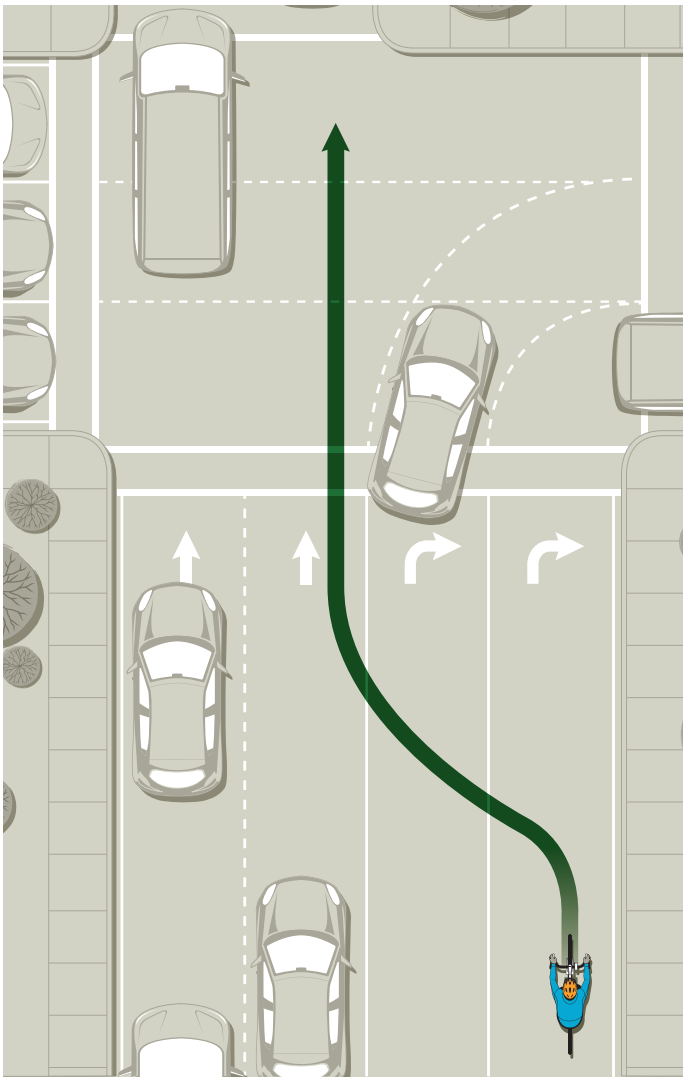
WAITING AT RED LIGHTS

When you're waiting at a red light in traffic, it can be tempting to squeeze your way up to the front of the intersection and get ahead of other vehicles. Not only is this hugely unpopular with drivers around you, but it can be really dangerous if the light changes to green and traffic starts to move while you are in between lanes and vehicles. Similarly, if you're sliding up the side of traffic on the right and a vehicle is making a right turn, they may not see you there. When they start to move and turn right, you can easily get trapped against the curb. This is especially dangerous with trucks and buses whose drivers don't have good visibility in exactly the spot where you are likely to stop.



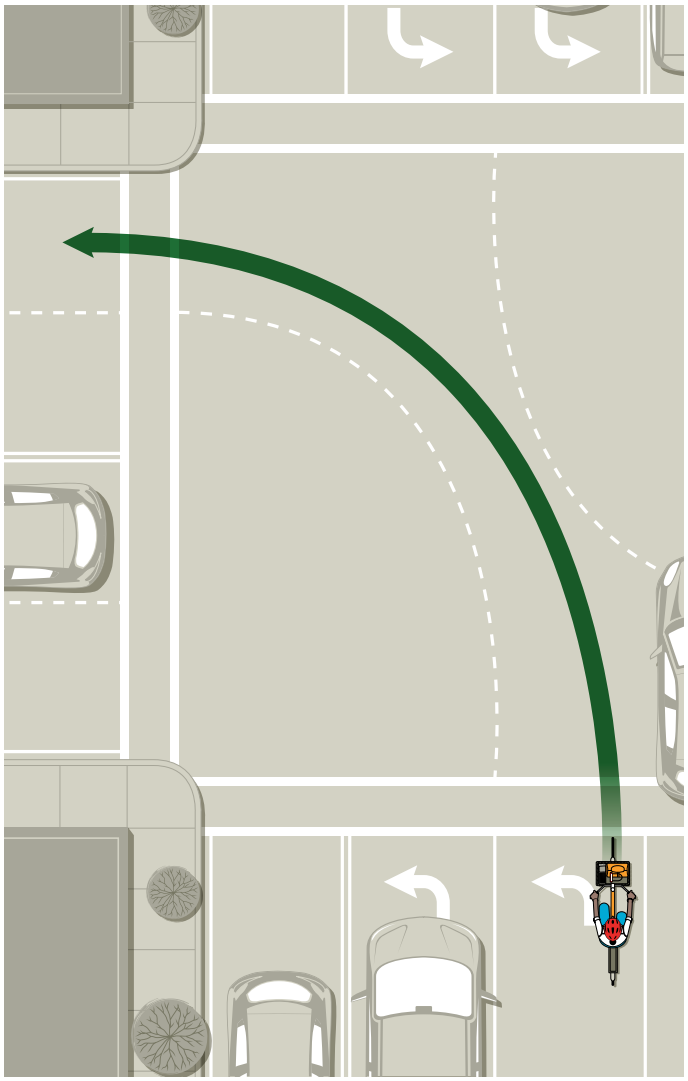
RIGHT TURN AND THROUGH LANES

Lanes that have more than one potential destination can be challenging, for example where the right lane is for both right-turning traffic and straight-ahead traffic. If you're approaching such an intersection and are traveling straight ahead, you should position yourself left of the center lane. This will discourage a right-turning vehicle from passing you and then immediately cutting in front of you.



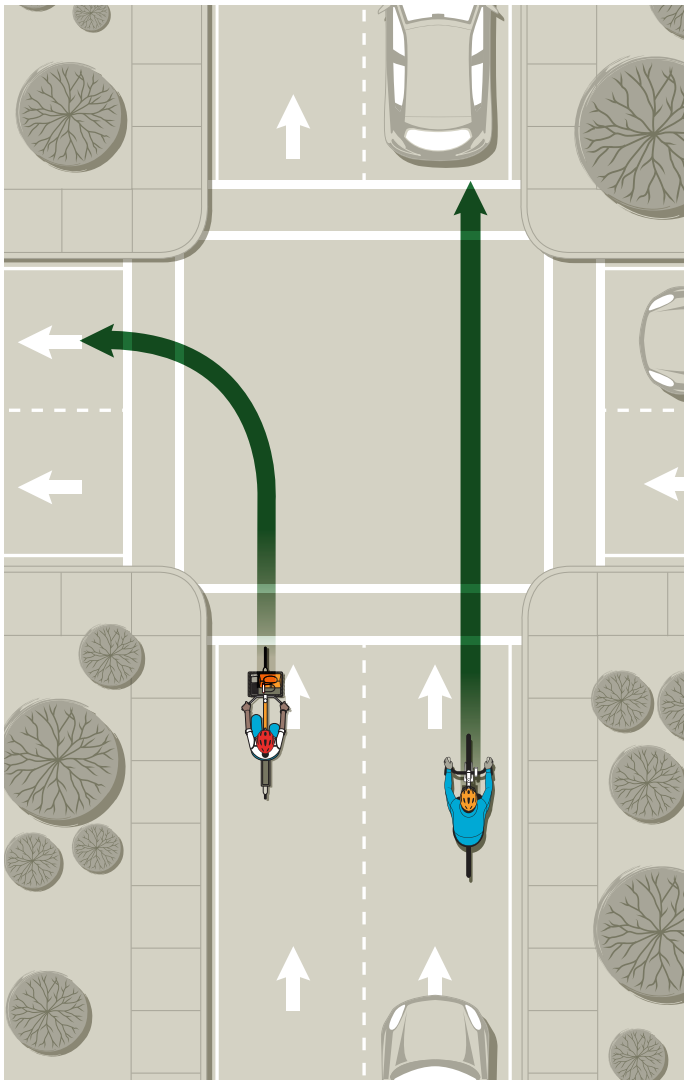
DOUBLE RIGHT TURN LANE

Big roads may have two lanes dedicated to right turns. The same principle applies—if you're traveling straight ahead, cross both the right turn only lanes and position yourself in the right third of the through travel lane. This can be intimidating, particularly when traffic is moving quite fast. If you aren't comfortable doing this, consider pulling over to the right side of the road to wait for traffic to stop or for a gap in traffic to appear.



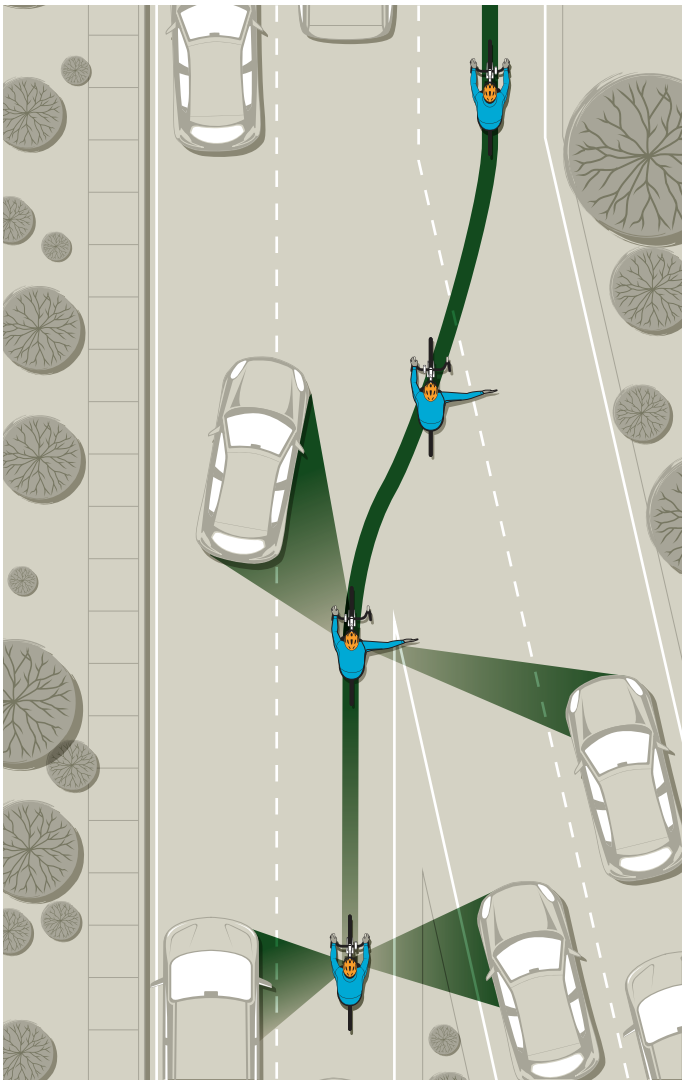
MULTIPLE LEFT TURN LANES

A road with multiple left turn lanes requires you to remember the lane rule and select the rightmost lane turning left. You must then select the appropriate lane positioning based on what additional destinations that lane may serve.



ONE-WAY STREETS WITH TWO OR MORE LANES

If a one-way street is two or more lanes wide, laws in most states allow you to ride at either side. When you make a left turn from a one-way street onto another one-way street, it's easiest to ride around the corner on the left. You would turn left from the left side of the lane if there is little turning traffic, but from the center of lane if both left and straight-through traffic is heavy.



ON- AND OFF-RAMPS; MERGING AND SPLITTING TRAFFIC

Places where two roads merge or split need to be treated with a lot of caution if you're on a bike. Intersections with on- and off-ramps from freeways are particularly challenging: Drivers are likely traveling quite fast, they are looking for a gap in traffic, worried about their lane ending, and they just aren't looking for someone on a bike.

Be assertive. Pay close attention to traffic coming from behind as well as both sides and be as visible and predictable as possible. You should follow the same principles we have just discussed for changing lanes and lane positioning.

As always, remain in the rightmost lane that takes you in the direction you are going.

Change lanes by scanning, signaling, and moving into a gap in traffic. This may mean merging to your right if another road joins yours from the right side.

RIDING ON SIDEWALKS

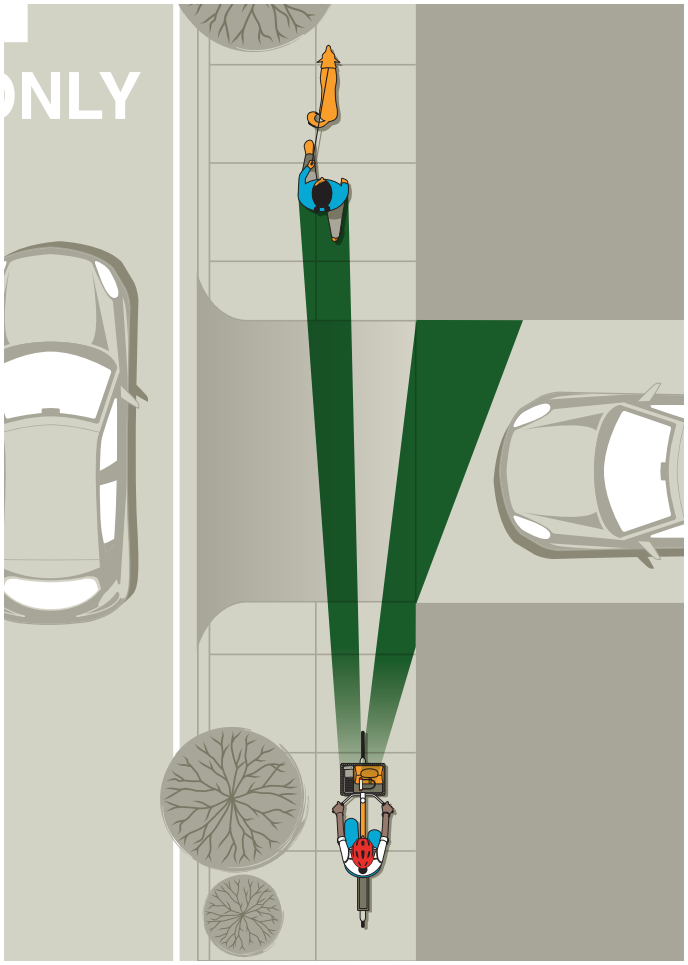
Riding on the sidewalk may seem like a good option, but a lot of crashes happen when someone on a bike is using the sidewalk.

When people are turning or pulling out of a driveway, they often aren't looking for people on the sidewalk. Instead, they're looking for a gap in traffic and simply will not see you, especially if you're coming from the wrong direction. Bikes move at a much different speed than pedestrians, so it's easy to misjudge the speed of someone on a bike.

When riding on the sidewalk, you also have to deal with many hazards: pedestrians, street furniture, signs, and trash. These items don't just make riding inconvenient; they also can make you invisible to drivers.

However, there are times when you may choose to ride on a sidewalk: when crossing a busy road twice in a couple of blocks doesn't make sense, or when there's a long stretch of wide sidewalk without any driveways or crossings on a high-speed busy road where riding on the street feels uncomfortable. In these situations, remember that a sidewalk is designed for walking speed so you must moderate your speed, watch for pedestrians and yield to them at all times. It's important to use extra caution at every driveway or intersection as it is safe to assume that drivers aren't looking for you and haven't seen you.

In some places, laws prohibit bicyclists from riding on sidewalks. Be sure to know the laws for locales where you're riding.



ADVANCED

LIMITED ACCESS HIGHWAYS

In some areas of the country, riding on a limited access highway (usually an interstate) may be the only route from one point to another. Before riding on one, know whether this is legal in the state. In states where bikes are permitted on highways, they're usually required to use the shoulder. Take care not to ride on the painted edge line. Limited access highway shoulders are normally at least eight feet wide. Usually at least four or five feet of clean shoulder are available before encountering debris or gravel along the far edge.

Traveling on the shoulder provides a safer margin against wind blasts from the large trucks. Be alert on shoulders for various types and positions of rumble strips and raised pavement markers. Cross them with caution. Also watch for chunks of tire tread, which occur frequently on freeway shoulders. At entrance ramps, cross the ramp where the merge begins and continue on the right shoulder. For exit ramps, keep to the right until you have a large enough opening to cross the ramp and continue on the through shoulder.

IMPORTANT

In most states, if you are riding on the shoulder, you do not have the right of way when the shoulder ends (intersections, lane merges). Be sure to scan and plan your merge with high-speed traffic in advance for optimal safety.

INTERMEDIATE

RURAL ROAD RIDING

Rural roads are typically more narrow than urban roads and often have no shoulder. Motor vehicle speeds are often higher, so the combination of higher speeds and less road width mean motorists can have a harder time operating around bicyclists. Motorists may have to cross into the opposing lane to pass, and often they are reluctant to cross the double yellow lines even if no oncoming traffic is present. Be alert to motorists who are passing an oncoming vehicle as they'll be in your lane and approaching head-on at a very high speed. A higher speed differential between motorists and people on bikes may give the motorist less time to react. Horizontal and vertical sight distances are sometimes poor due to curves, hill crests, embankments, and vegetation near the edge of the road. Also, rural roads are not usually well lit.

Does this mean you should avoid riding on a rural road? Absolutely not. Rural roads are often a delightful place to ride—so long as you're prepared.

BE VISIBLE

WEAR BRIGHT COLORED OR REFLECTIVE CLOTHING AND YOUR HELMET. REAR-END COLLISIONS ARE ABOUT FOUR TIMES AS FREQUENT ON RURAL ROADS AS ON URBAN ROADS, AND THEY USUALLY OCCUR AT NIGHT.

WATCH FOR ONCOMING TRAFFIC

Head-on collisions can result when an overtaking motorist coming from the other direction crosses over to your side of the road. When there's no traffic behind you, sit upright, move farther into the lane and be watchful for the driver who peeks around the lead vehicle of oncoming traffic. When you see a motorist do this, wave your left arm repeatedly in a full arc to gain the driver's attention. If they still pull out to pass, brake and leave the road quickly.

WINDBLAST

Windblast is a distinct hazard in rural areas with large open spaces and large trucks passing relatively close at high speeds. The passing truck pushes air in front of it and then creates a partial vacuum behind it as it moves past you. This will first push you to the right, and then pull you to the left. Be prepared to counteract these forces by adjusting your lean. Give overtaking trucks as much room as you can, and slow down if necessary to reduce the risk.

SHOULDER RIDING

If a ridable shoulder is present — four feet or more in width, free of rumble strips and debris — you should use it. Ride far enough to the right of the edge stripe to allow motor vehicle traffic to safely pass you without having to cross over the centerline or change lanes. On higher-speed roads, this may mean riding even further to the right. Remember to scan ahead for surface hazards, which are common on rural, less maintained roads. Shoulders often deteriorate quickly and may end abruptly. Rumble strips may start without warning and eliminate much of the ride area of the shoulder. Plan ahead to merge with traffic on the road and remember to consider the cracks or seams between the road and shoulder that often exist. This movement onto the road should be considered a lane change. Look behind, signal and yield to traffic before moving left.

BICYCLE FACILITIES

Photo by Allan Crawford

BIKE INFRASTRUCTURE

Bike infrastructure is being installed in communities across the country. The League welcomes this development and believes that bike infrastructure is encouraging more people to ride and makes biking safer and more convenient.

As with riding on more conventional shared-use paths and striped bike lanes, the basic principles of Smart Cycling hold true for all bike facilities: follow the rules of the road, pay attention to everything going on around you, make sure you're riding predictably and are quite visible. More specifically, don't ride against the intended flow of bike traffic and use the same lane positioning rules as if the bike lane were a regular travel lane (which, technically, it is). Always be careful at intersections and watch for turning traffic.

Many people like riding on shared-use paths because there's no motor vehicle traffic. However, there are more issues with people running, pushing baby strollers, or walking dogs. Conventional striped bike lanes on the road remove those other users, but reintroduce the presence of traffic. Similarly, bikeways offer a spectrum of benefits: Some have complete separation from motor vehicles, while others provide more priority for bicyclists without necessarily separating them from traffic. As a user, there are some general principles to keep in mind and some specific advice for using this infrastructure.

REQUIRED USE?

In most parts of the country, bicyclists are not required to use specific bike infrastructure. You should be familiar with your local laws so you'll know if you are in one of the few states or localities that have a "mandatory use of bike lanes" law. If you are, there are generally still exceptions that allow you to leave the lane for your safety—for instance, to avoid an obstacle or threat, or to make a turn from the appropriate lane.

REMEMBER TO:

- BE PATIENT
- RIDE AT A SAFE SPEED
- FOLLOW STANDARD RULES
- TAKE CARE AT INTERSECTIONS
- WATCH FOR CAR DOORS, DEBRIS, AND PEDESTRIANS MID-BLOCK

PEDESTRIANS

One of the great advantages of bike lanes is that they also provide a buffer between pedestrians and motor vehicles, making the walking environment better. Where the bike lane is protected by a concrete barrier or curb, that barrier may also provide an additional refuge for pedestrian to use when crossing the street. However, riders should always be on the look-out for pedestrians stepping off the sidewalk and into the bike lane in order to shorten their crossing distance.

ROAD MAINTENANCE

The greater the degree of separation from motor vehicles—perhaps using parked cars, concrete planters, or an elevated surface to separate bikes from the rest of traffic—the greater the issues you may encounter with maintenance. Unless the bikeway is swept regularly, you may need to look out for glass, sand, and debris, which may accumulate in the separated lane.

PARKED CARS

The less separation that's provided—where flexible posts, extra striping, or colored pavement are used to designate the bike space—the greater the chances of having to deal with illegally parked or stopped vehicles. Be prepared to encounter illegally stopped vehicles and anticipate well in advance how you're going to avoid them. Scan behind you to see if it's safe to leave the dedicated bike lane before you change lanes, signal as you change lanes, and move back into the bike lane after the obstruction by following the same steps.

HOW TO RIDE SAFELY ON BIKEWAYS

Beyond the general tips for riding on bike infrastructure, particular types of bikeways—like protected bike lanes—come with specific recommendations to ensure your ride is both comfortable and safe.

PROTECTED BIKE LANES

When a simple stripe isn't sufficient, local agencies may "protect" the bike lane with flexible posts, parked cars, concrete planters, or other physical barriers. While riders will enjoy the relative calm of the bike lane between intersections, they should pay special attention at the intersections to make sure they are visible to turning vehicles—especially if parked cars are used for the buffer.

TWO-WAY PROTECTED BIKE LANES

On a two-way protected bike lane, intersections can be a major issue. A well-designed intersection will separate as many conflicting turn movements as possible by using traffic signal timing and phasing. This would mean, for example, that turning vehicles have a red light while bicyclists still have a green light to go straight ahead. A two-way bike path on a one-way street adds yet another layer of complexity as motorists will not be looking for other vehicles— like you—traveling in the opposite direction from the flow of traffic. Riders need to be aware of this and not assume that drivers are going to stop or yield to bicyclists, or that they have seen you.

Also, on two-way lanes you always have to pay attention to bicyclists coming in the opposite direction, especially if the width of the lanes is five feet or less. Keep to the right of the lane, but, as you would on the road, not so far to the right as to risk striking a curb or parked car or whatever is creating the physical barrier.

Photos by Maggie Smith

SPEED

Some of bike infrastructure designs—particularly two-way paths on one side of the street, or narrow lanes for bikes—may mean that sometimes you have to wait behind slower bicyclists or travel a little slower than you might on a similar street without the bikeway. That's OK. You can't always drive the speed you want either, and you may have to stop at the next intersection anyway. If you really need to go significantly faster, you're better off using a different route. But the dramatic overall improvement in bicycling safety, comfort, and increased use that comes with this type of infrastructure is well worth the trade-off.

INTERSECTIONS AND TURNING VEHICLES

Generally speaking, bike infrastructure follows the same engineering principles as the rest of the road, so you need to always be watching for turning vehicles, cars and trucks pulling out of driveways, parking garages, and side streets. In some instances, a new bikeway design may introduce an unusual turning movement, or may put bicyclists in an unexpected place: for instance, if a two-way bike path is put on a one-way street. People get used to this over time, but smart bicyclists will always be watching for motorists turning across their path.

BIKE BOXES

At intersections with heavy right-turning traffic, a major left-turning bike movement, or simply where bicyclists are being given priority at an intersection and are encouraged to get to the front of the line of traffic, a bike box may be installed in conjunction with a striped bike lane leading into the box. The idea is that bicyclists can filter forward and be more visible at the front of the line—and get into position to make their next movement—in a large box, often painted green, in between the stop line for motor vehicles and the crosswalk.

Riders should know that the bike box is really only effective for maneuvering when the traffic signal is red and motor vehicles are stopped. At other times, bicyclists should treat the road as if the bike box were not there and position themselves according to the lane positioning rules here. When traffic is stopped, riders approaching the intersection with the bike box should use the bike lane to enter the bike box and position themselves in the appropriate position for their next move.

LEFT-SIDE BIKE LANES

There are some good arguments for installing bike lanes on the left side of the road in certain situations: for example, on busy, multi-lane one-way streets with heavy bus traffic, or where the majority of bicyclists are preparing to make a left turn. The downside is that motorists may not expect to see bicyclists to their left, and riders making a right turn must decide whether to move to the right lane to make their turn or make a pedestrian-style turn.

BUFFERED BIKE LANES

Buffered bike lanes are where an additional bike lane stripe and/or hatched area is marked on the road to provide a greater level of separation between motor vehicles and bicyclists. Riders should be wary of the unintended consequences of providing that additional width. It may be enough to encourage drivers to stop or park in the bike lane; bicyclists may be more likely to ride two or three abreast; and, especially on one-way streets, other riders may be encouraged to ride the wrong way against traffic. Watch for this behavior and be prepared to react accordingly.

RAISED BIKE LANES

In some cases, bicycle lanes have been built at a higher level —or step up—from the level of the road (sometimes at the same level as the sidewalk but often in between the road and sidewalk). This is usually done with a rolled curb rather than a curb face with a 90-degree angle. Bicyclists should obviously take care to avoid riding too close to the edge of the bike lane, as even riding over a rolled curb at the wrong angle can cause your wheels to slide out from under you.

HAZARDS *in* BICYCLING

Photo by Jeff Scher

CRASHES AND HOW TO AVOID THEM

A lot of numbers and theories are thrown around about bike crashes and how they happen. Here are some things we know.

Bicycling is a healthy and safe activity, but it isn't without some risk. Health experts around the world confirm that an individual is healthier and safer riding a bike than not doing so, by a factor of between 12 and 20 to one.

Approximately 650 people riding bikes are killed in crashes with motor vehicles each year in the United States. The average age of people killed in these crashes has risen quite markedly, doubling from 21 to 43 years over the past 20 years. Four states—Florida, California, New York, and Texas—typically account for 40% of the fatal crashes. The number of bicyclists injured in crashes with motor vehicles is estimated to be around 45,000 annually.

Studies of hospital admission records suggest that as few as one in 10 bicycle crashes causing injury are reported to the police, in large part because the police usually only record and report those crashes that both involve a motor vehicle and occur on a public road. This theory is backed up by studies of experienced adult bike riders that suggest up to half of all bike crashes are falls involving no other vehicle—for example, when people fall on gravel, railroad tracks, or drainage grates.

A hospital admissions study in the early 1990s documented more than 30 distinct crash types, and the frequency with which they happen. Two studies of riders, published in 1974 and 1996, also looked at where and why crashes occur, and there were many similarities (Jerrold Kaplan, 1974 and William E. Moritz, 1996). As a result, bicycle safety education programs have focused on changing certain risky behaviors including:

- Riding on the sidewalk
- Riding the wrong way, against traffic
- Riding the wrong way on the sidewalk
- Ignoring stop signs and traffic signals (both motorists and bicyclists)
- Failing to yield when turning (primarily motorists turning left or right across the path of a bicyclist)

As rider experience increases, the number of crashes decreases. Equally important, studies in numerous cities and countries show that the more bicyclists that are out on the roads, the safer riding becomes.

TYPES OF HAZARDS

WHAT ABOUT ... GETTING HIT FROM BEHIND?

If you ask most people about their own safety on a bike, they're worried about getting hit from behind or struck by a passing motorist. Yet this scenario doesn't show up among the leading causes of crashes.

The fear of being hit from behind is ever-present when riding on the road, since you can't see what's going on behind you all the time. Statistically, though, being hit from behind just isn't as frequent as people turning across your path at intersections, especially in more urban areas.

When this type of crash does occur, it tends to be more serious as it happens on higher speed roads—often more suburban and rural—and the consequences are more serious. Our own tracking of one year of crashes found that 40% of fatal crash victims were hit from behind or struck by a passing motorist.

WHAT ABOUT ... WHO IS TO BLAME?

As a general rule, the causes of crashes suggest that when adult bicyclists are involved they are "to blame" in one-third of crashes with motor vehicles. This is reversed when children are the victims. Of course, when the bicyclist is killed it's impossible to get his or her side of the story.

WHAT ABOUT ... HELMETS?

There is a famous and oft-quoted study from the prestigious Harborview Injury Prevention Center in Seattle that more than 80% of fatal bike crashes could be prevented if bicyclists wore helmets. This isn't quite accurate. There is no doubt that, all things being equal, if you hit your head in a bike crash or fall, your head will be better protected if you are wearing a protective helmet, and that, in some cases, will save your life. However, wearing a helmet doesn't prevent crashes from happening in the first place, and only protects your head. A collision with a car (or the road) at 30 miles per hour or more is likely to cause potentially life-threatening injuries to many other parts of the body. The League has encouraged wearing a helmet for decades, and our affiliated clubs usually require the use of helmets on all their rides. However, the topic is not an aspect of our education program because our focus is on preventing crashes from happening in the first place.

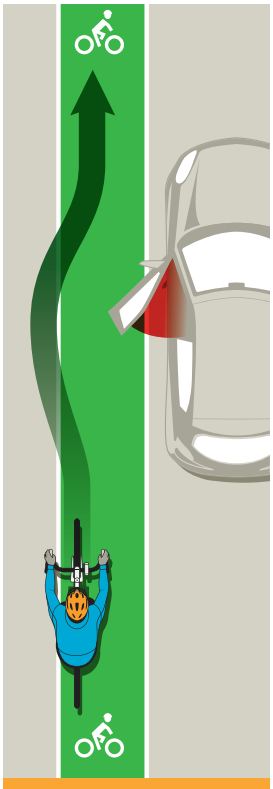
WHAT ABOUT ... DOORING?

Many local crash studies find that dooring—when a motorist opens his or her door into the path of a bicyclist—is a much bigger issue than the national data suggests.

Most of these local studies are done in cities or urban areas where there is a much greater likelihood of people on bikes having to ride next to cars parked on the street (and with limited street width).

And the national data tends to focus on crashes in which people on bikes are killed or seriously injured. While that can certainly happen as a result of dooring, the chances are greater that being doored will cause a nasty collision and injury, but rarely result in death.

Car doors may open unexpectedly, so ride far enough away to safely avoid them. Cars leaving parking spaces can be avoided by staying attentive to whether a driver is present and the motor is running.



BE ALERT IN CASE THE UNEXPECTED OCCURS.

FIVE LAYERS OF SAFETY

1. BIKE CONTROL
If you can skillfully control your bike by starting, stopping, signaling, and maneuvering smoothly, you will avoid falling or running into other bicyclists, cars and pedestrians.

2. FOLLOWING THE RULES
Follow all traffic laws, obey signs and signals, and use the correct lanes. Situational awareness is key, so be alert, predictable, and visible.

3. POSITIONING
Know when to control the lane or when to share a lane. Use your lane position to tell drivers what you're doing and discourage them from turning right or left immediately in front of you—a right hook or left cross—or other movements that put bicyclists at risk.

4. HAZARD AVOIDANCE
When all else fails and you're faced with a critical situation, understand how to maneuver your bike to avoid crashing, or at least limit the consequences of a crash. Practice in safe conditions to become adept at these maneuvers.

5. PASSIVE SAFETY
Wear a helmet so, if all else fails, you have a final layer of protection.

IN ADDITION TO MOTORISTS AND TRAFFIC CONDITIONS, THE ROAD SURFACE ITSELF CAN PRESENT HAZARDS AND PITFALLS.

SURFACE HAZARDS
Surface hazards can often be avoided if you pay attention to the road surface in front of you. It's far easier to plan to steer around a hazard than initiate an emergency maneuver.

METAL SURFACES
Take extra caution when riding over metal objects, as they can be very slippery. Proceed slowly and do not brake or turn quickly on metal grates, plates or slats. Water can make these even more slippery than usual, so try to avoid them if it's been raining.

CRACKS AND PAVEMENT JOINTS
Surface cracks and uneven road surfaces that run parallel to where you're riding can cause you to fall. In order to avoid this, cross over them at a right angle.

RAILS
When riding around rails, it's important to coast and stay vertically upright. If possible, do not to turn, use the pedals or brake—and cross the rails at a right angle without compromising any of the above.

VISIBILITY HAZARDS
Being seen when riding in various degrees of darkness is a serious consideration. When you're riding early or late and the sun is near the horizon, be extra cautious because visibility is reduced. Be prepared if you think you may be out during this time. Have appropriate lighting and wear light-colored, reflective clothing.

Other weather and environmental conditions such as rain, fog, or wind may obstruct your ability to see ahead and the ability of other road users to see you. Choose your place on the road with extra care when encountering these visibility impairments.

Objects such as parked or moving vehicles, fences, bushes, trees, buildings, and pedestrians can block your view of other traffic. Approach these objects cautiously, control your speed and be alert as you may be unable to see something until the last moment.

ADVANCED

HAZARD AVOIDANCE MANEUVERS

Riding safely on the road requires knowledge and understanding of traffic laws and the principles that determine and govern these laws. But even when you ride predictably and occupy your proper place on the road, situations may arise that necessitate maneuvering to avoid hazards or collisions. The ability to execute an evasive maneuver could mean the difference between a close call and a crash. Be sure to practice these often. For any of these maneuvers to work when you need them, they must come naturally.

QUICK STOP

When you're riding in traffic and something stops suddenly in front of you, you need to bring your bicycle to a Quick Stop, under control and in a short distance.

If you're like many people, you may instinctively grab both brakes in an emergency and apply them equally until the bike begins to skid. You have no control, and a wheel that is skidding offers virtually no stopping power.

There's an art to stopping a bike in an emergency. When you apply the front or rear brake, the bike begins to slow down and your weight transfers forward. The more weight on a wheel, the more effective the braking and the less likely it is to skid.

So the logic for effective braking is:

- Braking with the rear brake alone will help prevent pitch-over, but it is not very effective.
- In theory, you can stop fastest with the front brake, but an error will pitch you over.
- For a fast, safe stop, use both brakes. This produces the optimum deceleration. If the rear wheel starts to skid, ease up slightly on the front brake.
- When braking hard, slide your body back on the saddle as far as possible.
- When carrying a heavy load on the rear of your bike, you'll be able to brake harder with less risk.

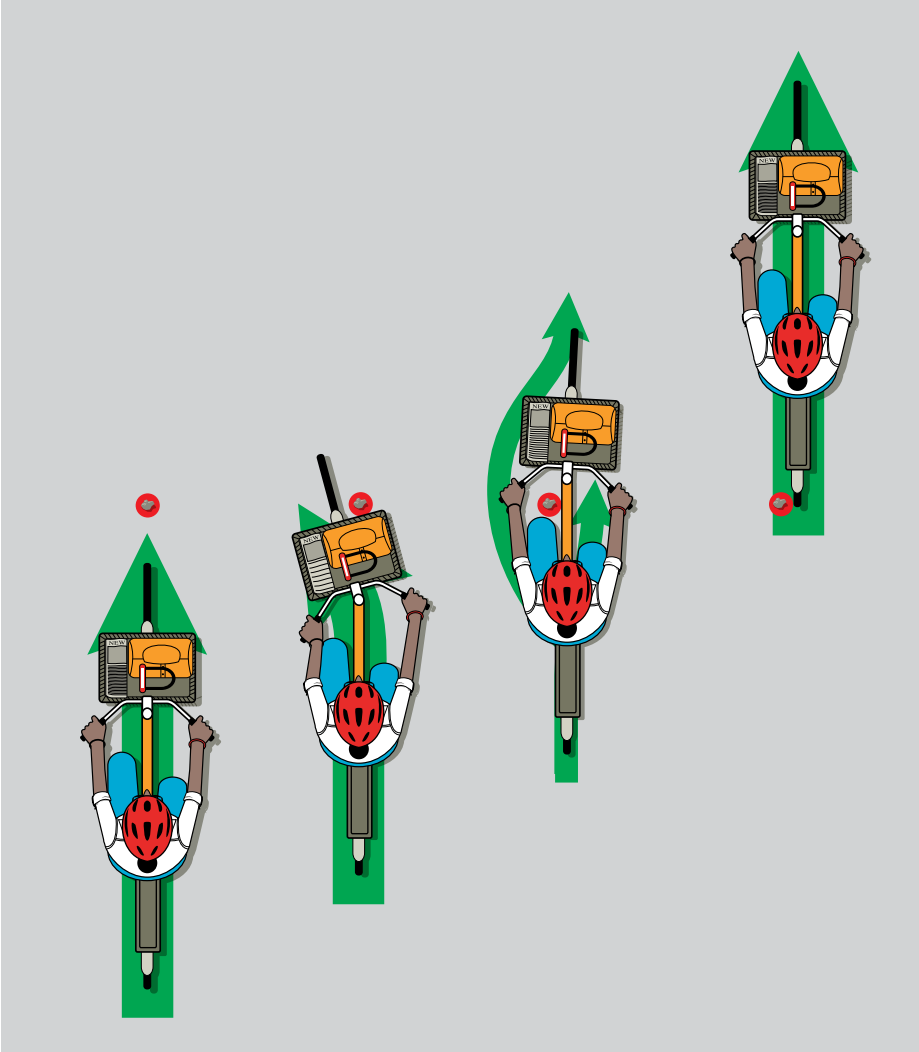
ROCK DODGE

The Rock Dodge is a maneuver to avoid any small object in the road.

To execute a Rock Dodge, keep riding straight until you're very close to the object. Just before you reach the object, turn the handlebar suddenly to the left—without leaning—so the front wheel goes around the object. Immediately straighten out and keep riding.

When you steer to the left of the rock, you automatically lean right. When you straighten up, you bring the bike back under you. Your front wheel snakes around the rock, your back wheel passes on the other side, but your body and the handlebar have barely moved. The motion is subtle and the entire action happens in a split second.

This technique will feel unnatural at first and will take practice before you can do it smoothly. Once you master the Rock Dodge, practice it regularly.



AVOIDANCE WEAVE

The Avoidance Weave is used when you suddenly encounter a series of hazards like potholes or rocks that could cause a crash.

The Avoidance Weave is a set of swooping turns. To avoid a series of hazards successfully, look ahead past the hazards and begin a turn before you reach each hazard. Continue to look ahead and turn sharply until you are through the hazards. It's important to lean your bike and get into a rhythm.

INSTANT TURN

The Instant Turn is used to avoid an unexpected vehicle passing directly in front of you. In these instances, you won't have the time or space to do a Quick Stop. An Instant Turn allows you to avoid the crash and go in the same direction as the vehicle. Even if you do crash, it will be at an angle and the consequences will be less than crashing head on.

Many people think that a turn is produced simply by turning the front wheel, but you actually lean first and turn second. Because they happen so fast, the two moves appear simultaneous. To force the lean quickly you have to perform a maneuver that feels unnatural and sounds even more unlikely. If you need to turn right, turn your front wheel left—toward the car. By doing this you're forcing a right lean. The moment you have a lean started, turn your front wheel sharply right and you'll find yourself in a tight right turn.

This doesn't ever feel natural, and you must train yourself to do it. The quick twitch in the wrong direction at the start of the instant turn is the most important and least intuitive part of the turn. You are deliberately unbalancing yourself by steering the whole bike out from under you.

NOTES

NOTES

Did you find this Smart Cycling Manual useful? Want to support more initiatives—like this one—to get more people on bicycles?

Become a member.

Join us. Together, we'll lead the movement to create a Bicycle Friendly America for everyone.

WWW.BIKELEAGUE.ORG/JOIN

Thank you to Gail Copus Spann and Jim Spann for their generous support of the Smart Cycling program.