

Roadway and Bikeway Safety Issues

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www.cycle-safety.com www.bikelaws.org



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Left: “Benign neglect”, a well maintained road with no bicycle “accommodation” makes an excellent bike route.

Right: Bike lane over bridge “ends”, directing cyclists towards sidewalk – a poor place to ride. This program was developed to help local gov’t officials understand bicycling safety issues, including hazards caused by separate bikeways. There is also a critical need to educate citizens about best practices.

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The Guiding Principle:

Cyclists fare best when they act and are treated as drivers of vehicles

SAME ROADS, SAME RULES, SAME RIGHTS following best practices

Operating by pedestrian methods and in unexpected places is often dangerous



Photo above from Chicago's Bike Lane Design Manual Feb 2003 Fred Oswald

Comparing principles --

Vehicular Cycling includes the best practices of experienced cyclists.

Pedestrian methods can be (somewhat) safe only at very slow speeds. If you need to go faster, ped. methods are very dangerous.

Can you find the errors in right photo?

1. Riding in dangerous door-zone bike lane.
2. Helmet is too far back on his head (also indicates the strap is too loose)
3. Seat is too low (hard on the knees)
4. Feet are too far forward on the pedals (ball of feet should be on pedals)
5. No gloves (skin hands in a fall).
6. Bike is an old coaster brake model with no front brake. Such a bike does not allow a quick emergency stop and thus should be restricted to low speed.

Integration vs Separation

Separated cycling on Multi-Use Paths & sidewalks

- Provide second class transportation
 - MUPs: Are a tiny fraction of the road network
 - MUPs: Don't access important destinations
 - Often unsafe, requiring slow speeds to avoid collisions with cyclists, peds and objects
- Encourages unpredictable movements
- Discourages learning of safe road skills
- Encourages violation of traffic laws
- High collision risk at road crossings



Integrated cycling on the existing road network

- Access to all the destinations motorists can reach
- Encourages cyclists to use safe traffic movements
- Encourages cyclists to follow Traffic Laws
- Lowest collision risk at road crossings



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Differences between integrated (vehicular) cycling and Segregation (pedestrian) methods.

Original slide by Dan. Gutierrez and Brian DeSousa

Why We Teach Integration

- The Integration Principle is US traffic policy:

- Same Roads as motorists → Access to ALL destinations
- Same Rights as motorists → Right to travel and use roads
- Same Rules as motorists → Safe predictable movements



- 100+ years of US Integration Heritage

- Used by knowledgeable cyclists for 120 years
- All State traffic laws support Integration
- Foundation of LAB BikeEd™ Traffic Cycling Education

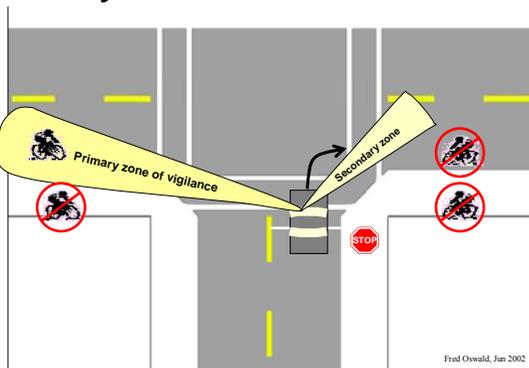
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Classes in Integrated Cycling are provided through the BikeEd program.

See www.bikeleague.org for details

Original slide by Dan. Gutierrez and Brian DeSousa

Don't ride Wrong Way or on sidewalk! Stay in traffic lane to be seen



Wrong Way & Sidewalk Hazards

- One of many scenarios showing wisdom of following standard rules of road.
- Drivers are likely to look in traffic lane to left. Less likely to look at sidewalk.
- Some people are taught to ride on the wrong side to “see traffic coming”.
- The crash rate for riding on sidewalk is about 2-9 times higher than street.
- Crash rate for wrong-way cyclists is about 3½ times as high as for cycling properly. Pedestrians walk facing traffic so they can sidestep off the road if necessary. You can't sidestep a bike.

Sidewalk and Sidepath Hazards

Riding on sidewalk/sidepath compared to riding on road increases collision risk by a factor of:

- 1.8 (California; Wachtel and Lewiston 1994)
- 2.7 (Eugene, OR, 1979)
- 4.7 (California, 1974)
- 3.4 (Sweden; Linderholm 1984)
- 2.4-8.6 (Finland, Sweden, & Norway; Leden 1988)
- 3.9 (Denmark; Jensen, Andersen, Nielsen 1997)
- 1.7 to 5 (Germany; Schnull, Alrutz et al 1993)



Riding against traffic on sidewalk or sidepath is significantly more dangerous.

Paul Schimek, 2001
D. Gutierrez & B. P. DeSousa, 2003

Sidewalk Crash Studies

Sidewalk about 2-9 times as dangerous as the adjacent road.

(depends on speed, driveway & intersection density, etc.)

Bicycle Sidepath / Sidewalk – Unsafe at (almost) any speed



"...Sidewalks are typically designed for pedestrian speeds and maneuverability and are not safe for higher speed bicycle use." Amer Assoc. of State Highway Trans. Officials, Guidelines for the Development of Bicycle Facilities
Photo by F. Oswald, Jun 1999

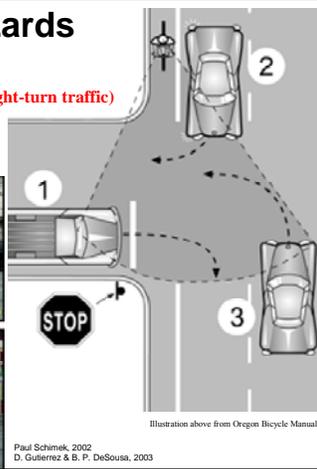
Sidepath Hazards

Sidewalk type sidepath from Cleveland parks. A path beside the road is just an asphalt sidewalk. Quote at bottom is from AASHTO "Green Book".

Bike Lane Hazards

Bike lanes encourage:

- Pass on right & filter fwd. (right of right-turn traffic)
- "Drive-out" at stop sign
- "Right hook"
- "Left cross"



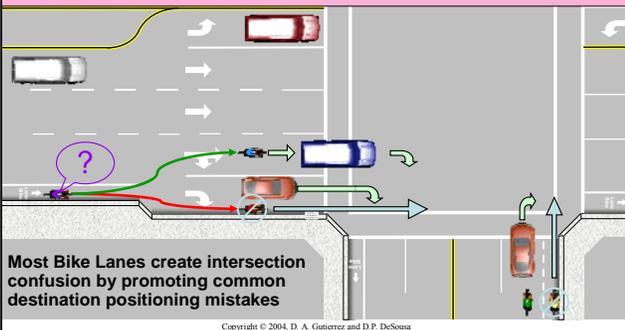
Paul Schimek, 2002
D. Gutierrez & B. P. DeSousa, 2003

Bike Lane Hazards

BL encourages cyclists to pass on right even where car may turn right. Also contributes to motorist mistakes. Bike lane makes "left cross" & "right hook" errors more likely

Destination Position & Bike Lanes

- Bike Lane type speed positioning doesn't work at intersections
 - Straight through traveling cyclists should not be at the extreme right
 - Bike Lanes often encourage cyclists to violate destination position rule



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Left cyclist is approaching dual destination (right/straight) lane next to right turn only lane. There is NO WAY to paint a separate bike lane without creating conflicts. The blue cyclist in the 2nd lane is in correct position for riding straight through the intersection. Red cyclist is in danger.

Bottom depicts "right hook" hazard from bike lane to the right of right-turning traffic. The Green cyclist (near middle of right vehicle lane) is in a much better position than the white cyclist in the bike lane.

Original slide by Dan. Gutierrez and Brian DeSousa

“Door Zone” Hazards



Too close!
Some doors stick out 4 feet



Door Zone Bike Lane



Fatality, Jul 2, 2002
www.rwinters.com/

Door Zone hazards

Left cyclist is a bit too close

Right-top bike lane is in door zone (Berea, OH)

Door Zone bike lane fatality in Cambridge, MA
(Cyclist was doored and fell under a bus.)

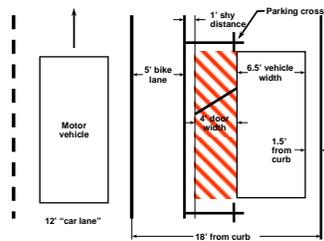
Photo from www.rwinters.com/.

Avoiding the “Door Zone”

--- It takes lots of space



The SAFE place is
outside the bikelane



Actual space req'd for
bikelane next to parked cars

Bike lane blunder

This bike lane in Berea, Ohio is too close to parked cars.

It also heads into a “rock garden” at the intersection.

What were they thinking? Why weren't they thinking?

“Stripeless” Bike Lanes

Stripeless bike lane advantages:

- Avoid most hazards of bike lane stripe
- May alert motorists to expect and accept cyclists
- Motorists may expect cyclists to use full lane
- May encourage better lane position
(Need education and correct placement)

Problems:

- Symbols are often too near edge of road
(Should be at least 14 feet from curb)
- Encourage harassment on other roads
- Hard to gain improvements not on the “bike route”
- Stencils do not reduce need for education
- Stencils may be worn away by traffic



Chevron
pattern



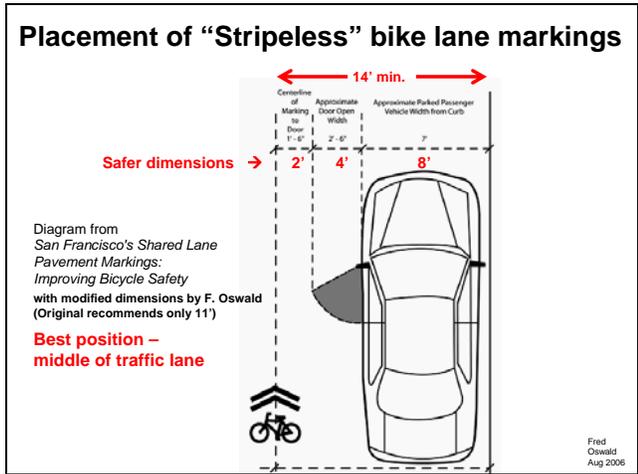
“Sharrow” stencil from Denver
Note: too close to parked cars

The best ‘bicycle facility’ is simply a correctly
designed, properly built and well maintained road.

Fred
Oswald
Aug 2006

Most of the hazards created by bike lanes are caused by the stripes on the road.

“Stripeless” lanes avoid most of these hazards, but don’t put them in a danger zone.



San Francisco's plans compared to much safer dimensions.



If vehicle detectors fail to detect bikes, how can officials expect cyclists to respect the law?

The detector marked with stencil at right is at NASA Glenn Research Center, Cleveland. There are ****NO**** safety problems from marking detectors.



Drain grate at left is right in the travel lane. Note a safer grate is next to the dangerous one (in the gutter pan). The bad grate was replaced about a week after the author reported it to the city. Cracks and slots are also serious hazards.

Vehicular Cycling “Layers of Safety”

1. Don't CAUSE collision (follow rules of road)
2. Prevent motorist mistakes
3. Drive defensively to escape hazards
4. Use safety equipment to reduce injury



Fred Oswald,
Jul 2004

Layers of Safety

Seems obvious but ~ half of car-bike collisions are fault of cyclist

Proper lane position and taking charge (illustrated above) often prevent mistakes from happening

Anticipate motorist mistakes and plan an escape route

Helmet, gloves and first aid kit are the last line of defense

Some people add another layer – bike handling to prevent falls and other single vehicle crashes.

Proper Lane Positioning

An essential skill for cyclists

Narrow Lane Road or Downhill – Use Full Lane

Cyclists have legal right and safety obligation to use the full lane when too narrow to share with motor vehicles



Photo by R. Woodward, Jan 2000



Photo by Wayne Pein

Fred Oswald
Aug 2003

The “secret” of experienced cyclists.

Note how red car is completely changing lanes to pass.

Beginners hug the curb, then wonder why cars pass so close.

Note: we do not suggest that a young child ride on a street like this. However, the sidewalk is not safe either, especially for an unsupervised child.

Use Expert Information About Cycling



Effective Cycling and Street Smarts should be on YOUR bookshelf

Fred Oswald, Jan 2002

Sources of expert information

Street Smarts is used in the bicycle drivers' manual in several states, including PA and OH.