Clarendon Street Bicycle Lane Evaluation

Prepared for City of Melbourne

CDM RESEARCH

Contents

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1 Introduction

This report describes a brief evaluation of improvements recently made to the on-road bicycle lanes on Clarendon Street (East Melbourne). The bicycle lanes in both directions between Victoria Street and Wellington Parade were upgraded in August and September 2012:

- a 0.6 m painted buffer was installed between the kerbside parking and the bicycle lane,
- a 1.5 m bicycle lane was installed,
- a 0.6 m painted buffer was installed between the bicycle lane and traffic lane, and
- green surface treatments were added to the bicycle lane across unsignalised side streets.

This design replaced the 2.0 m conventional bicycle lane that existed previously (Figure 1.1).

The effectiveness of the green surface treatments in reducing conflict between cyclists and motorists emerging from side streets has been demonstrated along St Kilda Road (SKM, 2011). It is possible the buffer between the bicycle lane and traffic lane will reduce motorist encroachment into the lane, although this was not tested in this evaluation. Instead this evaluation focussed on the effectiveness of the painted buffer between the parking bay and the bicycle lane, which had the design intent of encouraging riders to track farther from parked cars in order to reduce the risk of dooring-related crashes.

Two research questions are posed in this evaluation:

1. *Does the buffer between the parking and bicycle lane change the <u>average</u> lateral cyclist tracking position?*
2. *Does the buffer between the parking and bicycle lane reduce the proportion of riders travelling within 1 m of parking?*

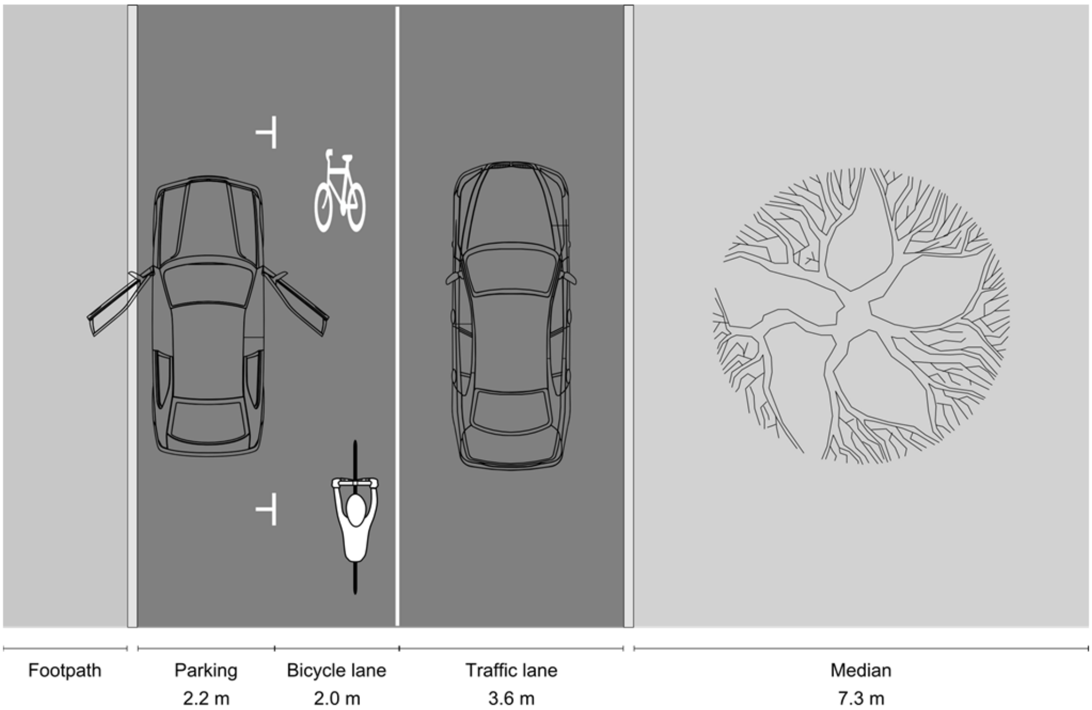
It is assumed for this evaluation that a cyclist would need ride <u>at least</u> 1 m from the parking bay in order to avoid a collision with an open car door. In practice, the distance required will depend on:

- the width of the parked car,
- the width of the open door, and the extent to which it is opened,
- how close the car is parked to the kerb, and
- the width of the rider and bicycle.

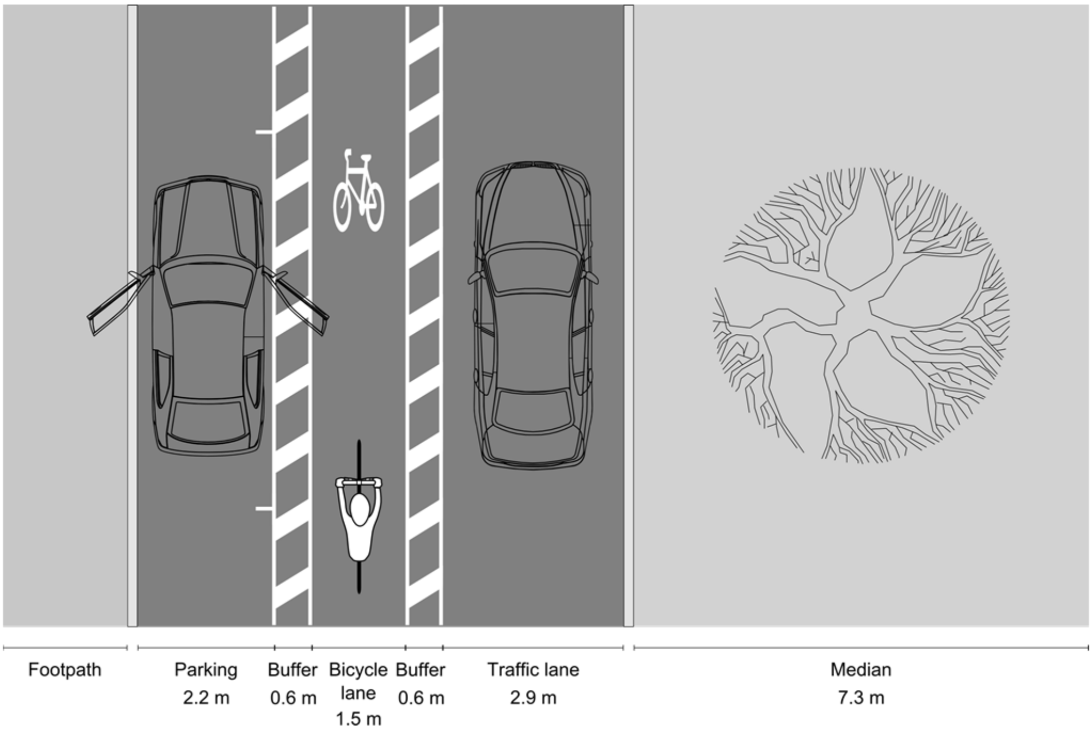
Most car doors when fully open extend to around 0.9 m at the farthest point from the car. Assuming the worst case scenario where a car parks at the <u>outer</u> edge of the parking bay and a fully opened door, and that a rider and bicycle is around 0.7 m wide then the cyclist will need track around 1.2 – 1.3 m from parking (using the cyclist centreline as a reference). In practice, we would expect most cars to park towards the kerb, and that most drivers do not fully open their door. As a result, 1 m is generally accepted as a reasonable assumption for the required dooring clearance.

■ Figure 1.1: Lane configuration

(a) Before treatment



(b) After treatment



2 Methodology

Video observations were made of cyclists riding along Clarendon Street, in both the northbound and southbound directions, before and after the buffer was installed. The location of the cameras is shown in Appendix A and sample screenshots are provided in Figure 2.1.

■ Figure 2.1: Screenshots from video cameras (red lines are the measurement datums)

(a) Northbound (before treatment)

(b) Northbound (after treatment)

(c) Southbound (before treatment)

(d) Southbound (after treatment)

Parking demand would be expected to influence cyclist lateral tracking position; where there is no car parked we would reasonably expect cyclists to be more likely to ride farther to the left. To control for this variable observations were made during similar AM peak and PM peak periods in the before and after observations. This controls indirectly for this factor in so far as it is assumed that parking demands at specific times of day did not vary between the before and after observations.

Two typical weekdays of peak period observations were obtained in both the before and after cases, in both the north and southbound directions:

- Before treatment:
    - Tuesday 31 July
    - Wednesday 1 August
- After treatment:
    - Wednesday 26 September
    - Thursday 27 September

Video was obtained between 7 and 9.30 am and between 4 and 7 pm on each day. However, as the number of potential observations was large (well over 500 observations at each site in each condition) only a subset of the available video data was analysed (generally 7.30 – 8.30 am and 4.30 – 5.30 pm).

The cameras were mounted such that they would be inconspicuous to the casual observer, and so highly unlikely to influence cyclist or motorist behaviour (Figure 2.2).

■ Figure 2.2: Typical camera installation (southbound)

At each location a datum was established and the position of the front bicycle wheel where it contacts the road was used as a reference point (Figure 2.1). This point was measured using pixel coordinates from the digital video record and was subsequently adjusted for camera azimuth and elevation using a series of geometric corrections (using known datum points as references).

3 Results

Summary statistics are given in Table 3.1. In all cases there is a statistically significant difference in cyclist lateral tracking; the average cyclist tracks 0.4 m farther from parking in the northbound direction and 0.29 m farther from parking in the southbound direction. Furthermore, the proportion who ride within the dooring zone (defined as 1 m from the parking bay) decreases by 23% in the northbound direction and 33% in the southbound direction. It is noted that the proportion riding in the dooring zone is much greater in the northbound direction than southbound, even after the treatment (66% do so travelling north, compared with 22% travelling south). This is likely to reflect the different parking occupancy on each side of the road; particularly during the AM period there was much lower parking demand on the northbound side of Clarendon Street. In addition, riders travelling north uphill will be travelling slower and are likely to be more comfortable riding closer to parked cars (as they will be able to stop or swerve more readily).

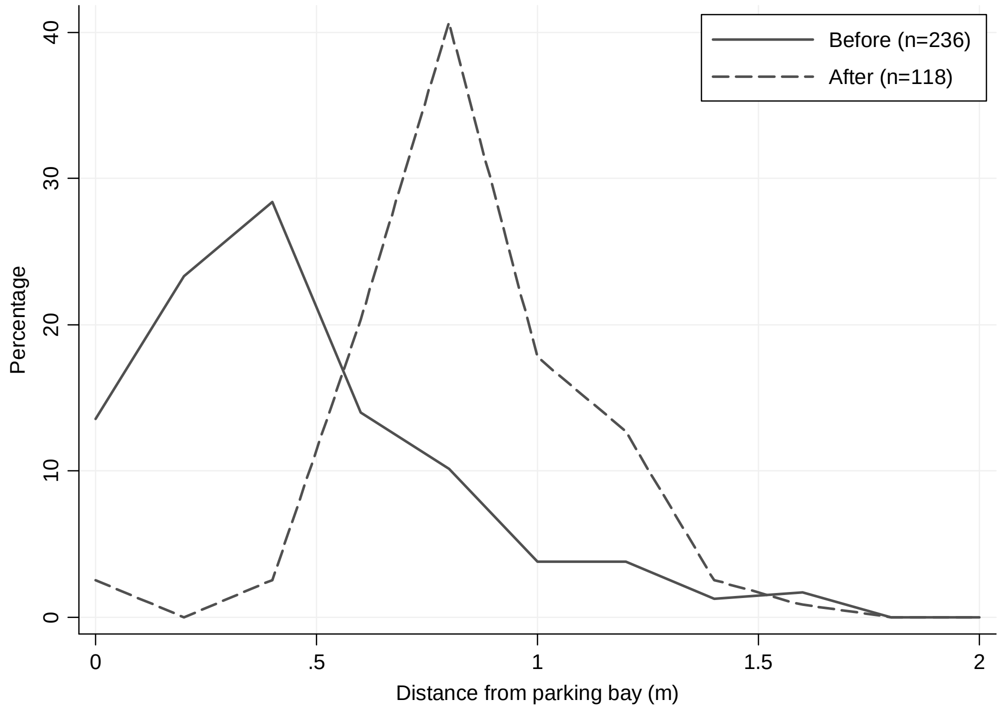
- Table 3.1: Summary statistics

		Before	After	Diff.	Test stat.	p-value[1]
Northbound	No. of obs.	236	118			
	Average	0.52 m	0.92 m	0.40 m	t = 8.72	< 0.0000
	% < 1 m	89%	66%	23%	z = 5.34	< 0.0000
	% < 0.75 m	77%	20%	56%	z = 10.12	< 0.0000
Southbound	No. of obs.	258	499			
	Average	0.98 m	1.27 m	0.29 m	t = 10.44	< 0.0000
	% < 1 m	55%	22%	33%	z = 9.07	< 0.0000
	% < 0.75 m	29%	4%	25%	Z = 9.88	< 0.0000

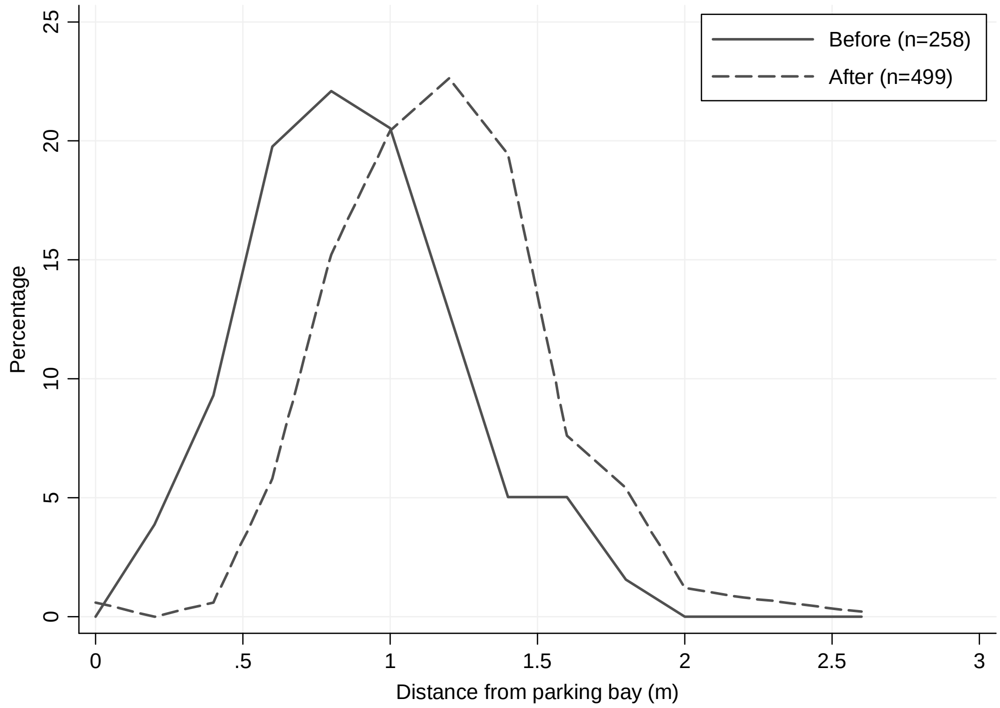
[1] Two-tailed p-value. This value represents the likelihood the observed difference is due to sampling variability; for example, p = 0.05 indicates there is a 5% chance the difference is attributable to sampling variability

Histograms of the observed tracking positions in the northbound (Figure 3.1) and southbound (Figure 3.2) directions show the significant shift in cyclist tracking away from parking that occurred after the treatment was installed. Figure 3.1 also illustrates the effect the absence of parking demand has on lateral tracking, particularly before treatment (as a significant proportion of cyclists track very close to the parking bay).

■ Figure 3.1: Cyclist lateral tracking histogram (northbound)



■ Figure 3.2: Cyclist lateral tracking histogram (southbound)



4 Conclusion

The results provide strong evidence with which to answer the research questions:

1. *Does the buffer between the parking and bicycle lane change the average lateral cyclist tracking position?*
    a. The average cyclist tracking position moved away from parking at both sites, and the change was highly statistically significant.
    b. In the northbound direction the average position shifted outwards by 0.40 m (t=8.72, p<0.00).
    c. In the southbound direction the average position shifted outwards by 0.29 m (t=10.44, p<0.00).

2. *Does the buffer between the parking and bicycle lane reduce the proportion of riders travelling within 1 m of parking?*
    a. Both sites experienced a statistically significant decrease in the proportion of cyclists riding within the dooring zone (defined as 1 m from parking).
    b. In the northbound direction the proportion decreased from 89% to 66% (diff = 23%, z = 5.34, p<0.00).
    c. In the southbound direction the proportion decreased from 55% to 22% (diff = 33%, z = 9.07, p<0.00).

Given these results we would reasonably expect a decrease in the risk of car dooring collisions along Clarendon Street as a result of the treatment.

5 References

SKM (2011) *St Kilda Road and Royal Parade Bicycle Lane Monitoring*. Prepared for VicRoads. http://cyclingresourcecentre.org.au/post/st_kilda_road_and_royal_parade_bicycle_lane_monitoring (accessed 5/10/2012).

Appendix A: Camera locations