

The Looked but Failed to See Motorcyclist/car Collision

Five Chances for Error*

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Introduction

Understanding the five chances for error and the associated visual phenomena is helpful in furthering our understanding of the Looked But Failed to See (LBFTS) Right-of-way Violation (ROWV) motorcyclist/car collision scenario. Knowing these five chances for error, and the associated phenomena, is also helpful in formulating recommended actions for both riders and drivers that will lessen the chance of these types of collision occurring.



A key point to understand is the human eyes and brain is not the equivalent of the lens of a camera. The commonsense argument that “if it is visible, we will see it if we look hard enough” simply isn’t true.

1. Didn’t look. Did the driver fail to look? If the driver is distracted or misunderstands the road layout (for example having no experience regarding traffic flow at a roundabout), he or she might not look or might not look in the necessary direction.

- Riders need to be aware of situations that might be complicated for drivers, reduce speed, and be prepared to take evasive action.
- Drivers need to eliminate distractions while driving and take extra time to focus at unfamiliar road layouts.

2. Looked but couldn’t see. The driver looks but the motorcyclist is not visible. If the motorcyclist is in the “wrong place” (for example behind a larger vehicle) or the motorcyclist is appropriately placed but the driver’s view of the motorcyclist is blocked (for example, by the car pillar or a roadway obstacle like a light pole) the driver could look but fail to see the motorcyclist.

- Riders have the responsibility to ride in a position to be seen.
- Drivers should “rock” their upper body while looking and take more time searching – allowing the motorcyclist to “appear” if the driver’s vision is blocked. Drivers must understand the need to look around pillars and roadside obstacles.

3. Looked, motorcyclist visible, but didn’t see. The driver looks, the motorcyclist is visible, but the driver never becomes aware of the motorcyclist. This is an example of what is called *inattention blindness*. There are several explanations for this phenomenon.

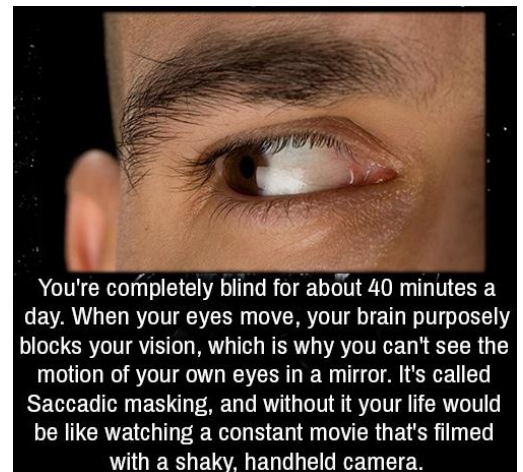
The long-standing explanation is that the motorcyclist is small and inconspicuous. Recent research however indicates that lack of conspicuity doesn’t explain many LBFTS ROWV crashes - drivers pull out in front of highly conspicuous trains and emergency vehicles. In regard to motorcyclists, the

research indicates that prevalence (lack of) and meaning (lack of) might be better explanations for drivers failing to perceive a motorcyclist that is clearly in the driver line of vision.

Motorcyclists are a small fraction of road users - there are not many motorcyclists on the road compared to other vehicles and most road users don't own or operate a motorcycle and have little connection to motorcycling. People tend to "see" (perceive or become aware of) things within their visual field that they expect to see and/or that have meaning to them. For example, antique car lovers can spot vintage cars in the traffic mix even though there are few on the road.

Saccade masking is another phenomenon about the way our eyes work that could account for when drivers look, the motorcyclist is visible but the driver does not "see" the motorcyclist.

When we move our head and eyes quickly to scan a scene, the background moves rapidly through our zone of vision. Drivers (and riders) on average look in each direction for less than a half second before turning their head to look in the other direction. When we turn our heads quickly, our vision is shut down in a series of **saccades**. Without saccades, our rapid head and eye movement would cause disorientation and dizziness. Our eyes don't move smoothly across the background, as we commonly think. Instead, our eyes move very rapidly from one selected fixation point to another.



This is known as **saccadic masking or saccadic suppression** and works very effectively for processing complex scenes, but there is a drawback. The brain ceases to process retinal images between saccades. It is only during the stationary fixations that an image is processed. The consequence is all drivers and riders are left with gaps in visual perception whenever we quickly scan both ways at an intersection. The brain "fills in" the missing visual data giving us the impression of continuous vision during the scan. We believe we have completed a full continuous scan, but the truth is our scan is more like a series of snapshots which, without our awareness, our brain has stitched together. Even an attentive driver looking in both directions to check for oncoming traffic may fail to see an approaching motorcyclist if he/she falls within a saccade.

- Research does indicate that riders can benefit from making themselves more conspicuous (visible). Riders should strongly consider wearing Hi-Viz gear and adding auxiliary lights.
- Drivers need to make (force) their brain to perceive road users that might be relatively rare in the traffic mix or have little meaning to the driver. Motorcyclists are vulnerable road users that fit this category. Drivers should look near, middle-distance, and far while asking themselves - is there a pedestrian, bicyclist or motorcyclist approaching? Taking more time to move our head and keeping our eyes moving in lock-step with our head will lessen the chance a motorcyclist will be lost in a saccade.

The left turn scenario presents yet another problem - **motion camouflage**. Many motorcyclists ride in the left third of their lane. This position is often recommended as the best position for seeing and being seen. However, a motorcyclist riding in the left third of the lane and approaching a stopped car waiting to turn left is placed directly in front (straight ahead) of the driver. The motorcyclist is moving toward

the car but from the driver's perspective the motorcyclist appears stationary because the motorcyclist remains on the same line of travel between the driver and a landmark point behind the motorcyclist. The motorcyclist can appear to remain at a far distance until the last moment.

- In this scenario, motorcyclists should consider moving toward the right portion of the lane. In this position the view from the driver to the motorcyclist is at an angle which presents a changing background and results in the perception of movement.
- The car driver, waiting to turn, looking ahead, and aware of this phenomenon can increase their chance of seeing a motorcyclist traveling directly at them by rocking their upper body side to side while looking. The rocking will remind them they are searching for hard to see motorcyclists and at the same time change their line of vision creating the same result as the motorcyclist can create by changing lane position.

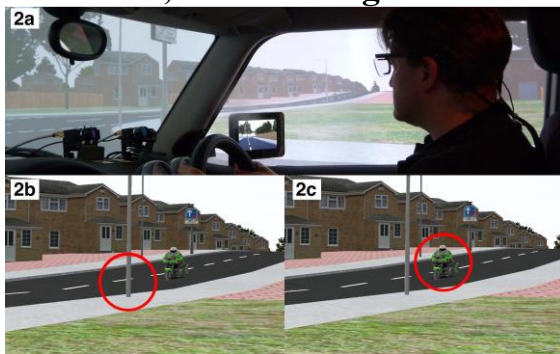
4. Looked, saw but miscalculated. The driver looks, the motorcyclist is visible, the driver sees the motorcyclist but fails to correctly judge the speed and distance of the motorcyclist. The research indicates that motorcyclists' approach speed toward intersections is often higher than that of other vehicles.

The phenomenon termed *size-arrival effect* is in play in this scenario. Our mind judges larger objects to be closer to collision than smaller objects, even if the larger object is farther away. Because motorcycles (and their riders) are small compared to other vehicles on the road, drivers may judge them as being farther away (longer time to arrive) than they actually are.



- Riders have the responsibility to slow down and approach intersections with caution and readiness to brake.
- To compensate for the size-arrival effect, drivers should assume the motorcyclist they see will arrive at the collision point sooner than they think - and choose to wait. Choosing to wait will cost a few seconds in time. Misjudging the motorcyclist's arrival and turning across his/her path causing a collision could result in a horrific catastrophe.

5. Looked, saw but forgot



Research suggest there is a role for short-term memory failures in understanding intersection crashes which in the past have been labeled Looked But Failed to See. The 2019 research titled *The 'Saw But Forgot' Error: A Role for Short-term Memory Failures in Understanding Junction Crashes?* explored where drivers looked and what they remembered while crossing junctions in a driving simulator. The results suggest that it's what happens in the moments between seeing an approaching vehicle and pulling out that can lead to a complete absence of memory

- particularly for approaching motorcycles. Drivers looked at, but seconds later failed to recall, critical approaching vehicles on up to 15% of occasions. Drivers were around five (5) times more likely to

forget a motorcycle and rider compared with a car. This research suggests that many 'Look but Fail to See' (LBFTS) crashes may have been misclassified and may be a case of 'Saw but Forgot' (SBF) errors.

The authors of this research suggest a simple intervention - if a driver sees a motorcyclist, they should verbally (or sub-vocally) note the fact. See motorcyclist - say motorcyclist.

Summary

Blocked vision, inattention blindness, saccadic masking, motorcyclist speeding, motion camouflage, size-arrival effect and short-term memory failure all come together at intersections (including informal intersections, such as driveways) to create a perfect storm that can result in a tragic crash. Riders and drivers need to understand these phenomena. Both can take action to lessen the chances of such a disastrous result.

- For the rider, Hi-Viz gear, auxiliary lights, slowing down and making informed choices about positioning are the main measures to take. Riders have the responsibility to ride in a position to be seen and need to be aware of situations that might be complicated for drivers and be prepared to take evasive action. When approaching a driver preparing make a left turn motorcyclists should consider moving toward the right portion of their lane.
- For drivers, looking to specific distances, rocking (side to side or back and forth) while looking, thinking about vulnerable road users by asking themselves if a pedestrian, bicyclist or motorcyclist is approaching, verbally or sub-vocally noting what has been seen and assuming a motorcyclist will arrive quicker than they expect are actions drivers can take to reduce the chance of a crash.

*Five Chances for Error is a concept from The Science of Being Seen by Kevin Williams <https://scienceofbeingseen.wordpress.com/> that has been developed and written by SMARTER at www.smarter-usa.org. A vulnerable road user search procedure that accounts for these visual phenomena, also developed by SMARTER, is available at <https://smarter-usa.org/wp-content/uploads/2021/10/SAR-x-2.pdf>