Critique of:

Is the three-foot bicycle passing law working in Baltimore, Maryland?

Wayne Pein
wpein@nc.rr.com

January 2014
Critique of: Is the three-foot bicycle passing law working in Baltimore, Maryland?

Criticism 1. The investigators misrepresent the law and mis-state measurements, demonstrating confirmation bias.

Discussion
The relevant words of Maryland's 3-foot law are:

“§ 21-1209 (a)...the driver of a vehicle shall...pass safely at a distance of not less than 3 feet...”

http://statutes.laws.com/maryland/transportation/title-21/subtitle-12/21-1209

In the Introduction on page 451 of the report the investigators wrote,

“... the MD law requires motor vehicles to pass cyclists with a clearance of greater than three feet (Maryland General Assembly, 2010).”

The actual wording of the law is “...not less than 3 feet...,” while the investigators wrote “...greater than 3 feet...” A 3-foot Vehicle Passing Distance (VPD) would be legal under the wording of the Maryland law, but the investigators consider 3 feet illegal. The investigators' misrepresentation of the law informs their report.
In *Methods and materials* on page 452 the investigators wrote,

“The first shot of each trip was a calibration image of a tape measure extended on the ground to provide a scale with which to measure distance from the bicycle in 1-ft intervals from 2 to 10 ft of bicycle clearance...The range of potential VPD measurements were ≤3, 4, 5, 6, 7, 8, 9, or ≥10 ft.”

The scale was in 1 foot intervals beginning at 2 feet, but then the range is said to begin at ≤3 feet. It seems that the investigators could have measured VPD down to 2 feet had any occurred, but apparently none were that close.

Figure 2 from the report shown at right reveals that the closest VPDs were 3 feet. But rather than describing them as “3 feet,” the investigators chose to call them “3 feet or less” throughout the report, seemingly to make it appear that passes were closer than they really were.

In the *Conclusions* on page 455 the investigators wrote,

“Cyclists in Baltimore, MD were routinely passed at a distance of three feet or less while cycling during morning and evening commutes, which indicates that the three-foot law is not being followed and cyclist safety may be compromised.”

It is disingenuous to portray 3-foot VPDs as “3 feet or less,” and to say that statutory legal 3-foot passes are illegal. This suggests confirmation bias.

![Figure 2](image-url)
**Criticism 2.** The investigators were also the subjects, and did not control for confounding variables. Crucially, bicyclist tracking position was not measured. This renders the VPD data suspect and may indicate subject-expectancy effect bias.

**Discussion**

In *Other factors* on page 455 the investigators wrote,

> “Traffic volume and speed, cyclist distance to the curb, time-of-day, and the presence of driveways are variables that other studies have identified as important to VPD (Harkey and Stewart, 1997; Hunter et al., 1999; Walker, 2007), but were not measured in this study...”

Where within the bike lane, standard, or parking lanes did the investigator bicyclists track? It was not recorded. This is crucial because bicyclist position largely influences passing motorist behavior and VPD.

**Where did the investigator bicyclists track?**

Saint Paul Street 3100 block. 11-foot lane next to 5-foot bike lane and 8-foot parking.

Saint Paul Street 3000 block. 10-foot “standard” lane adjacent to 9-foot parking lane.
The below screen shot from a video produced by the John Hopkins Center for a Livable Future shows the point of view of a bicyclist, presumably one of the investigators, following another bicyclist. Both bicyclists are riding on the parking lane line, straddling the parking lane and the adjacent travel lane.

The video is found at: [https://www.youtube.com/watch?v=eE1W4qH2P2Q](https://www.youtube.com/watch?v=eE1W4qH2P2Q)

As described on the following pages, the above tracking position enables and invites close passes.
The following graphics demonstrate the consequences of different bicyclist tracking positions.

The depicted bicyclist is 30 inches wide with a 40 inch Essential Operating Space per the 1999 AASHTO Guide for the Development of Bicycle Facilities. The depicted car is 6.3 feet wide, not including mirrors. Truck, bus, and trailer bodies may be 8.5 feet wide, with mirrors extending to 10 feet.

**Figure A.** Expected theoretical VPDs on bike lane streets; bicyclist and motorist centered per lane use concept of operations.

The VPDs would be expected to be approximately 3.5 and 4.5 feet respectively for the 11 and 13-foot lanes. This contrasts with the investigators’ 6.3 and 7.7 feet average findings (Figure B below).
Figure B. Average VPD findings on bike lane streets; bicyclist centered in bike lane.

Why would motorists track far left in their lane? An approximately centered motor vehicle position would be expected as shown in Figure A.
In the Introduction the investigators wrote,

“Creating space between vehicles and bicycles may be the reason why individuals prefer cycling in bicycle lanes over streets with no bicycle facilities (Kroll and Sommer, 1976; Stinson and Bhat, 2003) as a risk reduction strategy.”

Perhaps the investigator bicyclists sought to create maximal passing space by tracking at the right edge of the bike lane. This would have resulted in the unexpectedly large 6.3 and 7.7 feet average VPDs from motorists who typically track near lane center (when bicyclists are not within the standard lane).
**Figure D.** Some 3-foot VPDs on bike lane streets would be expected.

It is curious that the investigators found no 3-foot VPDs on bike lane streets. Such passes have been recorded on video by other investigators (Figure E next page).

Motor vehicles abutting the bike lane line would provide just 1.25 feet of clearance to a bicyclist centered in the bike lane.
**Figure E.** Approximately 3-foot passes in a 4.5-foot bike lane and 12-foot travel lane.

Screen capture at 3:05 from the video [https://vimeo.com/12273194](https://vimeo.com/12273194) by Keri Caffrey.

Figure F. Average VPD findings in 10, 11, and 12 foot standard lanes; bicyclist far right but fully within the lane.

To obtain 4.8, 5.0, and 5.8-foot average VPDs the motorists must have straddled the lane line, encroaching on both the bicyclist's lane space and the adjacent lane.
Figure G. Not legally compliant.

Minimum 3-foot passing distance cannot be achieved with a motor vehicle and bicyclist fully within a 10 or 11-foot lane, and is only barely possible in a 12-foot lane if the motor vehicle is a car (rather than a wide truck or bus).

By operating far right in a traffic lane, bicyclists enable and invite motorists to use the abundant lane space to their left. Some drivers “shoot the gap” and squeeze past bicyclists within the lane.

Thus, the bicyclist should control the full lane space as would a motorcyclist to not enable partial or fully within-lane passing and to compel a lane change.
**Figure H.** Lane control.

By operating at lane center, bicyclists compel a full lane change in overtaking motorists. This provides optimal buffer on both the left and right that is more than 3 feet to each lane line.

5.7 foot theoretical VPD in 10-foot lanes with bicyclist lane control is greater than the theoretical VPDs of 3.5 and 4.5 feet expected when vehicles are centered on bike lane roads (Figure A).

In *Bicycle infrastructure* on page 453 the investigators wrote regarding “sharrows” (Shared Lane Markings):

> “These markers [placed on the right edge of the travel lane] may not be as effective as sharrow markers placed closer to the middle of the travel lane that encourage cyclists to claim the entire lane.”

The investigators recognized the utility in claiming an entire lane, though they didn't explicitly state the benefits. But the investigator bicyclists apparently didn't execute lane control because they recorded numerous 3-foot passes. And they didn't record their lane position, or more simply their “cyclist distance to the curb” which they knew had been “identified as important to VPD” by others.

To obtain numerous VPDs of 3 feet on standard roads, the investigator bicyclists must have operated far right in the lane to enable and encourage motorists to pass while partially or fully within the lane.

To produce large average VPDs of 6.3 and 7.7 feet on bike lane roads, the motorists and/or investigator bicyclists must have tracked far left or right in their lanes respectively (Figures B and C). That may be subject-expectancy effect bias. Did the investigator bicyclists purposely track far right in bike lanes to manipulate the data? That would be unethical.
Criticism 3. There are citation and other errors.

Discussion

In Other factors on page 455 the investigators wrote,

“The predominant type of collisions are side-swipe crashes that often occur at intersections (Wang and Nihan, 2004) and were not addressed in this study.”

Sideswipe collisions are not the predominant type of collision at intersections. Moreover, an examination of the 2004 Wang and Nihan paper shows that it did not examine sideswipes. http://faculty.washington.edu/yinhai/wangpublication_files/AAP_04_BA.pdf

Figure 1 below from that paper reveals that Tokyo, Japan bicyclists were not in the street, a prerequisite for a sideswipe. Apparently the investigators did not understand or did not read the cited paper.

When citing papers to support one’s position, it is good practice to ensure that the paper is relevant and credible. I’ve critiqued 3 papers that were cited, showing that they are junk science.

http://bicyclingmatters.wordpress.com/critiques/san-franciscos-shared-marking/

Google maps shows the cross street Ensor at Monument, but the investigators call it Endor in their Figure 4 (b).
In *Bicycle infrastructure* on page 453 the investigators wrote,

“Our finding that streets with bicycle lanes are safer for cyclists than standard lanes of the same width ...”

Streets with bicycle lanes were not the same width as standard lanes. The investigators compared the VPD on bike lane streets with 16 or 18 feet of total width for motor vehicle and bicycle (11 or 13 + 5), with “sharrows” and “standard” streets in which the lane widths were 10-14 feet (the vast majority of passes were on lanes 10-12 feet wide). Further, the investigators did not examine safety as determined by conflicts or collisions. They merely measured VPD, and overstate their findings as increasing safety.

The investigators concluded,

“The construction of bicycle lanes is a transportation infrastructure solution that would engineer out deficiencies in motorist behavior toward cyclists.”

The investigators draw policy conclusions despite a failure to consider the issue systematically. The construction of bicycle lanes may engineer in reduced operating space for bicyclists and VPD, unless the bicyclists or motorists compensate by deviating from center-of-lane position. Bike lanes also engineer in turning conflicts and little buffer to side emerging motorists. And especially where mandatory bike lane use laws exist, they engineer in deficiencies in behavior toward bicyclists who are not in the bike lane.

**Critique Conclusions**

The 5 subject bicyclists in this study were not “blind;” they were the investigators who collected and reduced their own data.

The investigators misrepresented the 3-foot law, interpreting “not less than 3 feet” of the statute as “greater than 3 feet.” The closest passes were 3 feet but were described as “3 feet or less.” This indicates confirmation bias.

Bicyclist lateral position has an enormous effect on motorist overtaking behavior and VPD, but it was not measured, making the VPD findings of little use. A bicyclist tracking in a lane control position compels a full lane change in motorists, while tracking at standard lane edge encourages motorists to squeeze by within the lane.

To obtain large VPDs in bike lanes, the subject bicyclist investigators likely tracked far to the right in the bike lane. Moreover, there were no 3-foot VPDs in bike lanes, although some would be expected. Similarly, they must have tracked far right in standard lanes even though they recognized the utility of claiming a full lane. These discrepancies suggest subject-expectancy effect bias or deliberate manipulation of research.