

Bicycle Mirror Usage

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Why use a mirror when bicycling?

INTRODUCTION

In general, the main reason to use a mirror while bicycling in traffic is **to maintain rearward situational awareness**. Situational awareness is a cornerstone of safety. Being aware of your surroundings is key to predicting what will happen next, and avoiding potential conflicts. By glancing in a mirror every few seconds you effectively double your awareness by extending it rearward. We understand the importance of mirror use when operating a car, truck or motorcycle, but rearward situational awareness is especially important to bicyclists because of our relatively slow speed. Knowing what's behind us enables us to know, and prepare for as appropriate, what we will experience shortly in our immediate vicinity.

It's impossible to maintain rearward situational awareness without a mirror. You just can't turn your head often enough to do that because a head turn takes much more effort, time, and attention away from looking forward than a mirror glance does. Hearing is far too unreliable, especially with ambient noise (mostly from other traffic), and provides much less precise information compared to a mirror glance. With practice, you can learn to glance in an eyeglass or helmet mirror in a fraction of second with one eye, while still maintaining at least peripheral vision forward with your other eye.

Beyond maintaining rearward situational awareness in general, let's look at the many specific situations in which a mirror is especially useful to a cyclist.

- 1. To observe and learn how motorists react to various choices in lane position, in real time.**

Nothing convinces one of the value of full lane use more than watching motorists behave in the mirror. There is no *fixed* "sweet spot" where you get the best overtaking treatment, which CyclingSavvy co-founder Keri Caffrey likes to show for urban riding and multilane arterials. In any given situation there is such a sweet spot, but its location *varies* based on lane width, sight lines, road speed, road configuration, traffic and weather conditions, etc. With a mirror a cyclist can experiment adjusting left and right to observe which position causes motorists to behave optimally to find where that sweet spot is. A mirror greatly accelerates and enhances this process because one can observe motorist reactions to their position in real time while they're still a ways back instead of waiting to see how much room they give you once they pass. One thing we can see in a mirror is how soon and far back they react to our presence—the sooner and further back they slow or move over, the more noticeable and relevant we are; the more effective is our position. Without a mirror this information cannot be obtained.

2. To know when you're in a gap (no cars approaching from behind) so that you can freely use the full lane.

Even when there is adequate space for bicycling safely at the edge (clean bike lane, striped shoulder, or good margin of a wide lane), there are advantages to using the full lane. **The prevalence of gaps allowing full lane use is much more frequent, and the gaps are much longer, than most cyclists who don't use mirrors realize.** The advantages of using the full lane are numerous and covered in all traffic cycling courses, but here's a summary:

- a. Improves sight lines to potential hazards ahead.
- b. Improves buffer safety space to potential hazards at the road edge.
- c. Makes you more conspicuous, relevant, and attention-grabbing to crossing/entering traffic ahead (reduces left-cross/pull-out risk).
- d. Makes you more conspicuous, relevant, and attention-grabbing to the traffic that will inevitably approach from behind (reduces right-hook, drift, and weave risk).
- e. Puts you in a better position to start planning for a left turn, when applicable.
- f. Puts you on cleaner road surface (much fewer flats; less chance of a debris-caused crash).
- g. Allows for pleasant interactions with motorists who wave, smile and nod when you temporarily move aside for them (when safe, reasonable and necessary).

3. When using a full lane...

A mirror, while using the full lane (a.k.a. “taking the lane”, or riding near the center of a traffic lane), presents opportunities not available when riding at the road edge, in a bike lane, on a shoulder, or even in the right tire track. This is why many riders who habitually ride “out of the way” don’t experience many of the advantages of mirror use when they try one. But when you do use the full lane with a mirror, here are the advantages:

- a. **To see when traffic is approaching from behind to know when to release by temporarily moving aside** (if safe and reasonable to do so, after they indicate noticing you by slowing down). Many states have laws that require drivers of slow moving vehicles to use a turnout when five or more vehicles are behind (e.g. CVC 21656). A mirror enables the cyclist to see this condition develop. Without a mirror a cyclist must ride by default in the road position required when faster same-direction is present, when at the road edge or in a bike lane, because they have no reliable way of knowing when such traffic is arriving, or has arrived.
- b. **To not get hit from behind by seeing when someone is approaching from behind too quickly**, perhaps because they are blinded by the sun, distracted, or inebriated... **to know to do something to grab their attention**, like look back at them, stand up, or zig-zag, and, if all that fails to grab their attention... **to know when you must get out of the way.**
- c. **To eliminate most motorist harassment.** With a mirror you can see and know exactly when to acknowledge motorists approaching from behind, with a head-turn-lookback and nod, or by using the slow/stop arm signal, right as they approach you. This conveys to them that you’re not oblivious about their presence, and nips annoyance and potential road rage in the bud. Motorist frustration often stems from the perception that the bicyclist causing the motorist to slow down is oblivious about the motorist. This is frustration that can quickly escalate to road rage. This is why **timely acknowledgement**—a timely look back and nod, or slow/stop signal—is extremely effective in assuring motorists behind you that you know they are there and you know what you’re doing. It calms them. It also has the effect of knocking drivers out of “autopilot stupor”. Without a mirror a cyclist is likely to remain unaware of traffic approaching from behind until the motorist starts to get annoyed, if they are not already enraged and

honking. By then it's too late for acknowledgement to have much positive effect. Only with a mirror can you *reliably* notice them and acknowledge them *in time* to nip road rage in the bud.

- d. **To avoid the screened-second-driver crash.** If one vehicle approaches from behind when another vehicle is behind it, the first vehicle may screen the cyclist from being seen by the second driver. If the first vehicle approaches quickly and moves over to pass in the final moments the second driver may come upon the cyclist too quickly to avoid collision. ***Timely acknowledgement*** of the first motorist mitigates risk of experiencing this situation by causing the first motorist to slow earlier and leave a safe following distance to the cyclist.

4. When preparing for a left turn or left merge,

to know when not to bother looking back (you see a few more vehicles, then a good gap coming), or to know when signaling is required to initiate negotiation for right-of-way (long line of vehicles with no gap soon enough).

5. When in the leftmost/fast lane prior to making a left turn.

This is a special case combining 3c (eliminating harassment) and 4 (preparing for a left). On a relatively empty multi-lane road when you've already moved over into the far left lane in preparation for turning left, but still approaching the point where the left turn lane appears, it's impractical to ride with your left arm extended. But your presence there can be confusing and even appear unsafe or illegal to motorists approaching from behind. But with a mirror you can see them coming and extend that left arm for them to see for clarity, and usually dispel any consternation over your "odd" positioning.

6. Prior to taking a drink or a bite to eat,

to glance back and make sure you're not about to be passed by a large vehicle requiring both hands on the bars.

7. To see when another bicyclist is catching up with you,

so you know to speed up to keep that from happening!

8. To monitor a group when riding at the front,

to see if gaps are developing, if everyone is riding well together, etc. It's particularly useful on a climb, to see exactly when a gap starts to develop so as to know immediately when to back off the pace a bit.

9. To be the rabbit on a climb.

Your buddy is behind but catching up on that long climb, hoping to catch you. Use your mirror to maintain a tantalizing distance so he thinks he can catch you, but don't get so far ahead that he gives up.

10. To see attacks coming from behind,

so you can shift up and prepare to get on that wheel!

11. On a fast twisty descent,

so you can see if a motorist is about to pass you before moving from the edge towards the middle of the road following the optimal descent line.

12. On a blind curve or blind crest,

so you know when they can see you (if you can see them; they can see you), and when you're past that point. It also shows you, on blind curves, how much longer you're visible to them based on where you're positioned.

13. To protect against inadvertent drift.

I've been studying the problem of inadvertent drift since around 2004 when there was a rash of such crashes in Sonoma County where I have family. I use the word *inadvertent* here to distinguish from cases where a road rage motorist intentionally drives into a bicyclist.

While I had learned about all the standard crash types and how to avoid them, this one stumped me. I thought about it a lot, and experimented, and finally came up with a practice that is counterintuitive and seems complicated for most, but I find to be engaging, simple, and extremely effective.

The technique is based on the observation that drivers are more apt to be inattentive in light traffic, particularly when there is no traffic in front of them, and that cyclists on shoulders are essentially irrelevant to motorists and are very likely to be ignored and overlooked. So a road with a cyclist on the shoulder or in a bike lane, and otherwise empty, can be effectively perceived by a motorist to be an empty road.

When the road ahead is empty, or is perceived to be empty despite the presence of a cyclist on the shoulder, the approaching motorist is much more likely to attend to a distraction long enough to lead to a drift onto the shoulder.

So it occurred to me that the key to avoiding falling victim to such a crash is riding in a manner that grabs the attention of the motorist *before* they choose to attend to a distraction, and you do this by using the full lane during such periods even when there is a good shoulder or bike lane adjacent to the road you're on.

Further, with the mirror you can see them coming, you can observe them noticing you, by their slowing down or changing lanes, and then as a gesture of cooperation you can move aside perhaps even all the way onto the shoulder. It's a great way to get a nod, smile or wave from overtaking drivers, which you'd almost never get if you just were riding along on the shoulder the whole time.

I've been doing it for over 15 years now and it works really well for me. When I explain it, people often don't get it. They usually miss the part about grabbing the motorist's attention before they attend to a distraction. It's important to realize that it's impossible for a driver to maintain course without doing at least a brief course check every few seconds. It's during those inevitable course checks that you need to be in the lane where you'll grab their attention from continuing to attend to their distraction.

Of course in theory it's possible that somehow they'll overlook you in the lane right in front of them, but a driver doing this is blatantly obvious to a bicyclist in

the lane with a mirror because unlike every other driver who is slowing down and/or changing lanes this one is just continuing to maintain course and speed, and this is obvious long before it's too late to do something about it. You can do something even more overt to grab their attention like look back or issue the slow/stop arm signal, or even zigzag a little. If all else fails you still have enough time and space to bail onto the shoulder where you would've been if you weren't using this technique, but in almost 20 years I've never had to resort to doing that.

TODO:

1. Garmin Varia - to verify if false positive
2. Bike Boxes/red light stops - to be engaged with traffic approaching from behind
3. Fix section numbering. Add Contents
4. Most resistance to mirror use seems to stem from picturing riding in the same manner - same speed, same position etc. - with and without a mirror. Reality is that effective use of a mirror enables more effective use of strategic and conspicuous lane positioning. So when you ride with a mirror you ride differently too, and it's primarily the different riding that enhances the safety, not what you see in the mirror.
5. Scenario: riding stripe of DZBL and see bus coming.