ITEANZ Seminar - On Your Bike
Cities ‘safe enough’ for travel by bicycle?
*Inner Melbourne, Amsterdam and Copenhagen*

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*Embargo: Not to be quoted, this research is still in progress*

Warwick Pattinson
PhD Candidate, Urban Planning
warwick.pattinson@gmail.com
Comparative case study
Are Amsterdam & Copenhagen safer than Inner Melbourne?

• Three inner city areas: originally ‘walking’ cities, i.e. developed pre-car
• Adults - who have transport choices and are or could-be bicyclists
• Primary ‘Safety’ - crash avoidance, objective risk and perceived danger
Inner Melbourne
Five municipalities
15 km diagonal
Area: 135 km²

19th C walking
then extensive
trains & trams

Amsterdam
21 km diagonal
17th – 19th C
walking & canals
19th C some trams
Single municipality
Area 219 km²

Copenhagen
14 km diagonal
18th & 19th C
walking & canals
19th C some trams
Single municipality
Area 79 km²
Context is important: 19C Melbourne had Trains before and more Trams than Amsterdam or Copenhagen

**Melbourne**
- 1840s: Horse trams
- 1850s: Cable trams
- 1870s: Train network expands
- 1890s: Electric trams, 16 lines electrified
- 1980s: City Loop

**Amsterdam**
- 1875: Horse trams
- 1900s: Trams electrified, 15 routes
- 1965: Some trams replaced by buses
- 1970s: More new tram routes
- Metro t.b.c. 2018

**Copenhagen**
- 1863: Horse Trams
- 1930s: Mechanised trams
- 1960s: S-trains, 6 routes
- All trams replaced by buses
- Metro t.b.c. 2018

**Trams**
- Melbourne: 26 routes – 487 trams, 250 double track kms
- Amsterdam: 16 routes - 216 trams, 80 track kms
- Copenhagen: 7 lines, 170 track kms

**Trains**
- Melbourne: 16 lines, 372 kms
- Amsterdam: 16 lines, 372 kms
- Copenhagen: 7 lines, 170 track kms

**Buses**
Melbourne c. 1910

Copenhagen c. 1940
What we know

- More injuries than reported in CrashStats (Sikic et al, 2009, Garrat et al, 2015)

- Single vehicle – ‘bike only’ crashes are numerous but under reported

- Threatening experiences very common
  (Johnson et al 2010, Garrard, 2011)

- ‘Safe System’ approach not well developed in Victoria (or Australia)
  (Mooren et al 2011, 2013)

- ‘Safety in numbers’ works when motor traffic speeds and volumes are moderated
Understanding travel safety

*adults have choices – safety is relative*

**Objective safety** (‘risk’) – for *government and institutional actors*
Measurable risk: number of injuries related to a measure of travel
Risk reduction is an ethical criteria for governments and corporations (eg. vehicle manufacturers)

**Perceived safety** (‘danger’) - for *individuals*, shapes behaviour
Belief about danger is a threshold factor for mode choice.

*Can my trip be safely made by bicycle?*
Decision is based on beliefs:
(a)‘system safety’ (environmental danger),
(b) individual ability to cope, reduce danger
Safety: Injury Risk for Trips by Mode (IMAP)

\[ R_m = \frac{\text{KSI}_m}{P/T_m} \]

(KSI = killed & seriously injured) (P = population) (T = share of trips)

- Trips in cars and on foot are low risk
- \( R = 1.2 \) to 1.3

Trips by bicycle have six times the risk of serious injury
- \( R = 7.8 \)

<table>
<thead>
<tr>
<th>IMAP (Population 446,000)</th>
<th>Motor vehicle occupants</th>
<th>Pedestrians</th>
<th>Bicyclists</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSI</td>
<td>251</td>
<td>163</td>
<td>156</td>
</tr>
<tr>
<td>KSI/100,000 population</td>
<td>56.3</td>
<td>36.5</td>
<td>35</td>
</tr>
<tr>
<td>Mode share</td>
<td>47%</td>
<td>27%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Risk exposure index</td>
<td>1.2</td>
<td>1.3</td>
<td>7.8</td>
</tr>
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</table>
Risk in Inner Melbourne is:

1.7 X Metro Melb
14. X Amsterdam
12. X Copenhagen

Why the difference?

<table>
<thead>
<tr>
<th>Study Area</th>
<th>Metro Melb</th>
<th>Inner Melb</th>
<th>Ams</th>
<th>Cph</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (100,000)</td>
<td>40.87</td>
<td>4.46</td>
<td>8.20</td>
<td>5.59</td>
</tr>
<tr>
<td>Bicycling share of trips</td>
<td>&lt;2%</td>
<td>4.7%</td>
<td>28 - 39%</td>
<td>30%</td>
</tr>
<tr>
<td>Bicyclists KSI</td>
<td>363</td>
<td>163</td>
<td>130</td>
<td>111*</td>
</tr>
<tr>
<td>K.SI per 100,000</td>
<td>8.8</td>
<td>36.5</td>
<td>15.8</td>
<td>19.9</td>
</tr>
<tr>
<td>Risk exposure index (KSI/100,000/mode share)</td>
<td>4.5</td>
<td>7.8</td>
<td>0.56</td>
<td>0.66</td>
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</table>

*probably under reported
Framework for Change

Recognise CONTEXT
- Morphology
- Culture
- Policy

Comprehensive ‘safe system’ CONTENT
- Infrastructure
- People/Behaviour
- Vehicles

PROCESS
- Institutions
- Decision Making
- Co-production
Cultural Context  place of bicycling in city life

Inner Melbourne
– Car is ‘king’ of the road
– Bicyclists to keep out of the way of motorists
– Cycling only for the fit and fearless
– But people would like to bicycle

Amsterdam
– Bicyclists are ‘kings of the road’
– Bikes are just how they get around
– Bicycling is for everyone

Copenhagen
– Road users are equal - and look out for each other
– Bicycling is sensible city transport
– Bicycling is for everyone
**Cities Designed for people using Sustainable Safety Principles**

| ‘mono-functionality’ road classes | Three road types defined by the functions for people:  
- Local Access  
- Connection and Distribution  
- Through Movement (high volumes at speed) |
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<tbody>
<tr>
<td>‘homogeneity’ amongst users</td>
<td>Group users by mass, direction and speed to limit potential for injurious conflict between users</td>
</tr>
<tr>
<td>‘predictability’ for road users</td>
<td>Road users know what types of traffic to expect and at what speed, and only need to make one decision at a time</td>
</tr>
<tr>
<td>‘forgivingness’ of errors</td>
<td>People make mistakes; road design and road use culture to reduce and forgive errors with no serious outcomes</td>
</tr>
<tr>
<td>‘awareness’ by users</td>
<td>Road users to know their responsibilities and be aware of their individual limitations</td>
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Infrastructure: Recognisable functions

**Local street (‘Fietsstraat’ - cars are ‘guests’) intersects with Distributor Road**

**Amsterdam**

**Copenhagen**

Roadway Elements: Traffic lanes, Parking, Bike Path, Footpath
Safer Vehicles: eg City Trucks Local problem available **solution** - Vehicle Design Rules
Process — forward looking, co-operative

(Copenhagen incremental reduction in car parking)

Car parking reduced from 1960s

And more pedestrian space
Co-production Copenhagen

Drivers stop for bicyclists - because they were asked to

Respect between uses: walking, riding and bike parking – no signs
Amsterdam and Copenhagen - they changed!
Change for Inner Melbourne - Key Ideas

► Adaptive failure: a socio-technical problem (Context)
not adapted to the sustainability and liveability challenges created by excessive car dependence.

► ‘Good enough’ safety? (Content) environment needs to be very good, pursued with best intentions across all three safe system pillars: infrastructure, vehicles and behaviour

► Safety (Process) is ‘valued’
   can be co-produced by stakeholders
Context Opportunities

1) Major Construction projects - use disruption

2) Proposed major road projects - re-scope

3) Roads with trams - redesign

4) Re-focus TAC

5) Growing number of professionals who have experienced safety in Northern European cities
Seize opportunities: Major Project Disruption

Drivers are disrupted not people on bicycles

-Melbourne

Copenhagen
1) Stakeholders: Build momentum for change on shared values
   • Engage with motorists interests
   • Support pedestrian interests

2) Consider the NACTO model
   (National Association of City Transportation Officials, USA)
   - a cooperative response to the challenges faced by cities
     'to build cities as places for people, with safe, sustainable, accessible and equitable transportation choices, a strong economy and vibrant quality of life'.
   - exchange ideas, insights, and document best practices
   - make joint approaches on national transportation issues.
Content (Action) Opportunities

1) re-think intersection designs, road rules, priorities and enforcement
2) lower speeds (eg 30 km/h) on local streets, and at all intersections and crossings
3) rethink on-road car parking and ‘loading/standing’ provision centre-of-street parking on wide local streets?
4) narrow streets, one-way cars with two-way bikes?
5) consistent detail of road design elements like widths, surfaces and planting to communicate expected behaviour, speed limits, priorities
6) phase out shared paths - separate walkers and bicyclists
7) advocate for best international practice in Australian vehicle design regulations (ADR’s) for autonomous vehicles, bikes & trucks
Thank you

• Questions

• Discussion

warwick.pattinson@gmail.com
SELECTED REFERENCES


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