A controlled trial to allow motorcycles on bus lanes in Tel-Aviv: an assessment of mobility and safety impacts

Victoria Gitelman
Roby Carmel
Anna Korchatov

Transportation Research Institute
Technion – Israel Institute of Technology

31st ICTCT Conference in Porto, Portugal
October 25 & 26, 2018

Background: PTW use and injury

- An increasing use of motorcycles (powered two-wheelers – PTWs), mostly in metropolitan areas, in the world and in Israel
- Mobility benefits in densely populated areas
- But high risk of riders’ injury in road accidents

In Israel:

Annually: ~40 PTW fatalities, 400 serious injuries, 2000 total injuries

Measure: PTW use in bus lanes

- Recommended by 2-Be-Safe (2012), eSUM (2012)
- Introduced in European cities: Stockholm, since 1986; London, Barcelona, Vienna, Italian cities
- Follow-up of trials in the UK:
  - Bristol City Council (1995)
  - Sheffield City Council (2004)
  - TfL (2008) – in use in 17 authorities

No trial has resulted in a rejection for safety reasons.

Benefits:
- PTW separation from vehicle traffic → reducing conflicts
- Improving PTW mobility

Suspicions:
- Harm to travel times of buses
- Conflicts with other road users on the bus lanes

A trial of PTW use of bus lanes in Tel-Aviv

- On 2 streets - major traffic routes, a total length of 5.5 km
- Divided roads: built median, curbside bus lanes and 2-3 lanes of general traffic per direction

- Bus hours: (1) 7-10, 14-19, (2) 5-22
- Since 15.2.16, for 6 months
Method

**Aim:** to examine the mobility and safety impacts of the measure – a shared use of bus lanes by PTWs

**Method:** after-before comparisons of behaviour indicators and accidents

### Behaviour indicators examined

<table>
<thead>
<tr>
<th>Behaviour indicators examined</th>
<th>Desired change</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of PTWs using bus lanes</td>
<td>↑</td>
</tr>
<tr>
<td>% of PTWs using other travel lanes</td>
<td>↑</td>
</tr>
<tr>
<td>Keeping the travel lane by PTWs</td>
<td>↓</td>
</tr>
<tr>
<td>Conflict occurrences between PTWs and other road users</td>
<td>No increase</td>
</tr>
<tr>
<td>Conflict occurrences between PTWs and other vehicles near bus stops</td>
<td>No increase</td>
</tr>
<tr>
<td>Passing times of buses through pre-defined routes</td>
<td>No increase</td>
</tr>
<tr>
<td>Passing times of motorcycles through pre-defined routes</td>
<td>No increase</td>
</tr>
<tr>
<td>Accident rates: total, severe, with PTW and buses</td>
<td>No increase</td>
</tr>
</tbody>
</table>

### Conflict

Conflict – a change in speed and/or direction of moving of one of the actors to avoid a collision: 1 – regular braking/not abrupt change of direction (“precaution”); 2 – hard braking or abrupt change of direction, under low speed (“controlled”); 3 – like 2 but under high speed (“near-miss”), 4 – a collision (based on TRL, 2010).

---

### Definitions of follow-up windows

**For a street section:**

- For a junction:
  
- Line 1
  
- Line 2
  
- Line 3

**For a junction:**

- Line 1
  
- Line 2
  
- Line 3

---

### Behaviour data collection

1. Study video-cameras on 5 street sections
2. Video-cameras of traffic control center at 4 junctions
3. Mobile cameras on helmets of PTW riders while running the routes
4. Data on bus trip times, on the routes, from a GIS of bus operating company

*During bus lane hours*  
*8 hours per site*

**Before:** February 1-14, 2016  
**After:** May-June 2016

---

### Results: share of PTWs on bus lanes

![Graph showing average hourly traffic counts, section cameras](image)

- **On bus lanes:** route one (sites 1-3) - 14-26% of PTWs, route two - 5-14% of PTWs  
  - Mostly, an increase by 5-6%  
  - All sites: average increase from 11% to 14% (sig.)
Results: share of PTWs on nearby lanes
average hourly traffic counts, section cameras

- In general, PTW shares did not decrease in other lanes
- Total traffic did not change: -2% of vehicle volume, but +14% in PTW counts → an increase in total PTW share from 6% to 7%

Results: use of bus lanes by PTWs
PTW samples, section cameras

While entering the section:
- 38-39% on route one, 22-24% on route two
- An increase on route one, by 2-3%

While passing the section, in congestion:
- An increase up to 80-93%
Other sites – minor PTW samples in congestion

Results: use of bus lanes by PTWs
PTW samples, section cameras (on "entering line")

Near junctions:
- 18-40% of PTWs used bus lanes on route one to south, 7-16% on route one to north, 32-35% - on route two
- On average, an increase by 4%
While passing the section, in congestion: the use of bus lanes increased by 8%

Results: keeping the lane by PTWs & conflicts
PTW samples, section cameras
Under “moving/slowly moving” traffic conditions

- Keeping the lanes by PTWs: inconsistent changes
- Conflicts: rare events. "All: "precaution"
- Under congestion (2 sites): similar changes in keeping lanes, 1 conflict (after)

<table>
<thead>
<tr>
<th>N</th>
<th>No lane change by PTWs</th>
<th>Number of conflicts with other vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>site 1</td>
<td>139</td>
<td>77%</td>
</tr>
<tr>
<td>site 2</td>
<td>166</td>
<td>66%</td>
</tr>
<tr>
<td>site 3</td>
<td>225</td>
<td>75%</td>
</tr>
<tr>
<td>site 4</td>
<td>246</td>
<td>88%</td>
</tr>
<tr>
<td>site 5</td>
<td>234</td>
<td>89%</td>
</tr>
</tbody>
</table>

*sig. change, p<0.05
↓ T sig. change, p<0.05
Results: conflicts btw PTWs & other vehicles near b us stops

<table>
<thead>
<tr>
<th>Site</th>
<th>No of b uses stopped</th>
<th>No of PTWs observed behind stopped buses</th>
<th>PTW changed the lane?</th>
<th>Conflict with a vehicle?</th>
<th>Conflict level</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 (no bay)</td>
<td>202</td>
<td>59</td>
<td>7%</td>
<td>Yes, moved bw bus lane and lane1</td>
<td>Yes, ran on other lane</td>
</tr>
<tr>
<td>4 (a bay)</td>
<td>590</td>
<td>130</td>
<td>50%</td>
<td>Yes</td>
<td>Yes, ran on another lane</td>
</tr>
</tbody>
</table>

- Decrease or no change in the amount of conflicts
- Mostly: “precaution” (level 1)

Results: average passing times through the routes

- Buses: ~ no increase
- PTWs: ~ no decrease

Results: accidents in 3-8/2016 vs previous years

- On both routes, accident numbers did not change substantially during the trial, fewer serious accidents occurred
- Signs of a decrease in PTW-involving accidents

Summary & Conclusions

During the trial:
- rate of PTWs using bus lanes increased but they continued to be observed in other lanes
- amount of interactions between PTWs and other vehicles did not decrease but no serious conflicts were observed
- passing times of buses did not increase
- accident numbers did not change substantially

⇒ Allowing PTWs on the bus lanes produced slight improvements in motorcycle mobility, without harming bus travel times or detrimental changes in safety. The new measure “regulated” the situation that was previously present in actual traffic.