

INTRODUCTION

Most books on bicycling begin with instructions on how to select a bicycle and accessories. This one is going to be different. We're going to start by talking about a more significant acquisition: attitude.

The most important factor in how you ride your bike is how you feel about it. If you find bicycling enjoyable and reasonably safe, then you'll want to cover greater distances and go more places. But to do so, you usually have to ride in the company of cars -- and sharing the road with cars calls for an attitude of security and confidence.

Once you have that attitude, you can safely and enjoyably take on a commute to work in city traffic or a long day's tour on almost any kind of road. Almost anyone can become a confident, streetwise cyclist. This book will show you how.

EQUIPMENT CHOICES

A few words about equipment -- you do need the right equipment to put the ideas in this booklet to use.

YOUR BICYCLE

Your bicycle should match your riding style. Choices range from an ultra-lightweight, fast road-racing machine to a rugged all-terrain bike. Consider your level of skill and where you want to ride. A good bike shop can help you make the right decision.

For comfort, your bike must fit your body proportions like a good suit of clothes. Finding the right frame height by standing over the bike is just a start. Other measurements are equally important. For example, most women need to take extra care to buy bikes with a short top tube, since women's average upper-body length is shorter in proportion to leg length than men's/

Cranks, handlebar stem, handlebars and saddle can be changed to fit you better. A good bike shop will help you select the parts that are right for you when you buy a bike.

New or old-faithful, your bicycle must be in good working order. The gears must shift reliably, and the brakes must work smoothly. If you aren't sure that your bike is in top

shape, take it to a qualified mechanic.

HELMET

A helmet is a bargain in injury prevention. Wearing a bicycle helmet whenever you ride can reduce your risk of a serious head injury by 85%. A good helmet will protect against most of these. It reduces the risk of a fatal bicycling crash to about the same level as a car driver's, for the same amount of time spent at either activity (National Safety Council and H. Katteler; Minutes of the Velo-City Conference, Bremen, Germany, 1981).

REAR-VIEW MIRROR

A rear-view mirror can be helpful when maneuvering in traffic. A small, helmet-mounted mirror gives a wide field of view and good isolation from road shock. Aim it along the side of your head, looking directly back. You should see your left ear in the right side of the mirror. You'll need a couple of weeks to learn to use the mirror. If it still doesn't work well for you after that length of time, consider a handlebar-end mirror instead.

BICYCLING GLOVES

Every bicyclist takes a fall sooner or later, and puts out a hand to break the fall. Unless you wear gloves, the pavement will sandpaper your palm. Fingerless cycling gloves improve your comfort on long rides by cushioning your hands against road shock from the handlebars.

TOOLS

A small tool kit, tire patch kit and frame pump -- and the knowledge to use them -- will get you back on the road when your bike has a flat tire or other common minor breakdowns. Most on-road repairs are simple and easy to learn.

BAGGAGE

A frame-mounted water bottle lets you drink as you ride -- important on any trip of more than an hour. A small handlebar bag or rack-mount bag will hold your tools, extra clothing, maps and other items you take with you on your rides. A bag on the bike is a far better choice than a backpack, which will leave your back hot and sweaty in warm weather.

ACKNOWLEDGEMENTS

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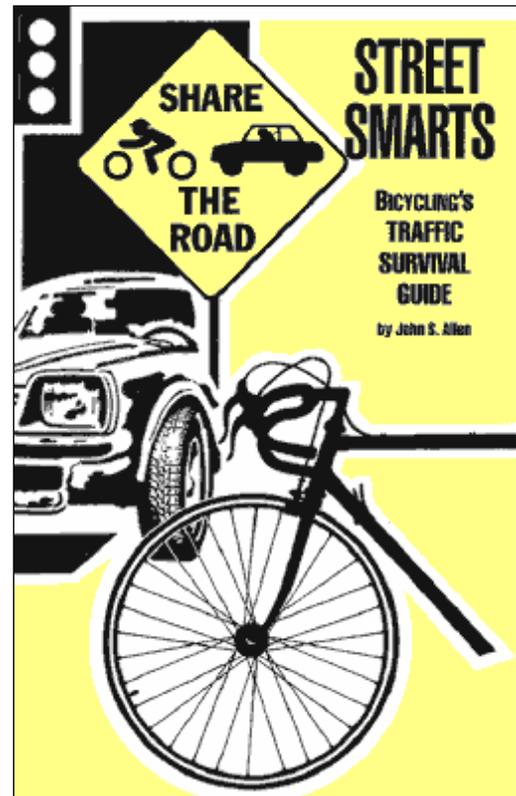
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FOREWORD

This manual will teach you safe bicycling on public roads and streets. To do so requires the ability to process information about traffic conditions on a continuous basis, as you ride along, just as when driving an automobile. That skill is far more developed in residents age 16 and older because they are more likely to possess a Pennsylvania Driver's License.

However, keep in mind that the Rules-of-the Road apply to drivers of vehicles regardless of the drivers age or vehicle type. If after reading this manual, you wish to apply the instruction but are under age 16 or do not possess a valid Pennsylvania Driver's License, it is recommended that you commence cycling in traffic only if you are in the company of someone who does possess a license and/or understands the principles of safe street bicycling taught in this manual.

Title 75 of the Pennsylvania Consolidated Statutes contains the laws which govern the operation of vehicles on Pennsylvania roads. In Pennsylvania, a bicycle is considered a vehicle and, as such, is governed by a general set of rules (common to all vehicles) and a specific set of rules (designed for bicycles). The following annotated list provides all of the important sections of the Vehicle Code which a Pennsylvania bicyclist should know. Keep in mind that the laws themselves often describe only what a bicyclist is required to do, not how to do it. This manual addresses how to bicycle safely and efficiently by following the rules of the road.

Chapter 35 - Special Vehicles and Pedestrians

Subchapter A - Operation of Pedalcycles (Bicycles)

Section 3501. Applicability of traffic laws to pedalcycles.

(a) General rule. -- Every person riding a pedalcycle upon a roadway shall be granted all of the rights and shall be subject to all of the duties applicable to the driver of a vehicle by this title, except as to special provisions in this subchapter and except as to those provisions of this title which by their nature can have no application.

(b) Application of subchapter. -- The provisions of this subchapter apply whenever a pedalcycle is operated upon any highway or upon any path set aside for the exclusive use of pedalcycles subject to the exceptions stated in subsection (a).

Comment: Bicycles are considered vehicles under Pennsylvania Laws and must obey all the rules of the road which apply to vehicles.

These are the "responsibilities" mentioned above. The "rights" refer to the roadway space required to operate the bicycle in a safe, lawful manner.

Section 3502. Penalty for violation of subchapter.

Any person violating any provision of this subchapter is guilty of a summary offense and shall, upon conviction, be sentenced to pay a fine of \$10.

Section 3503. Responsibility of parent or guardian.

The parent of any child and the guardian of any ward shall not authorize or knowingly permit the child or ward to violate any of the provisions of this title relating to the operation of pedalcycles.

Section 3504. Riding on pedalcycles.

(a) Use of seat by operator. -- A person propelling a pedalcycle shall not ride other than upon or astride a permanent and regular seat attached to the pedalcycle.

(b) Number of riders. -- No pedalcycle shall be used to carry more persons at one time than the number for which the pedalcycle is designed and equipped, except that an adult rider may transport a child in a pedalcycle or in a child carrier which is securely attached to the pedalcycle or in a trailer which is towed by a pedalcycle.

Section 3505.

(a) General rule. -- Except as provided in subsections (b) and (c), every person operating a pedalcycle upon a highway shall obey the applicable rules

of the road as contained in this title.

Comment: This statement reiterates the necessity for cyclists to conform to the expectations of other road users in order to ensure the safety of all.

(b) Operation on shoulder. -- A pedalcycle may be operated on the shoulder of a highway and shall be operated in the same direction as required of vehicles operated on the roadway.

Comment: A bicycle may be operated on either a shoulder or on the roadway (the travel lanes). The locations will be based upon traffic volume, the physical condition of the travel lanes or the shoulder, traffic speed, the bicyclist's intended direction, and other safety factors.

(c) Slower than prevailing speeds.-- A pedalcycle operated at slower than prevailing speed shall be operated in accordance with the provisions of Section 3301(b), unless it is unsafe to do so.

[3301(b). Vehicle proceeding at less than normal speed.

Upon all roadways, any vehicles proceeding at less than the normal speed of traffic at the time and place under the conditions than existing shall be driven in the right-hand lane then available for traffic, or as close as practicable to the right-hand curb or edge of the roadway, except when overtaking and passing another vehicle proceeding in the same direction or when preparing for a left turn at an intersection or into an alley, private road or driveway. This subsection does not apply to a driver who must necessarily drive in a lane other than the right-hand lane to continue on his intended route.]

Comment: Taken together, 3505 (c) and 3301 (b) state that slower vehicles should keep to the right, which is the normal expectation of all road users, while permitting bicyclists to make movements consistent with their intended route.

(d) One-way roadways. -- Any person operating a pedalcycle upon a roadway, which carries traffic in one direction only and has two or more marked traffic lanes, may ride as near the left-hand curb or edge of the roadway as practicable, exercising due care when passing a standing vehicle or one proceeding in the same direction.

Comment: Bicycles may ride in the left lane of a one-way street which contains two or more lanes. However, this does not apply to pedalcyclists on freeways. See Section 3511(d), below.

(e) Limitation on riding abreast. -- Persons riding pedalcycles upon a roadway shall not ride more than two abreast, except on paths or parts of roadways set aside for the exclusive use of pedalcycles.

Section 3506.

No person operating a pedalcycle shall carry any package, bundle or article which prevents the driver from keeping at least one hand upon the handlebars.

Section 3507. Lamps or other equipment on pedalcycles.

(a) Lamps and reflectors. -- Every pedalcycle when in use between sunset and sunrise shall be equipped on the front with a lamp which emits a beam of white light intended to illuminate the pedalcycle operator's path and visible from a distance of at least 500 feet to the front, a red reflector facing to the rear which shall be visible at least 500 feet to the rear, and an amber reflector on each side. Operators of pedalcycles may supplement the required front lamp with a white flashing lamp, light-emitting diode or similar device to enhance their visibility to other traffic and with a lamp emitting a red flashing lamp, light-emitting diode or similar device visible from a distance of 500 feet to the rear. A lamp or lamps worn by the operator of a pedalcycle shall comply with the requirements of this subsection if the lamp or lamps can be seen at the distances specified.

Comment: Many car-bike crashes occur at night and involve a poorly illuminated bicyclist. Bicyclists should understand that headlamps serve two purposes: a) primarily, they advise other road users of their presence (vitaly important to prevent unsuspecting motorists from cutting across the paths of cyclists they cannot even detect), b) secondarily, illuminate the bicyclist's path.

Section 3508. Pedalcycles on sidewalks and pedalcycle paths.

(a) Right-of-way to pedestrians.-- A person riding a pedalcycle upon a sidewalk or pedalcycle path used by pedestrians shall yield the right-of-way to any pedestrian and shall give an audible signal before overtaking and passing a pedestrian.

(b) Business districts.-- A person shall not ride a pedalcycle upon a sidewalk in a business district unless permitted by official traffic-control devices, nor when a usable pedalcycle-only lane has been provided adjacent to the sidewalk.

Section 3509. Parking.

(a) Sidewalks.

(1) A person may park a pedalcycle on a sidewalk unless prohibited or restricted by an official traffic-control device.

(2) A pedalcycle parked on a sidewalk shall not impede the normal and reasonable movement of pedestrian or other traffic.

(b) Roadways.

(1) A pedalcycle may be parked on the roadway at any angle to the curb or edge of the roadway at any location where parking is allowed.

(2) A pedalcycle may be parked on the roadway abreast of another pedalcycle or pedalcycles near the side of the roadway at any location where parking is allowed.

(3) A person shall not park a pedalcycle on a roadway in such a manner as to obstruct the movement of a legally parked motor vehicle.

(4) In all other respects, pedalcycles parked anywhere on a

highway shall conform with the provisions of Subchapter E of Chapter 33 (relating to stopping, standing and parking).

Section 3510. Pedalcycle helmets for certain persons.

(a) General rule.-- A person under 12 years of age shall not operate a pedalcycle or ride as a passenger on a pedalcycle unless the person is wearing a pedalcycle helmet meeting the standards of the American Standards Institute, the American Society for Testing and Materials, the Snell Memorial Foundation's Standards for Protective Headgear for Use in Bicycling or any other nationally recognized standard for pedalcycle helmet approval. This subsection shall also apply to a person who rides:

(1) upon a pedalcycle while in a restraining seat attached to a pedalcycle; or

(2) in a trailer towed by a pedalcycle.

Comment: The Pennsylvania Department of Transportation strongly recommends that all bicyclists wear approved helmets whenever they ride.

Section 3511. Pedalcycles prohibited on freeways.

(a) General rule.-- No person shall ride a pedalcycle on a freeway.

(b) Exceptions.

(1) On State-designed freeways, pedalcycles may be authorized under the following limitations:

(i) The pedalcycler is 16 years of age or older and is accompanied by a pedalcycler 18 years of age or older.

(ii) A written request for review of the freeway route based on the potential unavailability of a reasonable alternate route is made to the department.

(iii) The department determines that no reasonable alternate route exists.

(iv) The department publishes a notice in the Pennsylvania Bulletin authorizing pedalcycle access to the freeway.

The notice shall constitute approval for the persons authorized under subparagraph (i) to ride a pedalcycle on the State-designated freeway.

(c) Action by local authorities.-- Action taken by local authorities regarding permission to use pedalcycles on freeways under their jurisdiction shall be:

(1) by ordinance of the local governing body; or

(2) by a commission or public official authorized to act on specified matters.

(d) Operation on shoulder.- - If the department authorizes pedalcycle

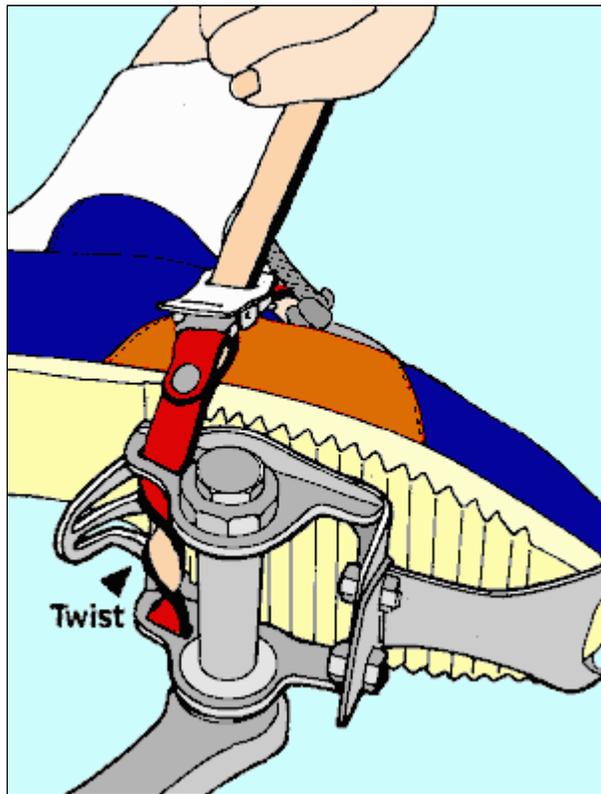
access to a freeway, the pedalcycle shall be operated upon the shoulder of that freeway whenever practicable.

Comment: Bicycles may be permitted on freeways in Pennsylvania with permission of the Department. The applicant must submit a written request (form) to the Department for review. In addition, Section 3511(d) requires the bicycle to be ridden on the shoulder of the freeway.

ONE.

OFF TO A GOOD START

Let's look first at how you get on your bicycle. If you climb onto it the right way, you get quicker, safer starts and a more efficient riding position. We'll also take a look at how to get off smoothly so you're positioned to start again quickly.



Thread a toe strap as shown, from outside to inside of the pedal. Leave the end hanging loose so you can pull it to tighten the strap.

PREPARING TO START

When you get onto your bicycle, first stand over the frame in front of the saddle. Hold the brake levers so the bike won't roll. A steady bike lets you get into position to mount.

Now, lift your right foot and put it into the pedal. Turn the crank backwards until the pedal is at 2 o'clock position - forward and high. Backpedal gently. If the crank won't turn easily, adjust the gear levers until the chain runs smoothly.

When the pedal is in the 2 o'clock position, you're ready to get moving. Let go of the brakes and push down on the pedal. The first pedal stroke starts the bike moving and lifts you up to the saddle. When the opposite pedal comes up to top position, put your foot on it for the second pedal stroke. If you don't get your foot into the pedal on the first try, ride along with the pedal upside down until you build up speed. Then put your foot

into the toeclip.

USING CLIPLESS PEDALS OR TOECLIPS

Clipless pedals and toeclips are your "feet belts" -- they increase pedaling efficiency and safety. But until you're used to them, leave them loose in stop-and-go traffic. Practice removing your foot from the pedal as you stop.

Thread toeclips and straps as shown in the illustration -- from the outside to the inside of the pedal. Leave the end of the strap sticking out like a floppy dog ear -- don't tuck it back in to the buckle. Tighten the strap by pulling on the end, and loosen it by pushing the buckle outward with your thumb.

Clipless pedals are usually easier to use than toeclips -- but the motion to release your foot is different, so practice it a few times before you use one of these systems out on the road.

When you're coming to a stop, stand on the right pedal, and slide forward off the saddle. Lean the bike a little to the left side and place your left foot on the ground. When stopped, raise your right foot and its pedal into the 2 o'clock starting position.

No matter what type of pedals you use, put only one foot on the ground when you stop. The other foot waits on its pedal in the 2 o'clock position, ready for a quick start.

As you slow to a stop, shift down to a low, starting gear. On a derailleur-equipped bike, the gears shift only while you're still turning the pedals.

AVOIDING COMMON MISTAKES

Many bicyclists like to sit down on the bike's saddle before they start, with both feet on the ground -- a common mistake. People get into this habit as children, riding tricycles. On a tricycle, your feet reach the ground, because the pedals are ahead of you. On a bicycle, the pedals are underneath you, so the saddle has to be higher.

People with the tricycle habit always keep their saddles too low. They can't develop much power, because their legs don't straighten out enough.

There are a couple of other common mistakes people make in getting onto their bikes. Some people push the bike along with a foot, like a scooter. Other people stand next to the bike, then leap over it, the way you mount a horse. But a bicycle is not a tricycle, a scooter, or a horse.

Practice the pedal-step method until you're comfortable with it. Raise the saddle if it is too low. Also, practice shifting your gears as you stop, so you'll have good acceleration when you start again. You'll be rewarded with smoother, safer and quicker starts.

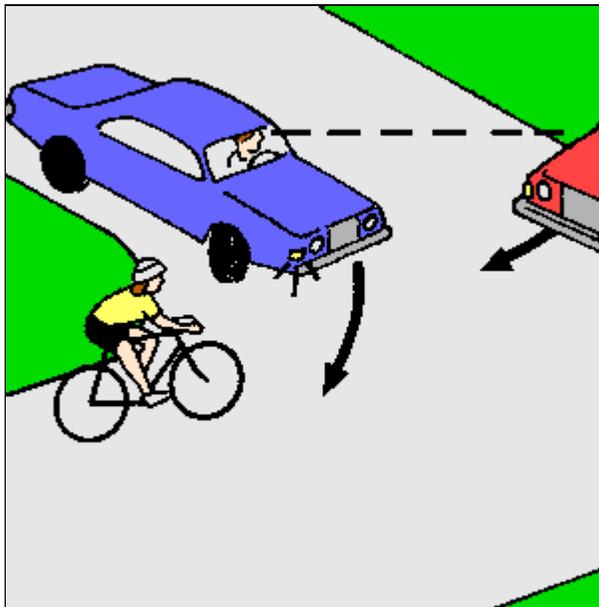
TWO

WHERE TO RIDE ON THE ROAD

We've all seen bicyclists who wander from left side to right, who go from the sidewalk to the street and who weave in and out between parked cars. From moment to moment, nobody can tell what these bicyclists are about to do. Pedestrians jump back, and car brakes squeal as such bicyclists approach.

On the other hand, we've seen bicyclists who seem to blend into the traffic flow smoothly and effortlessly. You always know where they are headed and what to do around them, whether you're on a bicycle, in a car or on foot. They make bicycling look easy -- but aren't they taking a risk? Isn't it safer to avoid the traffic as much as possible?

PART OF THE TRAFFIC PATTERN



Intersection collisions are the most common type caused by wrong-way riding. The motorist in the side street is looking left, where the traffic normally

With very few exceptions, the safest way to ride is as part of the traffic, going with the flow of the normal traffic pattern. Bicyclists who ride this way get where they're going faster and, according to scientific crash studies, have about five times fewer crashes than bicyclists who make up their own rules (J. Forester; *Effective Cycling*. Cambridge, MA, MIT Press, 1985).

Generally, the more you follow the normal traffic pattern, the safer and more predictable you become. The rules of the road set up a pattern for every situation, telling which driver has to wait. Sometimes you have to wait for other drivers -- for example, at a stop sign -- but sometimes they have to wait for you.

In this way, the rules of the road protect you by making it clear what you're going to do next.

comes from.

Riding right begins with riding on the right. Some bicyclists think they're safer on the left, where they can see cars coming, but riding on the left is actually one of the biggest causes of car-bike crashes.

If you ride in violation of the traffic laws, you greatly increase your risk of a crash. You also may give up all of your rights. If you get into a crash, the courts will almost always find that it was your fault!

If you ride on the left, both you and oncoming driver must come to a complete stop to avoid head-on collisions. When you ride on the right, drivers behind you only have to slow to your speed -- and they have three times as long to react. Also, drivers and pedestrians about to pull out from side streets and crosswalks will be looking toward you -- in the direction traffic normally comes from.

WHERE IS THE ROAD EDGE?

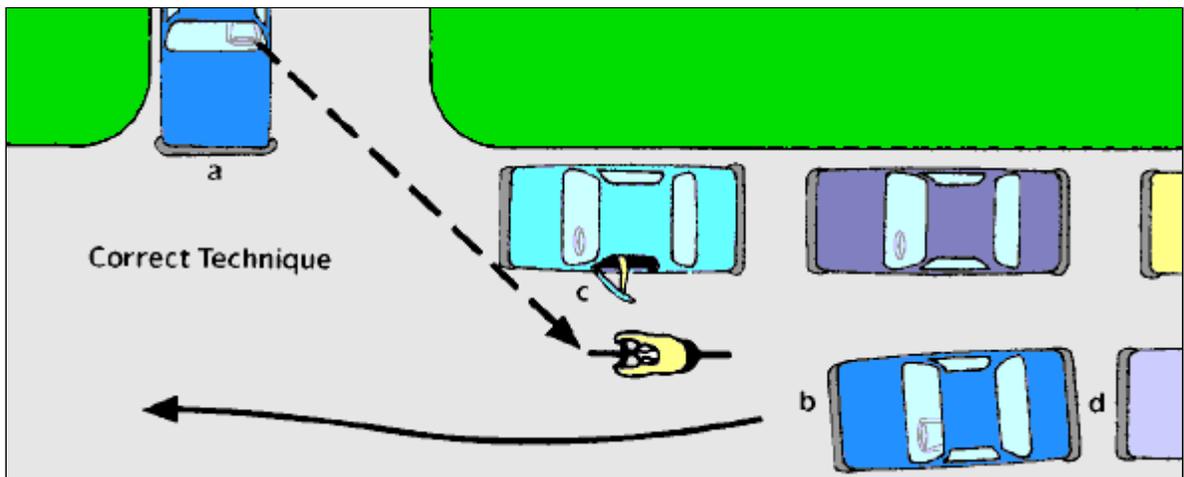
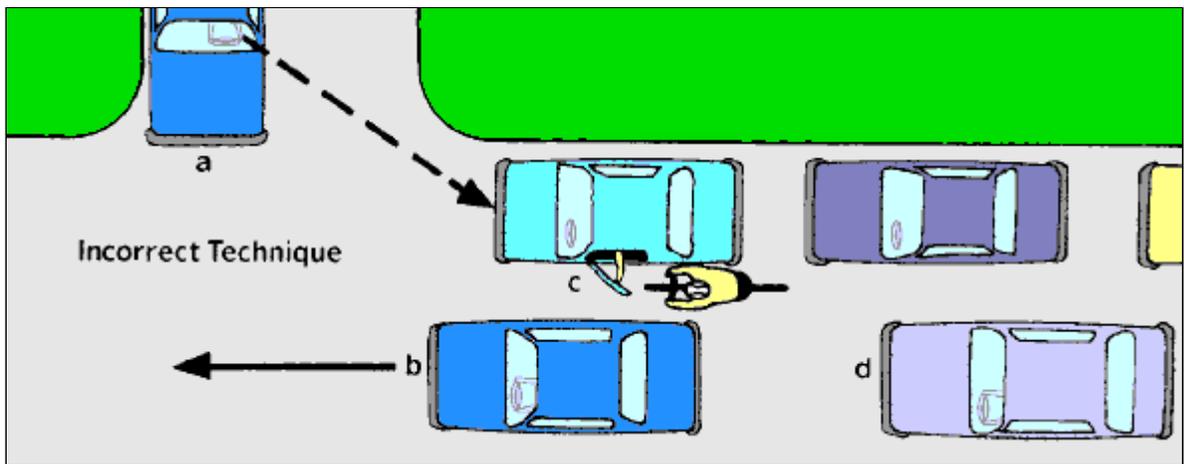
Normally, slower traffic keeps to the right, and faster traffic passes on the left. Since your bicycle is usually slower than other traffic, you usually ride near the right edge of the road. But how far to the right?

Generally, the usable width of the road begins where you can ride without increased danger of falls, jolts or blowouts. A road may have a gravel shoulder, its edge may be covered with sand or trash or the pavement may be broken. Don't ride there. Closer to the center, there's better pavement, which is swept clean of sand and debris by the passing cars. The right side of the road begins here.

Most bicycle crashes are simple falls or are caused by hazards in front of you. Train your eyes to scan the scene ahead, and look for blindspots. Keep your eyes moving - - you have to look up at the traffic and also down at the road for potholes and cracks.

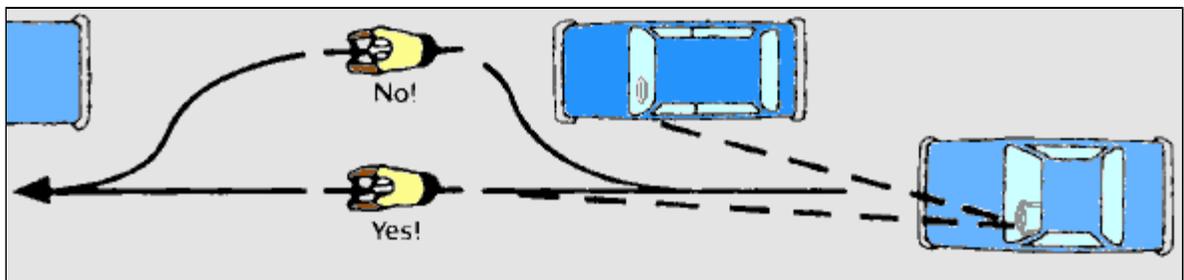
Ride far enough into the lane to avoid the risk from blindspots. If you ride too close to parked cars on your right you can't see around them into side streets and driveways. A pedestrian, car or bike could come out from between the parked cars. Drivers in side streets might pull their cars out into your street to look right and left. And the door of a parked car could open in front of you.

Where there are parked cars, the usable width of the street begins about 3 feet out from them -- or from a wall, hedge or other obstruction. As you approach a blind intersection or driveway, you should be even farther from the edge of the road -- imagine a car hood poking out. *Don't ride in the danger zone!*



By riding a safe distance from roadside hazard, you increase your safety. At a), the motorist in the driveway sees you; at b), the motorist overtaking you will not take the easy way out and skim by your elbow; at c), the car door is no threat; and at d), the motorist behind can see you.

Don't weave in and out between parked cars. If you weave to the right after passing a parked car, it will hide you from drivers approaching from behind you. Then you have to pop back out when you reach the next parked car. Put yourself in the place of a driver a couple of hundred feet behind you. Could this driver see you?



Don't weave between parked cars, where you become invisible to overtaking drivers.

Sure, many people -- even some bicycling "experts" -- will tell you, "Always keep as far to the right as possible," and, "Look out for opening car doors." But at speeds above 5 miles per hour, you can't stop in time to avoid a car door. Your only choice is

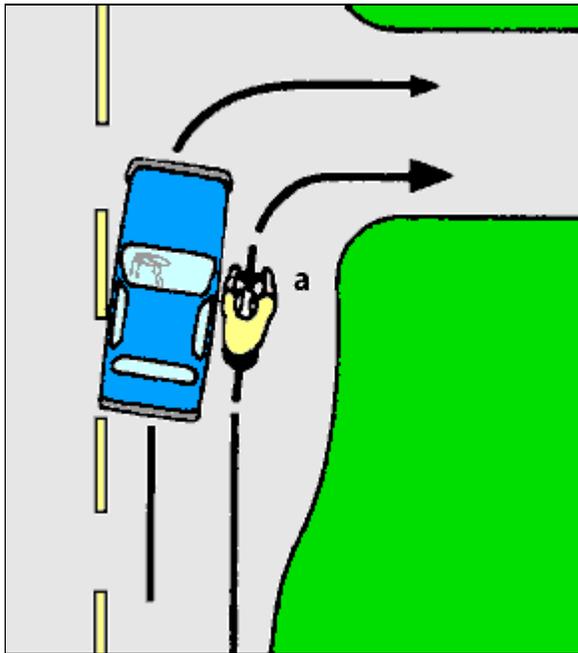
to swerve out into the street -- maybe into the path of a passing car.

It's much safer to ride in a predictable, straight line, where everyone can see you. Motorists don't mind slowing down for a predictable, visible bicyclist nearly as much as they mind a bicyclist who swerves out in front of them.

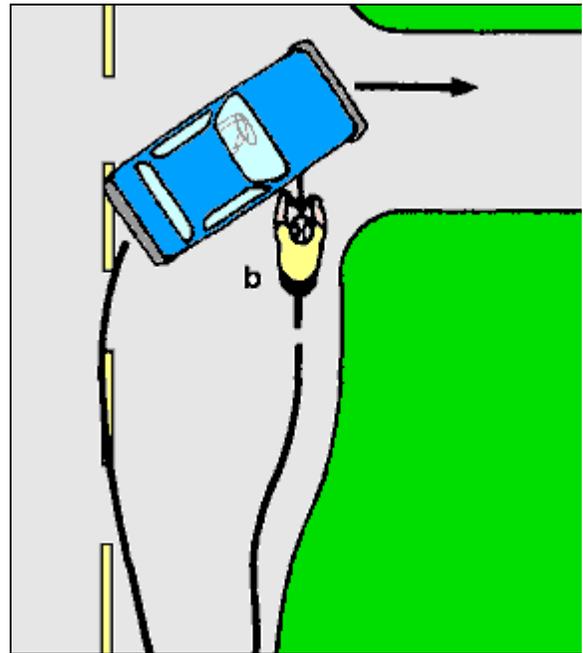
EXTRA-WIDE LANES

If the road has a paved shoulder or an extra-wide right lane, don't ride all the way over at the right edge. Instead, keep riding in a straight line 2 or 4 feet to the right of the cars. Stay at a steady distance from the left side of the right lane.

If you stay all the way over at the right edge of the shoulder, you're much more likely to be cut off by a right-turning car -- and when this happens, it's harder for you to avoid a crash. By the time you see the car, it will be blocking your path. If you're closer to the car, you can turn with it and avoid a crash.



In a wide lane, you are safer if you stay just to the right of the cars. As shown in a), you can turn to avoid a crash.

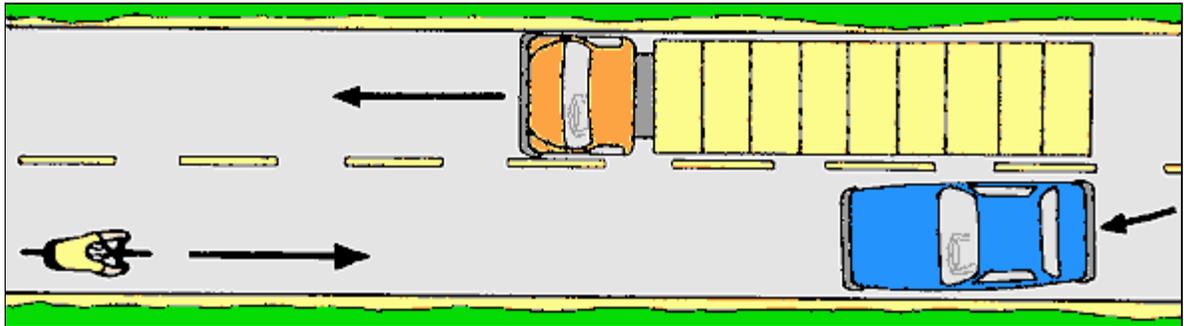


In b), the car is across your path before you see it.

There's only one important exception to this rule: In several states, it's legal for bicyclists to ride on high-speed limited-access highways. Here, you can ride at the right side of the shoulder, avoiding the wind blast from big trucks. Except at the rare on- and off-ramps, limited-access highways have no cross traffic, so there's no problem with turning cars or pedestrians.

RIDING IN A NARROW LANE

In a wide lane, there's room for cars to pass you. But in a narrow lane, cars have to move partway into the next lane to pass you. Narrow lanes are common on city streets and on backroads in the country. On a narrow two-lane, two-way road stay alert to strings of cars from the front, in case one pulls into your lane to pass. You can ride near the edge of this type of road if cars are coming from only one direction at a time. Then cars from the rear can pass you without having to move as far into the other lane.

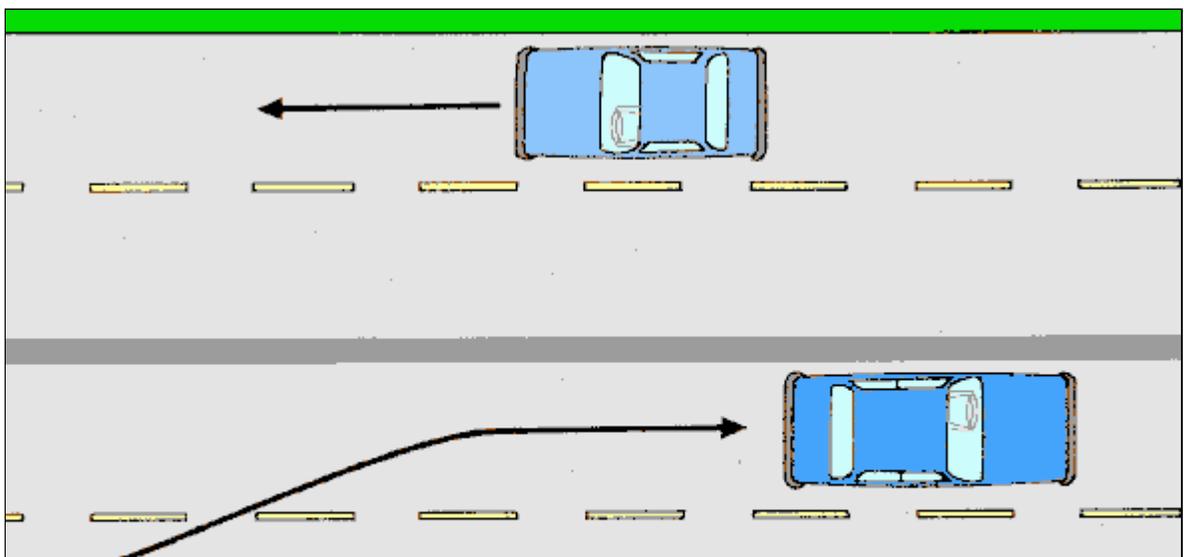


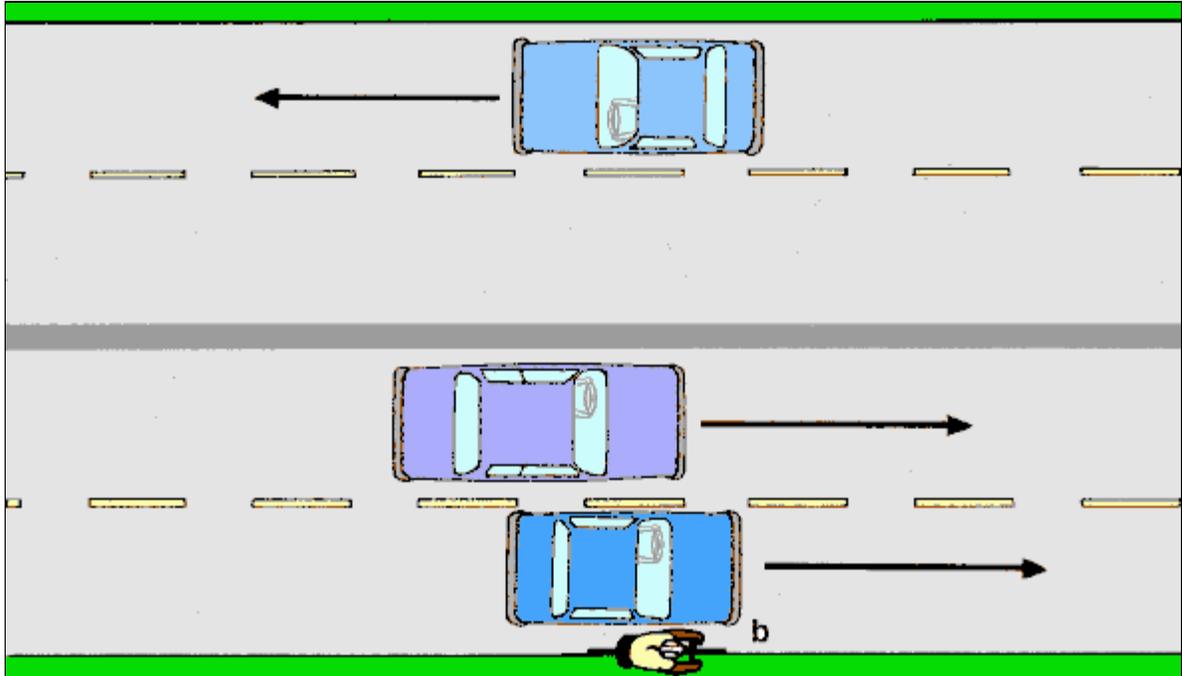
On a two-lane highway, be alert to drivers ahead of you pulling out to pass, especially if the lanes are narrow.

But if cars are coming from both directions, you have to take control of the situation. You can't take chances that the drivers behind you will try to pass you in oncoming traffic.

Glance behind you, and if there's traffic there too, take the first opportunity to merge safely to the middle of the right lane. Also merge to the middle of the right lane at a blind curve where there might be oncoming traffic. On a right curve in a narrow lane, this technique makes you visible earlier to the drivers behind you.

The driver behind you will have to slow and follow you. It helps to make a "slow" signal (left arm extended downward) to indicate that you're aware of the car behind you and that it's unsafe to pass. Don't let an impatient driver cause a crash.





On a multilane road with narrow lane, a), ride in the middle of the right lane. You are likely to get squeezed out, b), if you hug the edge.

Understand that the law is on your side. The law gives you the right to use the road, the same as a motorist, and to make other traffic slow down for you sometimes. Since you don't have eyes in the back of your head, you can't be expected to keep track of the traffic behind you at all times. The driver approaching from the rear is always required to slow and follow if it's not possible to pass safely.

It may seem dangerous to make a motorist slow for you, but it's not. The usual reason that bicyclists feel unsafe on narrow roads is that they do not take control of the situation. Remember, the drivers behind you don't have room to pass you safely anyway. If you ride all the way over at the right, you're inviting them to pass you where the road is too narrow and, too often, you will get squeezed off the road. If you show clearly that it's not safe for drivers to pass you, they're unlikely to try.

In any case, narrow roads aren't usually places where motorists drive very fast. It's dangerous to drive fast on narrow roads because there's so little room for error. Motorists expect to have to slow down for all sorts of reasons.

But be courteous. When it becomes safe for the car behind you to pass you, give the driver a wave-by signal. If you block traffic for more than a short time, the law requires you to pull to the side and let the traffic by.

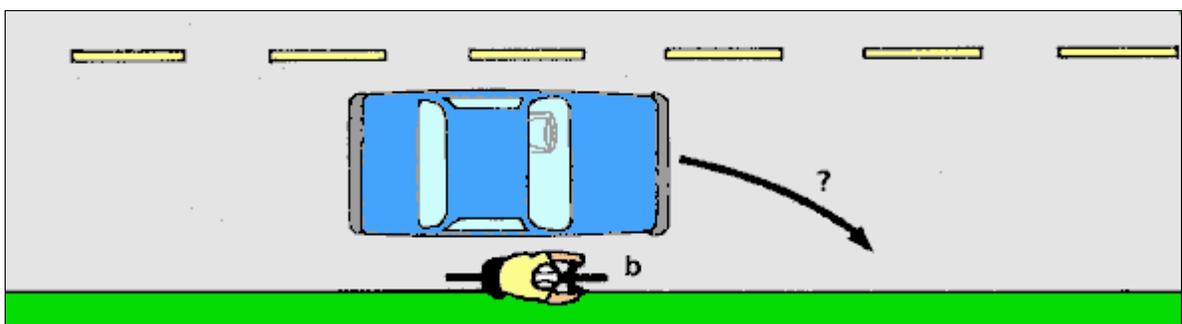
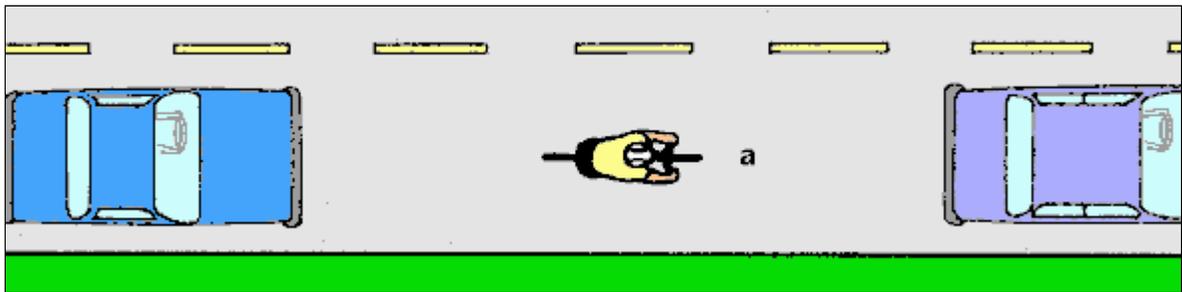
On a road with two or more narrow lanes in your direction -- like many city streets -- you should ride in the middle of the right lane at all times. You need to send the message to drivers to move to the passing lane to pass you. If you ride all the way to the right, two cars may pass you at the same time, side by side, and squeeze you off the road.

WHEN YOU GO FASTER THAN CARS

Usually, cars travel faster than bicycles. But not always. A row of cars may have slowed in a traffic jam. Or you may be riding down a hill where you can keep up with the cars.

If you're going as fast as the cars, pull into line with them. When riding down a hill at high speed, you need more room to steer and brake. Besides, it's dangerous to ride along next to the right side of a car. The driver could turn right or edge closer to the curb without ever seeing you.

As long as you keep up with the car in front of you, stay in line with it. If you begin to fall behind, pull to the right. But if you're catching up with the car, pass on the left, just as if you were driving a car yourself.



When going as fast as the cars, you're much safer if you ride in the middle of the traffic lane. In a), the driver behind you can see you. In b), the driver next to you has not seen you and could turn right.

The safest position in traffic doesn't depend on whether you're riding a bicycle or driving a car. It depends on how fast you're going and where you're headed. Drivers expect to be passed on the left, so they look back to the left before they pull out.

Before you pass, look back for traffic to make sure that you can pull safely into the passing lane. Keep your distance from the side of the car you're passing. Don't sneak along next to it. Put yourself where the driver will look for you. If you're passing a big truck or bus, give it even more clearance -- 5 or 6 feet -- since it could move farther before you could get out of its way. When you're finished, move back into the right lane.

Sometimes the car, bus or truck you're passing will pick up speed while you're still next to it. Then just keep the same position in the lane, and brake lightly if necessary to fall back. When you've fallen behind, look back to the right for traffic, then merge back to your normal position in the right lane.

On a street with multiple right-turn lanes or heavy, slow traffic, you may move left more than one lane to pass slower traffic.

Your correct position on the road follows a sensible set of rules, the same as for a car driver: Keep to the right if you're going slowly, but pull to the left to pass. The way you carry out these rules is just a little different -- as explained here -- since your bicycle is narrow and usually slow. An understanding of road positioning makes the difference between the rider who weaves and wanders and the one who blends smoothly and safely into the traffic flow.

THREE.

RIDING THROUGH INTERSECTIONS

Intersections are where all of your traffic-riding skills come together. If you ride smoothly through the intersections, you can handle almost any riding environment.

At intersections, move to the correct lane position depending on which way you'll be going. Often, you'll need to move away from your normal position near the right side of the road. If you're turning right, keep to the right. But if you're turning left, move to the center of the road. If you're going straight, go between the right- and left-turning traffic.

RIGHT TURNS

Right turns are easiest. Just stay in the right lane, look around for traffic and go around the corner. To avoid being squeezed against the curb, ride in the middle of the right lane if it's narrow, just as you would on a straightaway. Remember that the rear end of a car pulls to the right as it makes a right turn.

At a stop sign or legal right turn on red, yield to traffic coming from the left on the cross street. You're always required to yield to pedestrians in crosswalks. Bicyclists follow the same set of rules as drivers do.

A right-turn signal is a useful courtesy to drivers who would have to wait for you if you were going straight. Make your right-turn signal by pointing with your right arm.

CHANGING YOUR LANE POSITION

To prepare for most intersection maneuvers, you need to change your lane position. Even between intersections or when making a right turn, as just described, you may have to move farther into the right lane. So far, we've gotten by with a quick description of how to look back and check for traffic.

But when making a left turn, you often have to move across more than one lane. It's time to go into more detail. Before you change your lane position, you must always look back for traffic. Your sense of balance is in your head, so you need some practice to turn your head without swerving.

Some bicyclists change lane position without looking back, because they're afraid of swerving. Don't trust your ears! Many cars are very quiet, and a bicyclist behind you is quieter.

In an empty parking-lot practice area, ride along a straight, painted line. Turn your head to glance back, and then look forward again to see whether you're still riding straight. To keep from swerving, think about the position of your arms. If you don't turn the handlebars, you won't swerve.

Turn your head to look, even if you have a rear-view mirror. A mirror can help you to keep track of the traffic directly behind you, but no mirror will show cars or bicyclists at your side.

The best way to look back depends on your riding position. If you're sitting upright, swivel your neck and your back. If you're in a low crouch, duck your head sideways. Some bicyclists look over their shoulders and some even duck their heads underneath their arms.

GETTING A DRIVER'S COOPERATION

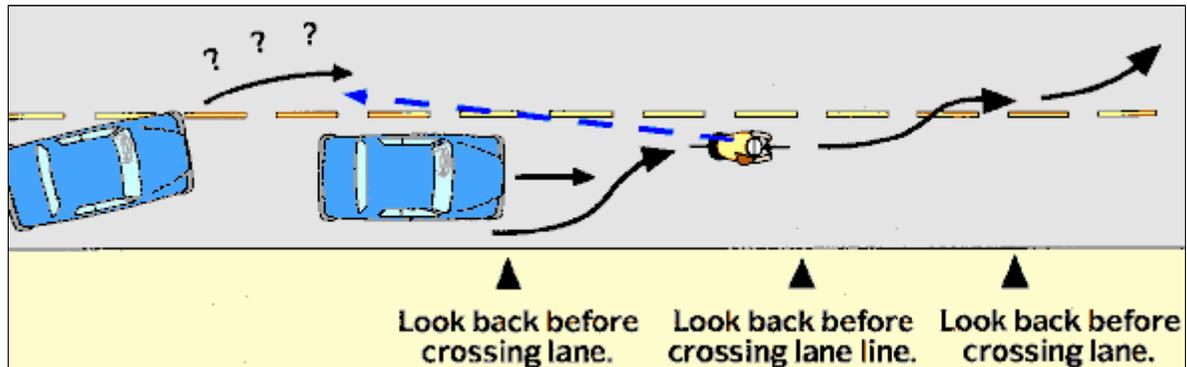
So now you've looked back. What next? If there's a car close behind you, let that car go by, and deal with the next car.

Usually, the next driver will have time to react to your signals. If you make your intentions clear, the driver will almost always let you into line.

Extend your left arm to signal that you want to move to the left. Wait a couple of seconds, then look back again to check that the driver has slowed down or moved

aside to make room.

Turning your head to look back is a signal, too. In slow, crowded traffic, you need to keep your hands on the handlebars, ready to brake. You can usually move into line with the cars while signaling only with a turn of the head. Whatever signal you use, always make sure that the driver behind you has noticed your signal and made room for you.



Cross a lane in two steps; one to cross the lane line and the next to cross to the other side of the lane.

Do not change your lane position until you're sure that the driver has made room for you. Most drivers will, but there's no guarantee. Your signal doesn't make it safe to change lane position. Only the driver's response to your signal makes you safe.

If you begin your lane change early enough to deal with two drivers, you'll almost always succeed; if the first one doesn't make room for you, the second one almost certainly will. So anticipate turns and plan for them in time.

In high-speed highway traffic, drivers may not have time to react to you. Then you need to wait for a gap in the traffic and move across all of the lanes at once.

LEFT TURNS

To prepare a left turn, change lanes until you reach the left-turn position in traffic. As you move toward the center of the street, this is where no cars on your left will go straight ahead. If the lane carrying left-turning traffic also carries through traffic, ride at its left side. If it's a left-turn-only lane, ride at its right side. On an ordinary two-lane street, turn left from just to the right of the centerline.

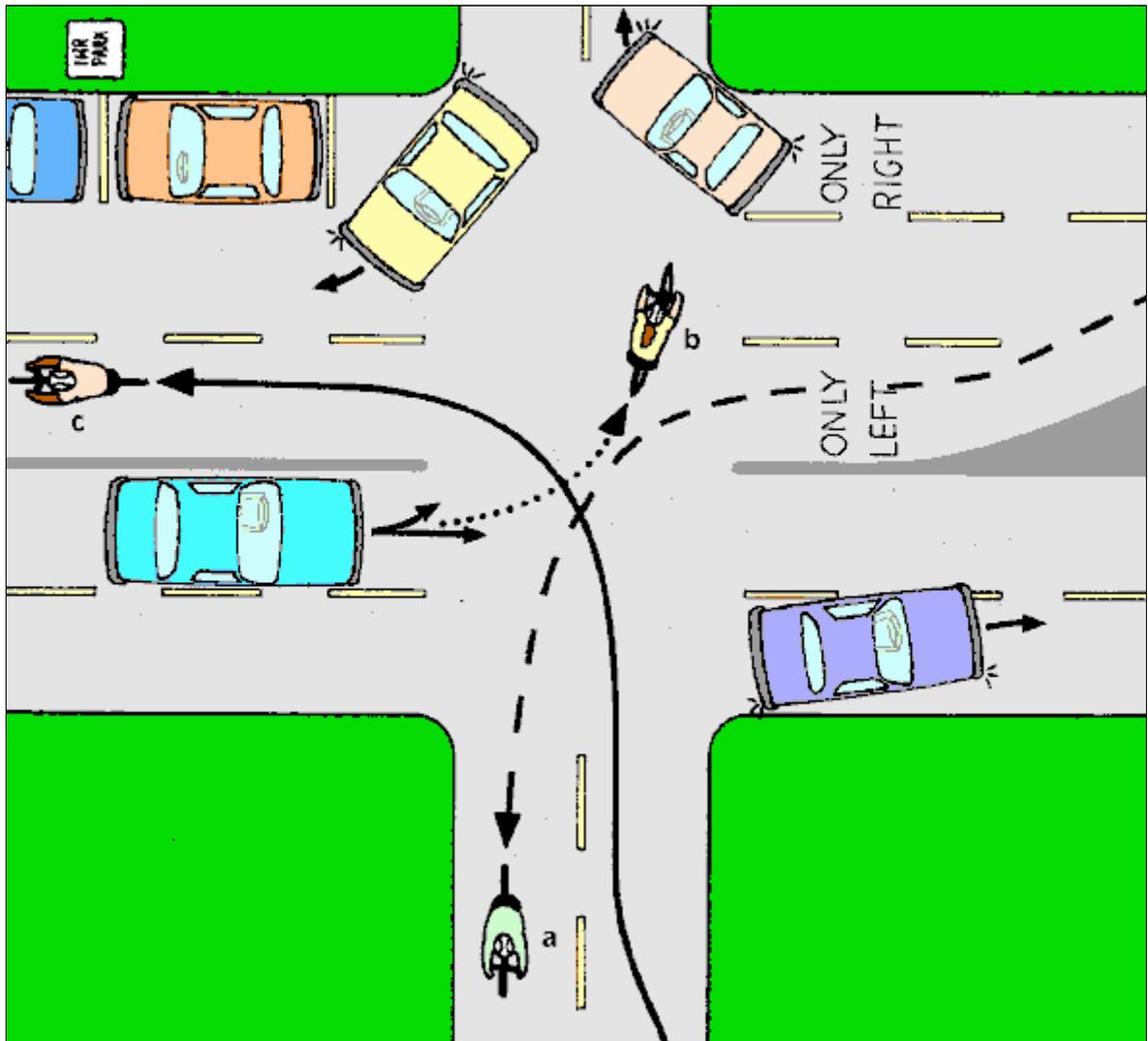
It may seem dangerous to move to the middle of the street, but in fact, the middle is the best position for a left turn. When you're in the correct position, all the traffic you have to deal with is in front of you. Since you're to the left of the through traffic coming from behind you, you don't have to look back while making your left turn. You can concentrate on the traffic from the left, right and front.

You may have to cross more than one lane to reach the left-turn position. Cross each lane in two steps. With one step, cross the lane line so you're just inside the next lane. With the next step, cross to the far side of the lane. At each step, look back and,

get a driver to make room for you.

Yield to traffic from the left, right and straight ahead; so you don't have to come to a stop, you may move slowly out to the middle of the intersection, the same way cars do. Then you can get moving faster when there's a gap in the traffic. Pass an oncoming left-turning car right side to right side.

When turning left from the left side of a lane, don't let left-turning cars behind you pass you on the right. While waiting, keep near the middle or make a slow signal with your right hand. As you enter the intersection, ride straight ahead for a few feet so the left-turning cars behind you can pull to your left.



Correct paths for left turns. a) The bicyclist has turned left from the right middle of a narrow left turn lane. b) The bicyclist has turned left from the left middle of a narrow left-and-through lane. Wait for a traffic light at the middle of such a lane unless you know which way the car behind you is going. c) The cyclist turns from near the center of a two-lane street and enters the inner lane of a four-lane street to avoid the right-turning car entering the outer lane.

If you don't make it to the left-turn position by the time you reach the intersection, go straight through the intersection. Make your left turn at the next intersection, or cross

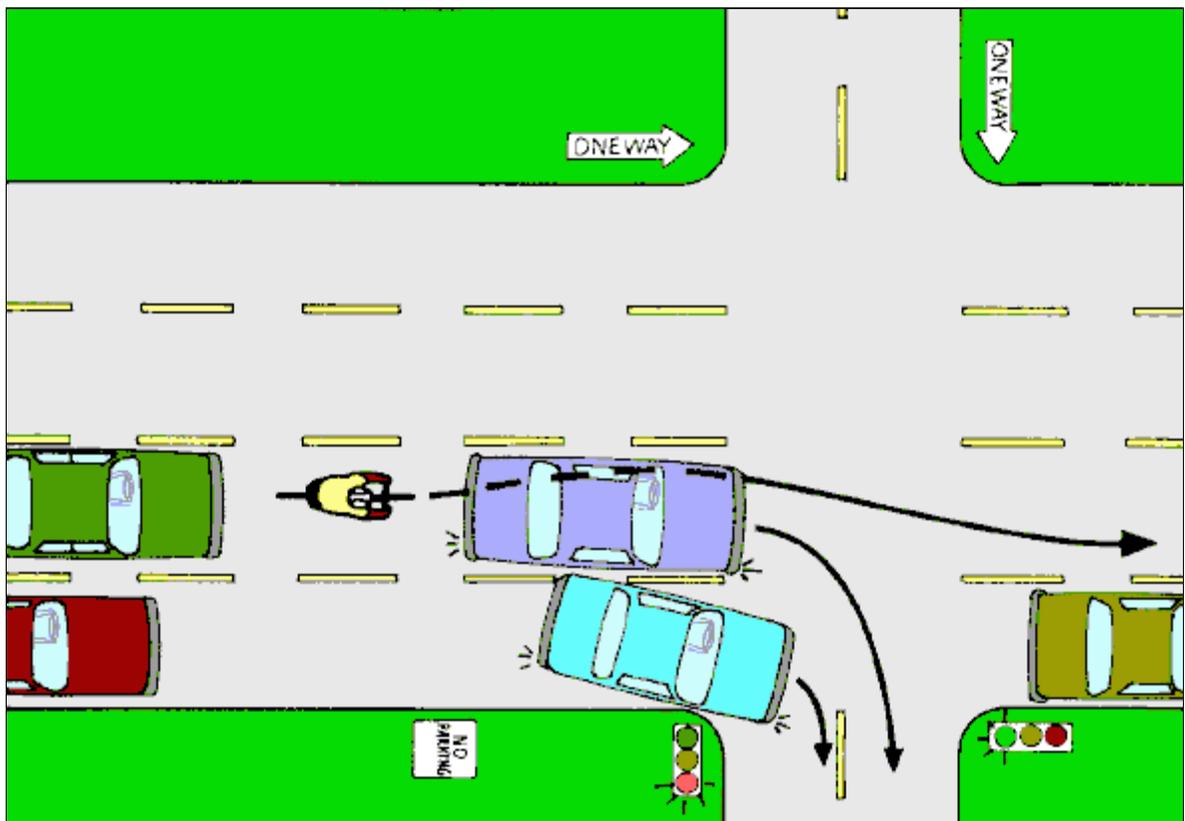
to the other side of the street, double back and make a right turn.

It's also okay to make a left turn as a pedestrian. This way, you can turn left legally at a "no left turn" sign or handle traffic situations you feel are beyond your abilities. Be sure to come to a complete stop when you reach the far right corner of the intersection. At this point, you have to look for traffic from all four directions at once; there's no safe way to do so while you keep moving.

GOING STRAIGHT THROUGH

Going straight through an intersection is easy compared with a left turn. You may have to change lanes, but not usually as many.

When going straight through, make sure right-turning traffic passes you on your right. Stay completely out of a right-turn-only lane. If there's a lane marked for right turns and through traffic, ride near its left side. You may have to move into the second or third lane from the curb to avoid the right-turning traffic.



Keep to the left of right-turning traffic when going straight through an intersection. Do not go to the right of traffic unless you are turning right.

When going straight through, make sure right-turning traffic passes you on your right. Stay completely out of a right-turn-only lane. If there's a lane marked for right turns and through traffic, ride near its left side. You may have to move into the second or third lane from the curb to avoid the right-turning traffic.

When you approach an intersection where cars are waiting for a stop sign or traffic light, never pass the first car. You never know for sure when or in which direction that car will move. Besides, while you're passing the car, it may hide a pedestrian or other hazard.

The most difficult intersection to ride straight through is the one that looks simplest -- on a small, two-lane street. Traffic in the right lane goes in three different directions -- right, straight and left! Still, on a street with parallel parking, the empty space between the parked cars and the corner serves as a right-turn lane. Don't wander right, into this space. Keep going straight ahead.

On a street without parking, pull a little farther into the lane to discourage right-turning drivers from passing you on the left. With a little finesse, you can position yourself just far enough from the curb so cars can pass you on the right to make a legal right turn on red.

Some motorists hesitate to pass between a bicyclist and the curb even to make a right turn. Wave them by with your right hand.

FOUR.

GETTING ACROSS NON-STANDARD INTERSECTIONS

Not all intersections are of the standard, "crossroads" type. Though the same principles of lane positioning apply to all intersection maneuvers, some situations can be confusing and deserve a second look.

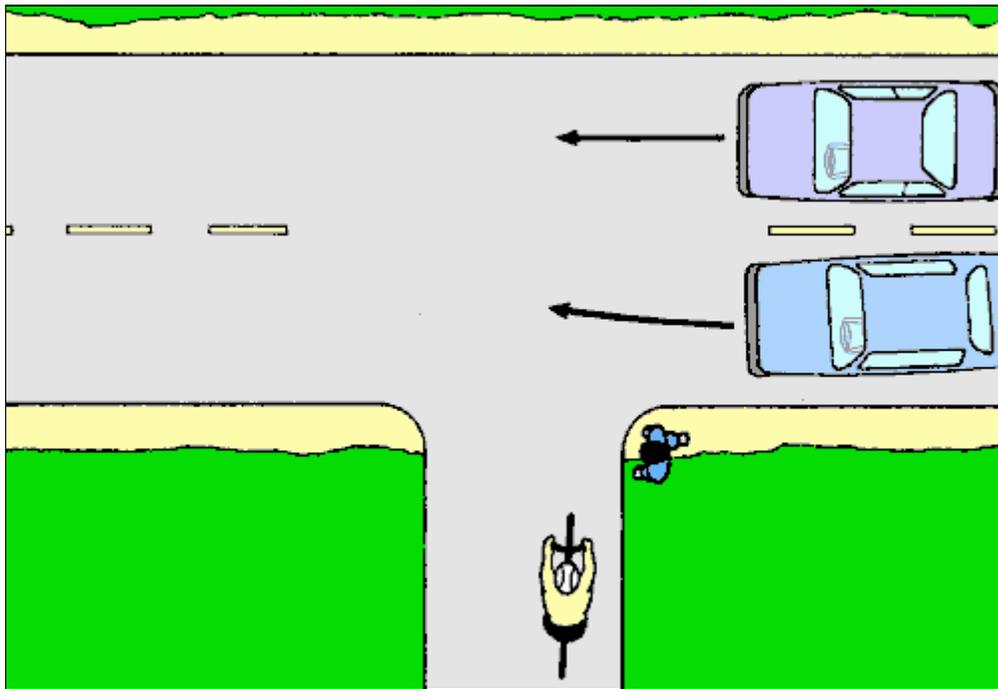
ENTERING THE ROAD

Bicyclists sometimes will ride against traffic or take unusual routes across intersections to get to their lane positions. Don't do it!

Instead, look for a good place to enter, where you can start out with a normal intersection maneuver: a left or right turn, or a lane change to merge into traffic. The traffic laws apply as soon as you're on the road, and even if you have to walk your bike half a block to a driveway, a legal start is much safer. Besides, you often get

started faster, since you can then move with the normal flow of traffic.

When entering the road from a narrow driveway, ride down its middle. A pedestrian could be approaching on the sidewalk from either side, and a car could be about to enter the driveway from either direction. By placing yourself in the middle, you can see in both directions equally well.



When entering the road, look left, but always look right as well for pedestrians and overtaking cars.

Even when preparing for a right turn onto a rural highway, look left, right, left, and then right again. A car approaching from your right can pull out to pass very quickly and head for you in the lane you're about to enter.

DIAGONAL INTERSECTIONS

Traffic follows the usual rules at a diagonal intersection, but it's harder for drivers to look into the diagonal cross street behind them. Be especially careful of vans and trucks, which have a right rear blindspot.

Some of the turns in a diagonal intersection aren't very sharp, so cars may not slow down very much. Be alert to oncoming left-turning traffic, and be sure the drivers have seen you.

ON- AND OFF- RAMPS

When you're riding along a road and an on-ramp comes in from the right, stay in your normal lane position. Traffic from behind you on the ramp will first pass to your right, and then to your left.

An off-ramp is much like a right-turn lane, except that the traffic is faster. If you're going straight and the ramp goes off to the right, stay in your normal traffic position, to its left. The exiting traffic will pass you on your right, and the through traffic to pass you on your left.

When you're passing an off-ramp, exiting drivers may hesitate to pass you on the right. It's effective to stay a little farther to the left than usual and make a left-turn signal. Drivers can see your hand signal for hundreds of feet behind you, so it's useful even when cars are traveling at highway speed.

A one-way roadway can have on- and off-ramps to the left side. When entering on a ramp from the left, ride along its left side, then the left side of the roadway until you can cross to your normal lane position. When exiting on a ramp to the left, cross to the left before the ramp and ride on the left side of the ramp.

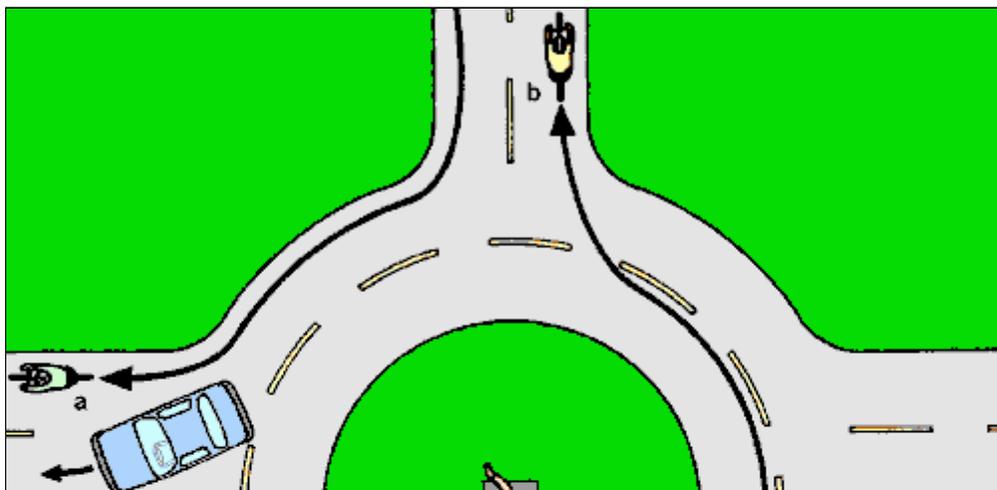
Sometimes two roadways will join or divide, but the total number of lanes will stay the same: For example, a couple of one-lane roads can join into a single two-lane one-way road. In high-speed traffic, it's best to ride along the edge, as with ramps. When entering or exiting from the left in slower traffic, you may ride on the right side of the left road, so you avoid having to cross as many lanes.

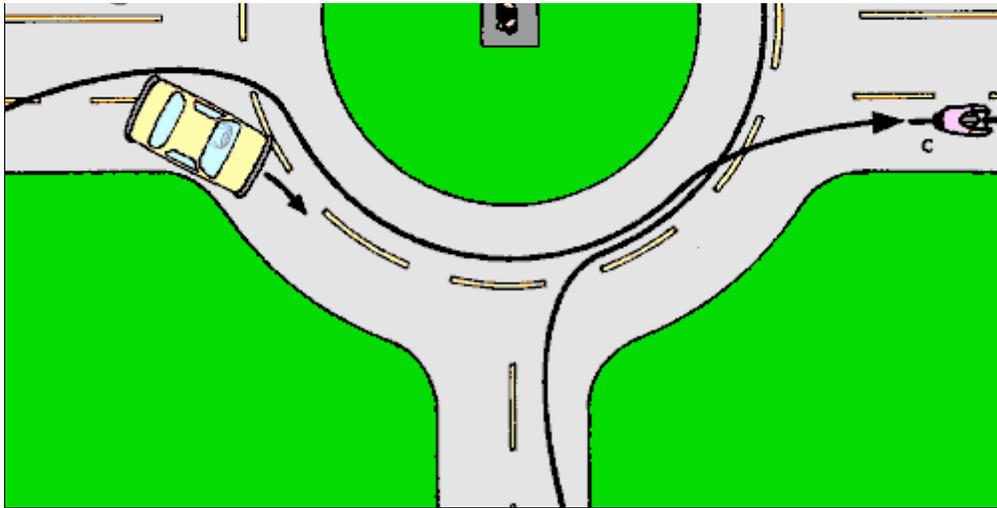
TRAFFIC CIRCLES

A traffic circle is a left-curving street with several side streets going off to the right.

The right lane of a traffic circle, then, is a right-turn lane used by entering and exiting traffic. Enter the traffic circle in the right lane if you're going to turn right at the first exit. But if you're going past the first exit, change lanes to the inside as you enter the circle. Ride around at the outer edge of the inside lane. It sometimes helps to make a left-turn signal while in the inside lane; drivers then feel comfortable about passing you on the right as they exit the circle.

Change back to the outside lane as you approach your exit. Use your normal tactics and hand signals for lane-changing.





In a traffic circle or rotary intersection, a) Keep to the right if you will take the first exit, b) and c), Ride in the inside lane if you are going past the first exit.

Because of the traffic circle's left curve, cars go straight to turn right. For this reason, it's especially dangerous to cross an exit of a traffic circle in the right lane. Bicyclists who always keep to the right will tell you that traffic circles are very dangerous. On the other hand, you'll find it surprisingly easy to ride around in the inside lane. Drivers don't go very fast there, since they follow the curve.

TWO LEFT TURNS IN A ROW

Sometimes you need to make two left turns quickly, one after the other; for example, if you're turning left at an intersection and then turning left into a driveway at the middle of the block.

In this case, don't head for the right side of the street after the first left turn. You may not have time to change lanes to the left again. Finish your first left turn in the correct lane to begin your second left turn.

LEFT TURNS ON ONE-WAY STREETS

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.

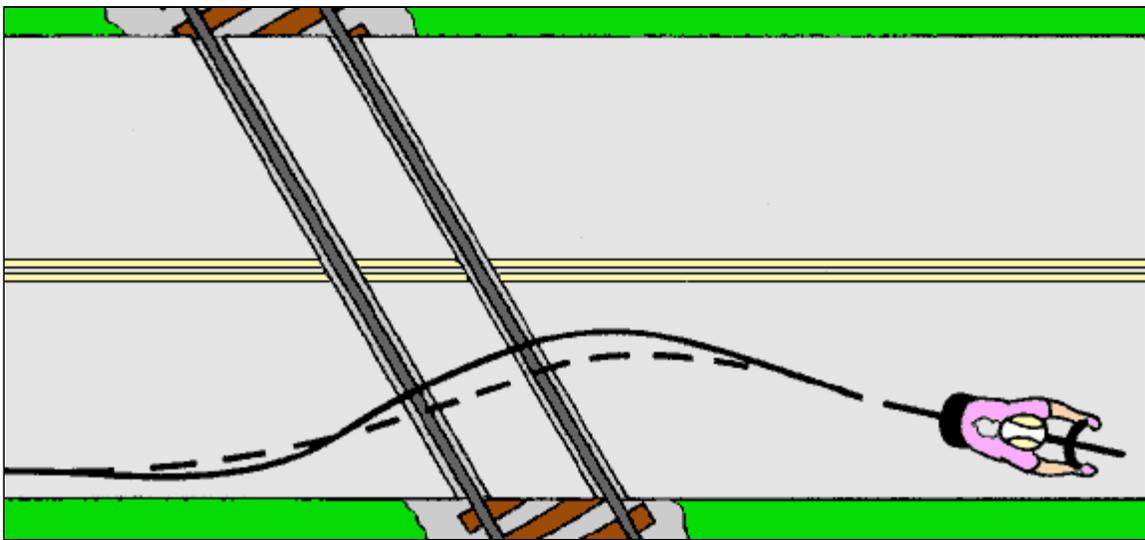
And there they are -- the difficult intersection types. Once you can handle these, you can ride just about anywhere. You can even figure out how to handle intersections not described here by using the principles of lane changing and positioning on which all intersection maneuvers are based.

FIVE.

STEER OUT OF TROUBLE

A bicycle is a highly maneuverable machine, but that maneuverability makes it quite tippable. You have to take extra care to stay upright and read the road for the special hazards that can cause a bike to fall.

Beware of any slippery or loose surface: gravel, snow, ice, leaves, oil patches, wet manhole covers and crosswalk markings. Avoid these, or ride over them slowly. Don't turn, brake or accelerate. Be ready to put a foot down for balance.



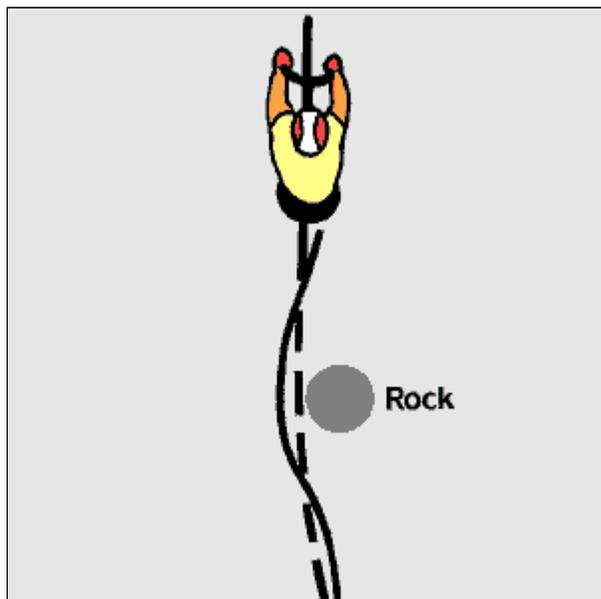
Check behind yourself for traffic, then cross a diagonal railroad crossing at a right angle.

Be especially careful of diagonal railroad crossings, trolley tracks, a row of raised lane-line dots or a step between the shoulder and the travel lane. Any of them can push your front wheel to the side and sweep your bike out from under you. When you can't avoid them, cross them as nearly as possible at right angles.

Beware of steel-grid bridge decks, which, especially when wet, will steer your bike parallel to the gridding, making balancing difficult. Test a grid deck at a low speed, and walk or use the bridge sidewalk if necessary.

Any bump, rock or pothole more than an inch high can squash your bicycle's tires flat against the rims, damaging the wheels. Avoid the bumps if you can, and walk your bike if the going gets too rough.

GOOD NEWS



Avoid a rock by turning the handlebars to one side; then correct your balance by turning them the other way.

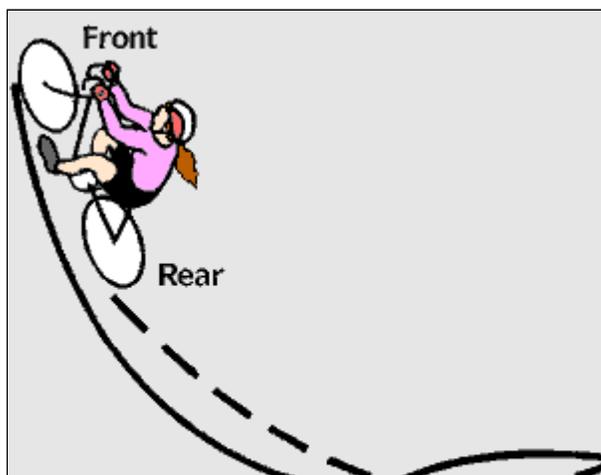
Now for the good news: Thanks to your bicycle's small size and quick steering, you can prepare yourself for situations like this one. It's a pleasant, two-lane country road, just wide enough for cars to pass you in your lane. You look up at the scenery and then down at the road. There's a rock directly in front of you. And there's a car just behind you. You can't swerve left into the traffic and you don't want to swerve to the right, into the gravel and dirt. What to do?

Make your wheels weave around the rock while riding in a straight line -- the rock-dodge maneuver. Just as you reach the rock, steer quickly left, then right to correct your balance, then straight again.

Because you correct the balance quickly, your body doesn't have time to follow the bike's weave. You continue nearly in a straight line. To give yourself better odds against rocks and potholes, go to an empty parking lot and practice the rock dodge until it becomes easy.

QUICK TURNS

Picture yourself in another pinch: You're riding along a street, approaching an intersection, and a car on your left suddenly begins a right turn. The side of the car is headed straight for you! You have to turn quickly alongside the car to get out of trouble.



To begin a turn quickly, you have to lean your bike over quickly. But how do you maneuver?

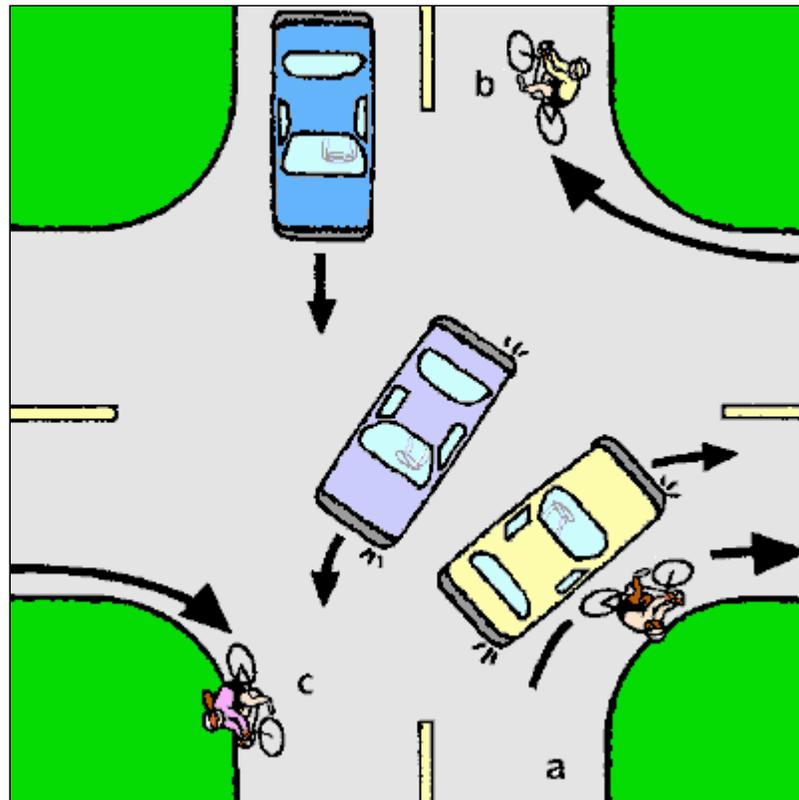
Your bicycle balances the same way you balance a yardstick on the palm of your hand. If you want to move the yardstick to the right, you move your hand to the left. Then, the yardstick leans to the right, and you follow it with your hand.



In order to turn sharply to the right, twitch the handlebars to the left first to start your lean to the right.

Just the same way, if you steer your bicycle out from under you to the left for a moment, then you can turn to the right. You must first steer momentarily toward the car you're trying to avoid.

Try this technique in your parking-lot practice area. At slow speeds at first, yank the handlebars quickly to the left. Your bicycle will lean to the right, and then you can steer right. Practice first at slow speeds, then at faster ones. The faster you go, the less sharply you have to steer.



Accident avoidance. a) Instant turn to the right of a right-turning car. b) Instant turn to avoid a car running a stop sign. c) Instant turn ahead of a left-turning car.

The instant turn is useful in many situations. If a car coming toward you begins a left turn, turn right into the side street with it. If a car pulls out of a side street from the right, swerve into the side street. It's best to turn to the right, behind the car -- but if it's too late for that, turn left with the car. Even if you hit the car, the nearer you're going in the same direction, the lighter the impact.

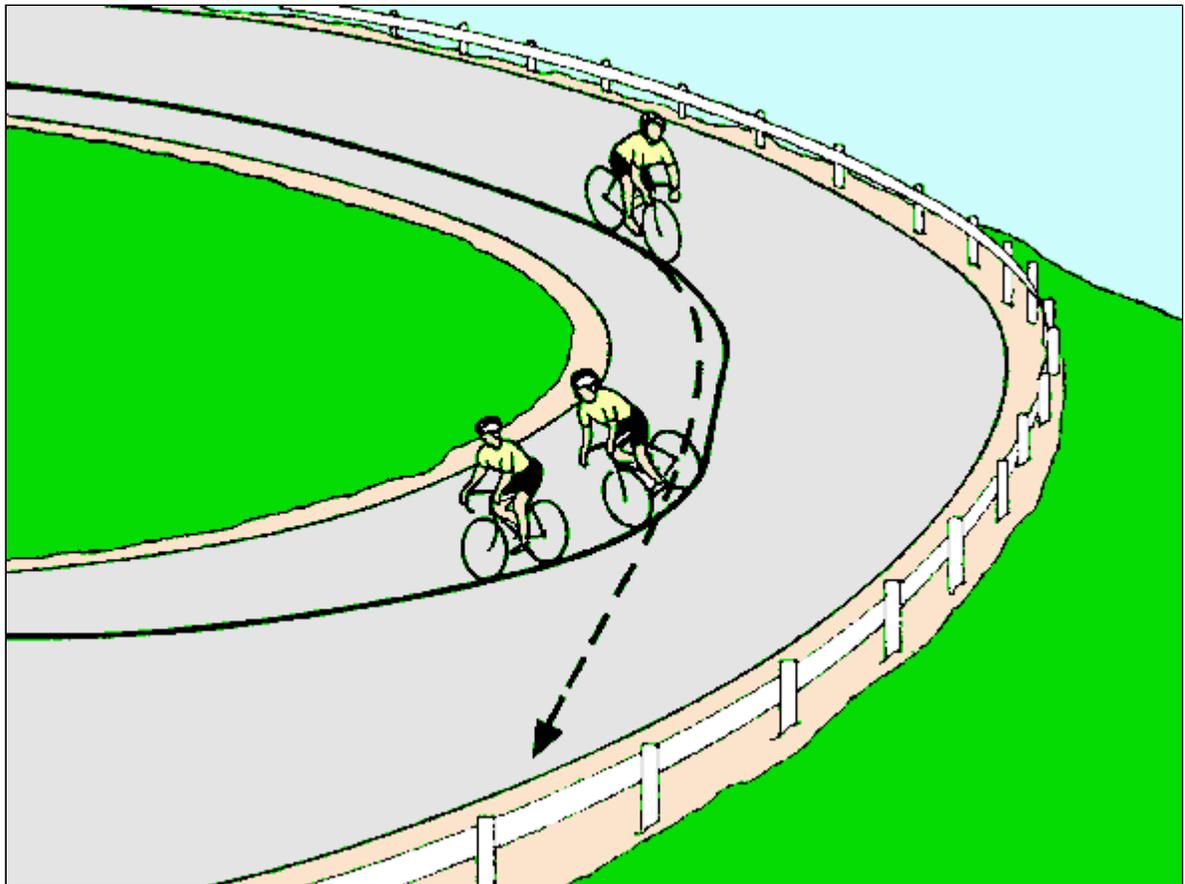
TOO FAST!

Sooner or later, you may find yourself going around a downhill curve too fast. A

variation on the instant turn can get you through this situation in one piece.

The usual, panic reaction is to steer straight and brake. But then you're likely to go headfirst off the road before you can stop. Instead, steer with the curve. Don't brake. Straighten the handlebars momentarily, as in the instant turn, to drop your bike into a deeper lean.

Usually, you'll make it around the curve -- your tires have more traction than you normally use. If you do skid out, you'll fall on your side and slide to a stop.



If you're going around a curve too fast, straighten the handlebars momentarily to drop into a deeper lean.

If you're about to ride into a wall or over a cliff, you may decide to deliberately skid out. Lean into a turn, then hit the brakes. The fall may hurt -- but not as much as the alternative.

JUMP?

There is a pothole straight ahead, and no time for even a rock dodge. You were so busy looking up at the traffic that you didn't see the pothole ahead, and now you're about to trash your wheels. If only you could fly . . .

Unfortunately, you can't fly your bike like the kid in E.T., but you can jump your bike.

Holding the pedals horizontal, squat down and pull up on the handlebars. Then jump up and yank your legs up under you. You'll be past the pothole faster than reading "squat-pull-jump-yank."

Jumping is the quickest last-resort way to avoid a pothole or other road-surface hazard. Once you get good at it, you can even use it to climb low curbs or to cross diagonal railroad tracks. In your empty parking lot, practice jumping your bike. You must lift first the front wheel, then the rear wheel as it takes its turn with the bump. Your timing depends on how fast you're riding.

Once you know your emergency maneuvers, you'll gain a much expanded sense of security, confidence and style. You'll be able to "ride loose," to use the language of California all-terrain riders. It's a sign of an experienced rider, and it saves your bike a lot of wear and tear.

SIX.

USING YOUR BRAKES

Picture yourself on a city path. Suddenly, you notice that you're about to ride down a flight of stairs. Or you're riding on a country road and there's a bridge out just a few feet in front of you. In cases like these, your bike's brakes could save your life. But even if you don't have such a dramatic experience, you'll feel more confident and go faster if you're ready to stop quickly and smoothly.

It takes practice to get peak performance out of your brakes. You can't just jam them on and skid to a stop as in a car. You'd fall off!

Your brakes must be in good condition to give you the most control. Good bicycle brakes work powerfully and smoothly. If your brakes are weak or grabby, it's time for an overhaul. But in addition to good brakes you need to understand weight transfer and how it affects your stopping.

HOW WEIGHT TRANSFER WORKS

When you're stopping -- in a car, on a bike or on foot -- your weight shifts to the front. You see examples of such momentum every day. When you're running and stop suddenly, you have to put a foot out in front of yourself to keep from toppling forward. In the same way, when you stop a car, its front springs squeeze down as more weight goes to the front wheels.

Your bike doesn't have springs, but the weight nonetheless goes to the front wheel. Try a little experiment: Walk along next to your bike. Squeeze the front brake lever. The bike will stop quickly, but the rear wheel will rise off the ground.

Then squeeze the rear brake lever. Braking will be weak, and the rear tire will skid.

The same things happen when you're riding. If you rely too heavily on the rear brake, the rear wheel will skid and wear out your back tire quickly. On the other hand, you can go right over the handlebars if you use the front brake too hard.

How, then, do you get a powerful stop without risk? There's a trick to learn. Use the rear brake as a signal to tell you how hard to apply the front brake.

THE REAR BRAKE'S SIGNAL

Practice on your bike in an empty parking lot. Squeeze the front lever three times as hard as the rear, while increasing force on both brake levers at the same time. With your light force on the rear brake lever, you're braking the rear wheel only lightly.

For a powerful stop, squeeze the brake levers harder and harder -- the front always three times as hard as the rear. The rear wheel will eventually skid. But by this time, most of the weight will be off the rear wheel, so it will skid only lightly. You won't wear a big bald spot in the rear tire -- though you will feel and hear the skid.

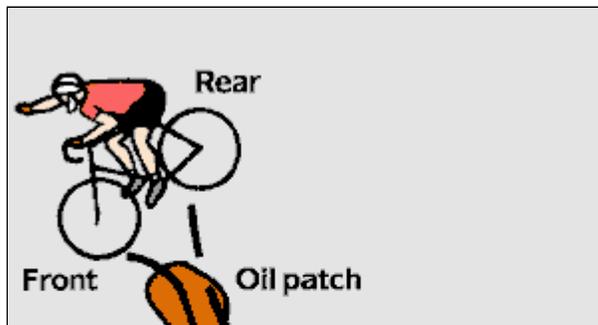
The rear wheel's skidding is your signal to release the front brake a little. Once the rear wheel stops skidding, squeeze the front brake harder. Keep adjusting the force on the front brake lever to keep the rear wheel just below the point of skidding.

This is your braking technique for straight-ahead stops on clean, dry pavement. Under these conditions, the front wheel will never skid, and you can keep the bike under control.

You can train yourself to release the brakes whenever the bike begins to go out of control. Practice using your front brake so hard that the rear wheel actually lifts off the ground. At a very low speed, 2 or 3 miles per hour, grab the front brake lever so hard that the rear wheel lifts off. Then release the brake lever instantly. Wear your helmet!

BRAKING UNDER POOR CONDITIONS

Braking technique is different when the road surface is slippery, or if you're turning. Under these conditions, the front wheel can skid. You must brake lightly and use the front brake less.



On pavement that is good except for a few places, look ahead for the slippery spots and bumps. Release the brakes as you go over the bad spots, then increase force again once you're back on good pavement.

On dirt, gravel or any surface that looks as though it might be slippery,



Avoid turning and braking on a slippery surface. If your front wheel skids out, you'll fall.

test the surface by applying the rear brake lightly. If the rear wheel skids easily, avoid using the front brake. Keep your speed down so that, even with your reduced braking power, you can still stop. In wet weather, the streets will be more slippery and so will your rims. Dry the rims by applying the brakes ahead of time. It can take 100 feet or more before the brakes begin to work normally.

When turning, you may have a choice to swerve out of danger or stop -- but don't try to do both at once. Practice braking on turns and slippery surfaces to get a feel for these conditions.

Your training will pay off as you become more confident on the bike, in all types of riding situations. You never know when you might have to stop -- and the better you can stop, the more confidently you go.

SEVEN.

RIDING IN GROUPS

Whether you're touring, training or just exploring country roads, riding with friends can add a lot of fun to your bicycling. With a local bicycle club, you can meet people and share information about routes, equipment and bicycling events. In addition, bicyclists often push themselves harder and improve more when training together.

But you can spoil the fun if you run into one of your companions. Bike/bike crashes are just as common as car/bike crashes, so give some attention to safe group riding.

THE SAFETY COCOON

Imagine a "cocoon" of space around each bicycle in your group of riders. It's easy to think that you can safely pass closer to a bicycle than a car, because the bicycle is smaller. But the bicycle can turn to the side just as fast as a car. Keep 3 feet of clearance when you're passing another bicyclist -- more at high downhill speeds.

At any time, one of your companions might be about to pass you, so be especially careful to ride straight. You don't have eyes in the back of your head, and you can't constantly trace the position of bicyclists behind you as you ride.

When you're about to pass another bicyclist, it's your responsibility to do it safely. The other members of your group can't read your mind to know that you are about to

change position in the group. Check behind you before you change your lane position. Call out, "On your left" to the bicyclist you're passing, and pass on the left of their bike.

Never sneak past another bicyclist on the right -- if you do, you force the other bicyclist farther toward the middle of the road without warning.

RIDING SIDE BY SIDE

Bicyclists often like to ride side by side so they can talk with each other. Riding two abreast is legal in most states. It's okay on a straight, flat road. There, drivers can see you from behind, and you can usually see or hear them approach.

Side-by-side bicyclists occupy a whole lane. On a multilane road with light traffic, cars can pass you in the next lane. On a narrow road or with heavier traffic, be courteous! Don't make drivers wait for you. Pull into a single line well before cars reach you. It takes only one thoughtless rider out to the left of the group to endanger the whole group. Call out, "Car back" to let the group know it's time to single up.

A rear-view mirror helps you to check on the cars behind you. With a mirror, you can ride two abreast more often and still pull back into a single line to let the cars pass you.

Never ride two abreast on a hilly or winding road. Don't make yourself into a last-moment surprise coming around a curve or over a hilltop.

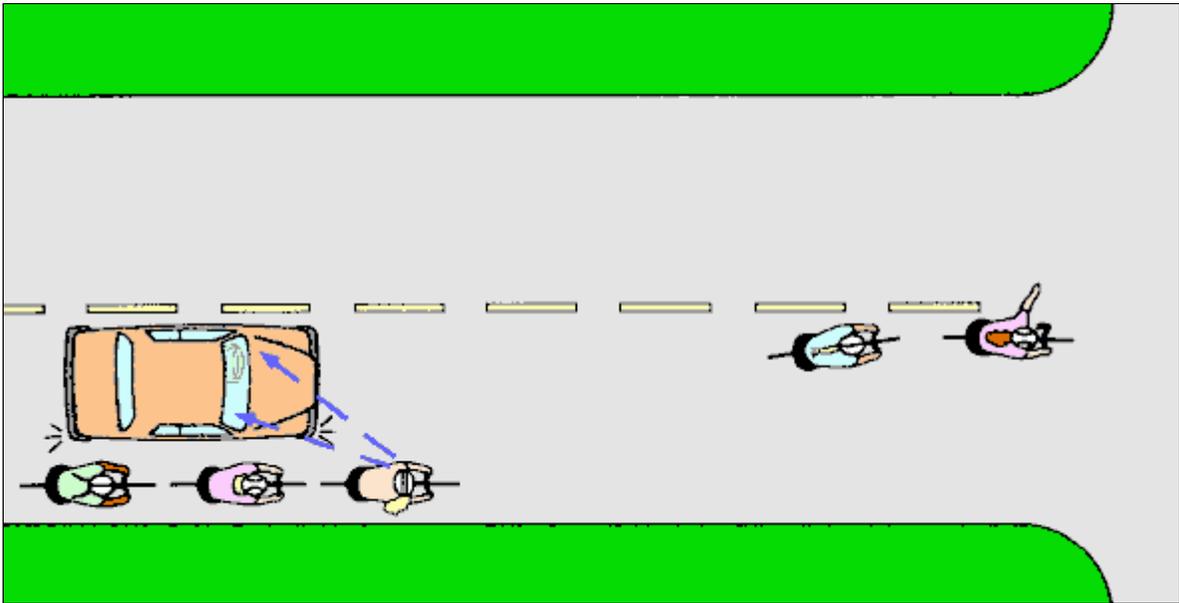
DEALING WITH OTHER ROAD USERS

Some bicyclists fall for a "herd instinct" when riding in groups -- as if the group protected them, or there's nobody else on the road besides the group. It's tempting to play "follow the leader" in a group of bicyclists -- tempting but dangerous.

When preparing a lane change or turn, you're on your own lookout. It can be safe for the bicyclist ahead of you to change lane position, but not safe for you, since cars or other bicyclists could be approaching from the rear. You must look back for them just the same as when you ride alone. Look left, right, and left again for traffic at stop signs -- don't follow the rider ahead of you into an intersection.

The only exception is in a tightly organized, small group that moves completely as a unit. The first and last riders are understood to be on the lookout for the entire group. Don't count on this service unless it's understood in advance.

When crossing lanes, a line of bicyclists should "snake" across, each rider in turn. This way, you leave a safe passage for cars. A ragged line of bicyclists blocks the entire lane.



"Snaking" across a lane, the cyclists can allow the car passing to make its right turn, while they turn left. Each cyclist looks back before crossing the lane.

Make a neat, straight line when waiting at intersections. Groups of bicyclists who pile up at intersections block the road. This practice is unnecessary, discourteous and dangerous.

When you stop to rest, read your map or wait for companions, pull completely off the road. It's surprising how many bicyclists fail to observe this simple caution.

DRAFTING AND PACELINE RIDING

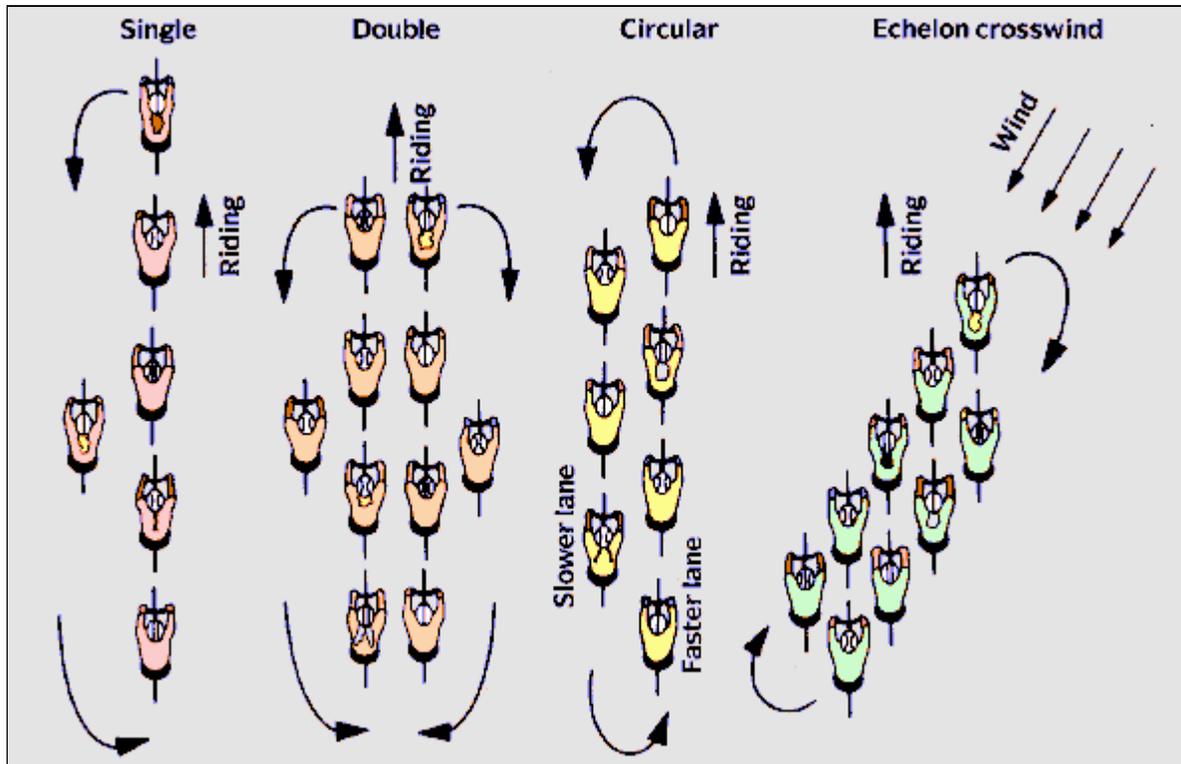
When you ride close behind another bicyclist, you don't have to work as hard. The bicyclist in front of you serves as a windbreak, reducing your air resistance. Experienced bicyclists take advantage of this effect, drafting each other in a paceline.

In a paceline, each bicyclist works hard for a little while at the front, and then drops back to the rear along the left side of the line of riders. Large groups may ride in two lines side by side -- a double paceline, with the leaders dropping back along the outside, right and left.

A well-coordinated paceline is poetry in motion, but drafting is always a little risky. To take advantage of the windbreak effect, you must follow the rider ahead of you closely; but you must never let your front wheel overlap that rider's rear wheel. If the wheels touch, you suddenly can't balance and you'll almost certainly take a quick, hard fall. Other riders behind you will land on top of you. Ride in a paceline only if you've developed good control over your bike.

Everyone in a paceline must ride smoothly, with no quick braking or swerving. Look past the rider in front of you: Don't stare at his or her rear wheel. Try to anticipate the moves the lead rider will make. The lead rider should announce road hazards:

"Glass," "Dog right," "Car up," and maneuvers: "Slowing," "Left turn." The last rider should announce "Car back" when a car is about to pass the group. Hand signals aren't a good idea in a tight paceline group -- it's more important to keep both hands on the handlebars.



Four types of pacelines. The two at the left are relatively easy, but the two at the right require a well-coordinated group of expert riders.

When you pull in behind another rider to draft, call out "On your wheel" so he will know you're there.

There's a major exception to these rules of cooperation: In a mass-start road race, riders often swerve deliberately to make it hard for others.

Meanwhile, other riders lurk behind, drafting each other until the final minutes when they sprint all-out for the finish line. The tactics of a race -- drafting and solo sprints, cooperation and competition -- make it exciting for the racers and spectators.

But leave this kind of excitement for the racers. When riding in a group, focus on cooperation, not competition. Relax and enjoy your ride!

EIGHT.

RIDING IN RAIN AND DARKNESS

If you use your bicycle for transportation, sooner or later you'll find that you have to ride at night or in the rain. Though statistical studies show that it is more dangerous to ride under these conditions, they also show that the overall crash rate for bicyclists who ride regardless of weather is lower than that for bicyclists who ride only on fine days (see Jerrold Kaplan, "Characteristics of the Regular Adult Bicycle User," Federal Highway Administration, 1975). Skill and correct equipment make it easy to ride with confidence.

NIGHT RIDING

To ride at night, you need lights. Even when streetlights show you the way, you need lights so other people can see you against the glare of car headlights.

A white headlight identifies the fronts of all vehicles. All states require a bicycle to have a headlight at night. Pennsylvania also requires a rear reflector visible from 500 feet.

TYPES OF BICYCLE LIGHTS

Three major types of lights are available for bicycles: small battery lights, generator systems and the high-powered battery systems. Choose your lights depending on where you ride.

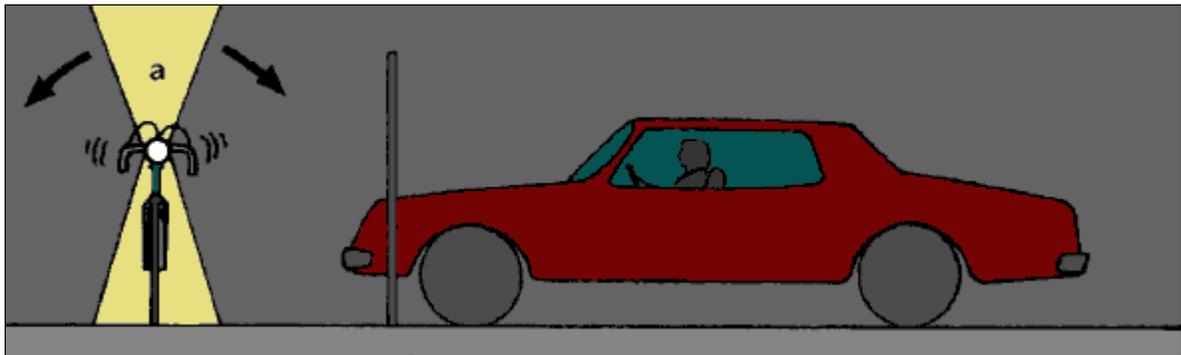
Small battery lights are most useful for riding under streetlights. Aim the headlight so its looks as bright as possible to people ahead of you. Nickel-cadmium rechargeable batteries will cut the cost of operating small battery lights. Most hardware stores sell these batteries and chargers for them.

Unlike small battery lights, a good generator system is bright enough to light your way on dark roads. It's the best choice for long-distance touring, where you may not be able to buy or recharge batteries. Most generator systems go dark when you stop riding; a disadvantage in stop-and-go city riding. Some generator systems have a battery backup that keeps them lighted when you stop.

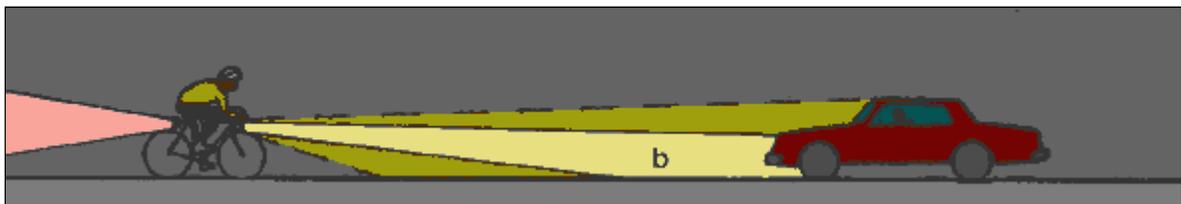
High-powered battery lights are brightest of all. They're best for night riding under demanding conditions: on dark roads or off-road. They're more expensive and heavier than other bicycle lights, and they need recharging frequently.

When riding at night, carry spare bulbs and batteries for your lights. It's also a good

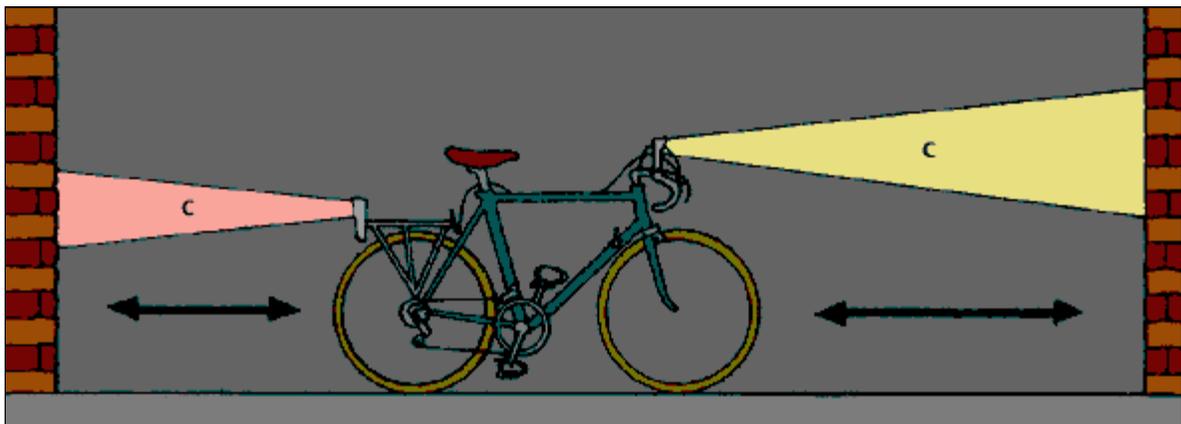
idea to carry a small battery light as a spare to get you home in case your main lighting system goes on the blink.



Aiming your lights. a) To alert drivers, flash the headlight by twitching the handlebars.



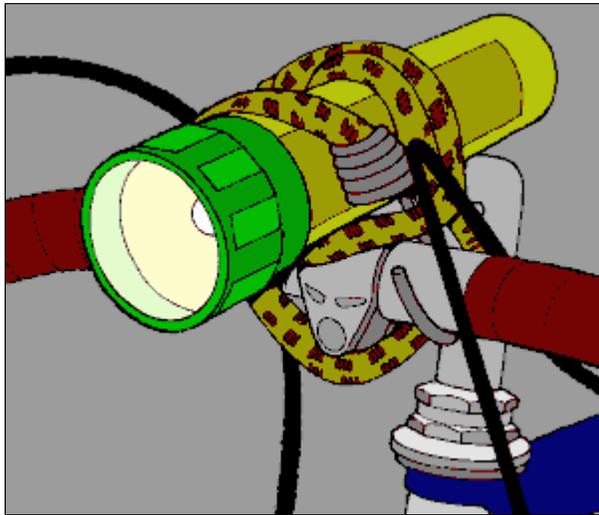
b) Mount a generator or high-powered battery light low, to cast the longest beam.



c) Aim taillights and small battery headlights level. Test aim by rolling the bike toward and away from a wall. The center of the beam should stay at the same height.

USING REFLECTORS

Don't ride at night without a rear reflector and pedal reflectors -- and make sure that your reflectors aren't obscured by baggage or dirt. Reflectors work well for drivers approaching from behind you; they continue to work if your taillight bulb has burned out, or if you're stopped and your generator lights go out.



The no-excuse headlight: A flashlight strapped to the handlebar stem with a bungee cord is legal, and sufficient for city use.

It's a good idea to use additional reflectors beyond those sold with a new bicycle. Most bicycle shops carry reflective legbands and vests. Adhesive-backed strips of reflective material are also sold for the bicycle frame and fenders. The rear reflector sold on new bicycles isn't as bright as it could be; it has three panels to reflect to the left, right and center. A large automotive reflector is brighter directly behind you where it's really needed. Be sure to aim your rear reflector directly back. If it's tilted up or down, it may not work at all.

Don't consider front and side reflectors to be a substitute for a headlight. Pedestrians stepping off the sidewalk in front of you have no headlights and won't see your reflectors. Motorists pulling out of side streets ahead of you also won't see your reflectors, because these cars' headlights throw their beam straight ahead -- across the road in front of you.

Test your nighttime equipment: Have someone ride your bike past you at night and check to see how well your systems work.

NIGHT-RIDING TACTICS

When riding at night, you can't see drivers inside their cars to make eye contact, but you can flash your headlight at them by twitching the handlebars. Flash your headlight when you need to get the attention of a driver pulling out of a side street.

In some cities, the risk of theft and physical attack in dark, empty places like parks, pedestrian overpasses and industrial areas is generally greater than the risk of crashes on streets with a reasonable amount of traffic, in residential areas and business districts. Choose routes accordingly.

Rural riding at night is the most demanding of your equipment and technique. Most generator lights are not bright enough to allow you to ride downhill at full speed on an unlighted road. Stay within the limitations of your lights.

Two-lane, shoulderless rural roads with moderate to heavy traffic have a bad record for nighttime bicycle crashes. On the other hand, quiet rural roads can be very pleasant to ride at night if your headlight is powerful enough to show you the way.

At night there are generally fewer drivers on the roads; but of these drivers, a much larger percentage are drunk drivers. A useful trick on an unlighted road is to look at

your shadow as a car approaches from behind. If the shadow moves to the right, the car is passing to your left.

RIDING IN WET WEATHER

Riding in wet weather can be miserable, but if you equip yourself well, you can stay comfortable.

Many bicyclists carry no wet-weather gear, and they get soaked. Some bicyclists try to use raingear borrowed from the coat rack at home. Long raincoats and ponchos tangle with the spokes or frame. Rubberized rainsuits get as wet inside as out, because they don't let perspiration evaporate.

A bicyclist's rain cape is a fine solution, along with fenders on your bike. The raincape is like a poncho but tailored to fit you in your riding position on the bicycle. It's small and light to carry, and relatively inexpensive to buy. It has loops at the front, which you can hook over your thumbs or the brake levers, extending front like a little tent. A waist strap holds down the back of the cape. The cape should be bright yellow, to make you more visible to drivers.

The rain cape allows ventilation underneath, and so it's the best solution on a warm, rainy day. But with the rain cape, you need a pair of full-length fenders on your bicycle. They keep dirty water and mud from flying up under your cape. A mudflap on the front fender or toeclip covers will keep your feet dry.

High-tech rainsuits of Gore-Tex or other materials that "breathe" can do the job too, especially when equipped with air holes to allow for cooling. Many have reflective stripes to enhance your visibility, too.

Your riding technique needs some modification in wet weather. Rim brakes work poorly if the bicycle has steel rims -- stopping distances may be increased by 10 times. It helps to wipe the rims dry by applying the brakes in advance, well before you need to stop.

There are several ways around the problem of wet-weather braking, among them special leather-faced brake shoes, aluminum rims or a hub brake. One of these is advisable if you ride much in wet weather. Check with your bike shop about the best choice.

In the rain, pay special attention to metal surfaces, such as manhole covers, painted traffic markings, wet leaves and oil slicks. They're all especially slippery. Avoid riding through puddles if you can't see the bottom -- a puddle can hide a pothole.

When you get home, it's a good idea to relubricate your bike chain, to help prevent it from rust.

Equip yourself, use reasonable caution and don't let messy conditions keep you off your bike.

NINE.

WAYS TO DEAL WITH TOUGH SITUATIONS

Let's face it -- some traffic situations go beyond the normal rules. When the traffic system begins to break down because of overcrowding, poor planning and disrespect for the law, you may have to "bushwhack" your way through the mess.

You can emerge safe and maintain the respect of other road users if you're careful. Here are some of the common situations where you have to take the initiative.

WHEN TRAFFIC LIGHTS DON'T TURN

Always stop and wait for red lights. You not only ensure your safety, but also increase respect for cyclists as law-abiding road users.

But some traffic lights don't turn green until they receive a signal from a metal detector buried in the pavement. A bicycle doesn't have enough metal to make many of them work.

Recognize the detector by a square or octagonal pattern of thin lines in the pavement, where slots were cut for the detecting wires. The detector is most sensitive if you ride along one of the wires.

If your bike doesn't trip the detector, you have to wait for a car to do it, or else you have to go through the red light. Going through the red isn't against the law, because the light is defective. If you ever have a crash or get a traffic ticket because a traffic light won't turn green, it's the fault of whoever installed the detector.

Detectors are made that work for bicycles, at little or no additional cost. Federal design guidelines exist for these detectors. If you put enough pressure on your local and state government, bicyclists can avoid the crashes and the city can avoid the lawsuits which may follow.

GETTING THROUGH TRAFFIC JAMS

Traffic jams don't have to stop you -- that's one of the biggest advantages of bicycling in the city. But in the tight quarters of a tie-up, take extra care. Stopped cars in a traffic jam present the same hazards as parked cars: blindspots, doors and unpredictable starts and turns.

If there is an open passing lane, use it rather than thread between cars. If the street is completely plugged, pick your way forward slowly and with your hands on the

brake levers. Remember, any car door could open!

If you're in a traffic jam, you can be fairly sure that the cars will not move, since they have nowhere to go. But if there's an open driveway or parking space into which a car could turn, you have to assume that it will. Look to see whether the car's front wheels are turned. Move away from the side of the car as you pass, and try to get the driver's attention as you approach the front of the car.

When cars are stopped, but not completely bumper to bumper, be very wary of cars from other lanes cutting across in the gaps. Stop and look before you move out into a gap. Be especially careful if the vehicle you're passing, like many vans, doesn't have a hood you can see over.

Don't pass a long truck or bus in a traffic jam unless there's a full, open lane next to it. If you ride close to the side of such a vehicle it may begin to merge toward you, leaving you no way to escape.

As you approach an intersection, change lanes to the same position as you would in normal traffic. Before you cross in front of a car to change lanes, make eye contact with the driver even if the car is stopped. When you reach an intersection, wait behind the first car at the traffic light. Don't move up next to that car; drivers don't always use their turn signals, so you don't know for sure which way the car will turn when the light turns green.

These traffic-jam tactics are reasonably safe, but in some cities it may not be legal for a bicyclist to pass on the right or ride between lanes of traffic. On the other hand, it's usually legal for you, or any driver, to cautiously disobey normal traffic rules when the road is "obstructed."

SIDEWALK AND BIKEPATH RIDING

Many people consider sidewalks a safe place to ride because cars don't travel on them. Unfortunately, sidewalks aren't safe. Stay off them, except where you have no choice.

Trees, hedges, parked cars, buildings and doorways create blindspots along a sidewalk, which is too narrow to allow you to swerve out of the way if someone appears. A pedestrian on the sidewalk can sidestep suddenly, or a small child can run out from behind an adult. Never pass a pedestrian until you have his attention.

And cars do use sidewalks -- at every cross street and driveway. Since there are no clear rules for travel on a sidewalk, your only choice is to ride very slowly and look in all directions before crossing a driveway or street.

A bikepath should be used with caution. Even if bicycles are supposed to have the right of way, the path may be too narrow for safe maneuvering. Pedestrians are just as unpredictable, and intersections are often hazardous. A bikepath can get crowded with roller skaters, dog walkers and careless, inexperienced bicyclists.

A bikepath can sometimes provide a useful shortcut, and it can be pleasant and scenic. But don't ride on it just because it's there. Most bikepaths are no place for a fast ride or commuting trip.

AVOIDING THE MOVING BLINDSPOT

On your bicycle, you can see over most cars. You'll become used to this advantage. Don't let it fool you, though. You can't see over a large van, truck or bus. Moving blindspots lurk behind these tall vehicles.

Suppose that you're riding on a two-way, four-lane street. You've merged to the inside lane, because you want to turn left. You signal your left turn and continue to move forward. You see only one other vehicle on the street: a van, coming toward you in the opposite passing lane. It stops to let you turn left. Can you make your turn safely?

No! Since you are moving forward, a blindspot behind the van is "moving toward you." A car could be passing the van in the outside lane, and you would never see that car. If you were to cross in front of the van, you could be met with a terrible surprise.

ARE YOU INVISIBLE?

People will often tell you to "ride as if you were invisible." That advice only makes sense where you're actually hidden by a blindspot. To ride all the time as if you were invisible, you would have to pull off the road whenever a car approaches them from behind. You would also have to stop and wait until traffic clears before crossing any intersection.

Instead, ride to make sure you're visible. Wear bright-colored clothes by day, and use lights and reflectors at night. Also, test to make sure that drivers have seen you. This is the safest way to ride.

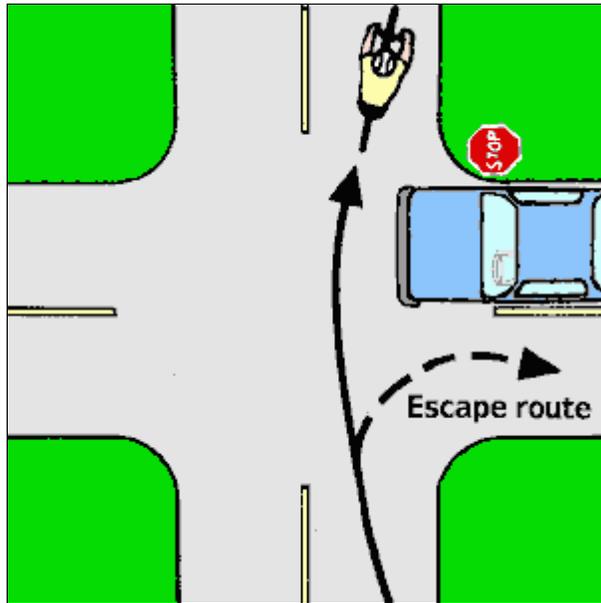
How do you test that a driver has seen you? Here's an example. Suppose that you are on a main street, riding toward an intersection. A car is approaching from the right in the cross street, where there's a stop sign. How do you handle it?

MAKING EYE CONTACT

As you approach the intersection, look into the car window and make eye contact with the driver to ascertain that the driver has seen you. Watch for the car to slow down more than it would if you weren't there.

If you look into the driver's window and the driver isn't looking at you, then be very cautious. Even if the car is stopped at the stop sign, a driver who doesn't know you're there has no reason to stay stopped. Slow down, and call out to get the driver's attention. Proceed only when you're sure that the driver is waiting for you.

DEALING WITH RUDE DRIVERS



To call the bluff on a driver inching out from a stop sign, check behind you for traffic, then keep pedaling as you move farther into your lane.

Some drivers try to cut across in front of you. They inch out from a driveway or stop sign and treat you as if you have no right to the road.

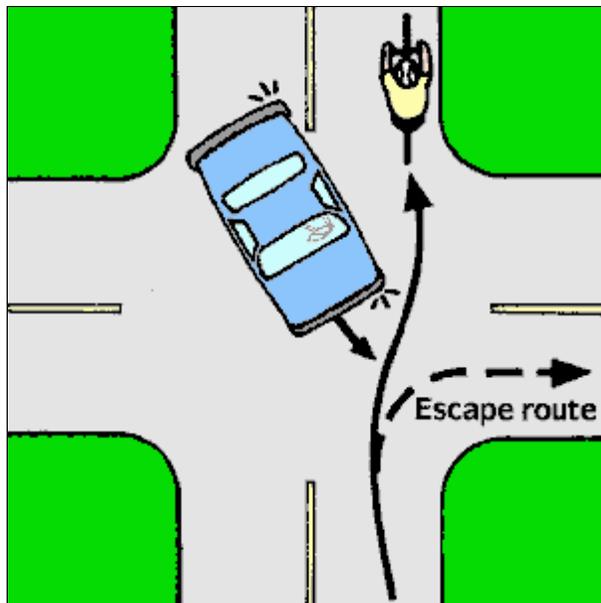
These drivers seem more dangerous than they actually are. Most drivers who play these tricks are only trying to bluff you. They inch forward with one foot on the gas pedal and the other on the brake pedal, waiting to see whether you'll stop.

Giving in to this bullying will slow you down and leave your self-esteem in shambles. Stand up for your rights. Don't let rude drivers spoil your trip. Outbluff them. Here's how.

With a little experience, and after reading the chapter on emergency braking in this booklet, you'll have a good idea of your bike's stopping distance in any situation.

You outbluff a driver by making it clear that you don't intend to stop. Continue to move forward -- and keep pedaling, since your turning pedals are a clear signal to the driver. Meanwhile, figure out when you'll have to hit the brakes, in case the driver pulls out in front of you anyway.

In 999 cases out of 1000, the driver will stop and wait for you before you have to brake. Move right on past the car. In the odd case that the driver doesn't stop, you'll be prepared to brake in time.



To call the bluff on a driver inching out from a stop sign, check behind you for traffic, then keep pedaling as you move farther into your lane.

The real danger at intersections is from drivers who run stop signs or red lights without even slowing down, or who stop and then start again without looking. But these drivers are rare; crashes tend to deplete their numbers.

REDUCING FRICTION BETWEEN BICYCLISTS AND MOTORISTS

The main way bicyclists annoy motorists is by doing unpredictable maneuvers this booklet warns against.

Fearful instruction -- "always keep away from traffic" -- is passed down to children by parents who don't know much about bicycling -- the blind leading the blind. From about 1930 to 1965, few adults rode bicycles in the United States, and that was long enough for incorrect ideas about bicycling to become deeply rooted.

Certainly, children shouldn't be allowed to ride bicycles in heavy traffic, any more than they should be allowed to drive cars. But that doesn't mean that adult bicyclists should have to ride like children.

There will always be people in cars who yell, "Get off the road." Don't let them bother you. Position yourself to encourage drivers to maneuver around you correctly. If most bicyclists in your community use incorrect maneuvers, drivers will have some trouble understanding your correct maneuvers. You need to make especially clear signals. With experience, drivers will discover that they have an easier time with bicyclists who use correct maneuvers.

The number of bicyclists is increasing, and in the long run, more drivers will come to understand that it makes sense to share the road. Bicycles use less road space than cars; every person who chooses to ride a bicycle is reducing traffic problems.