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Bicycle Lanes at Roundabouts

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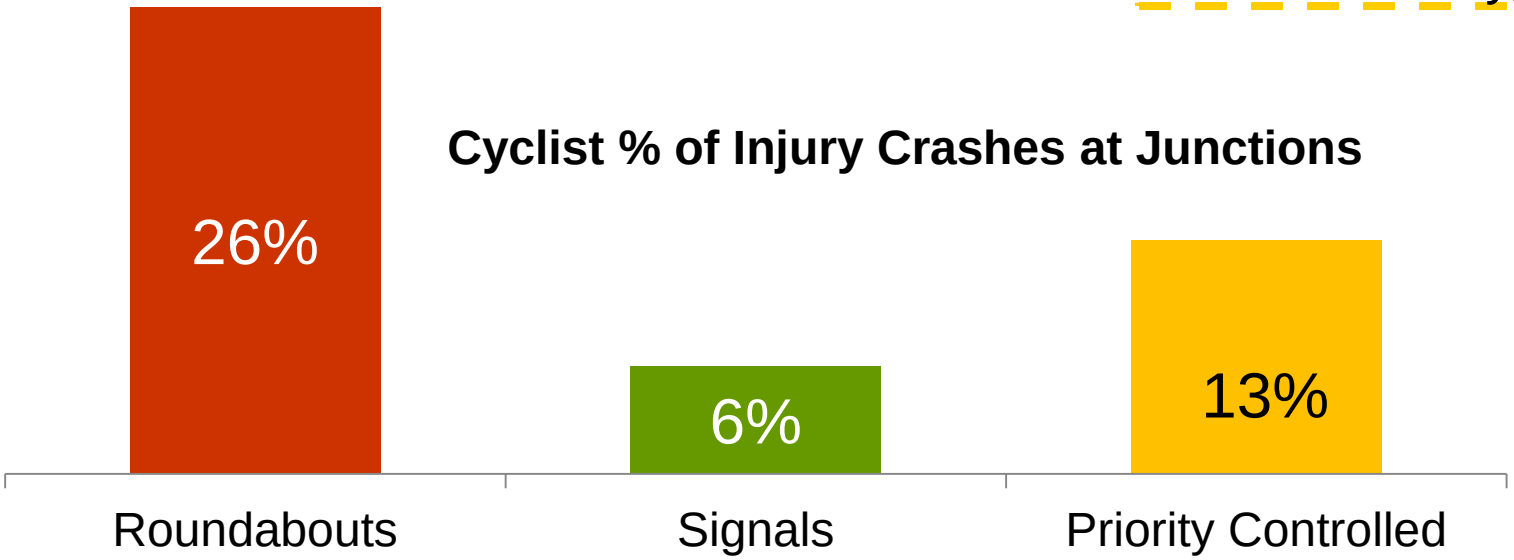
Client: Austroads

Roundabout Safety

- 26% of roundabout injury crashes are cyclists
  - Are roundabouts less safe for cyclists, or
  - Are roundabouts safer for motorists?

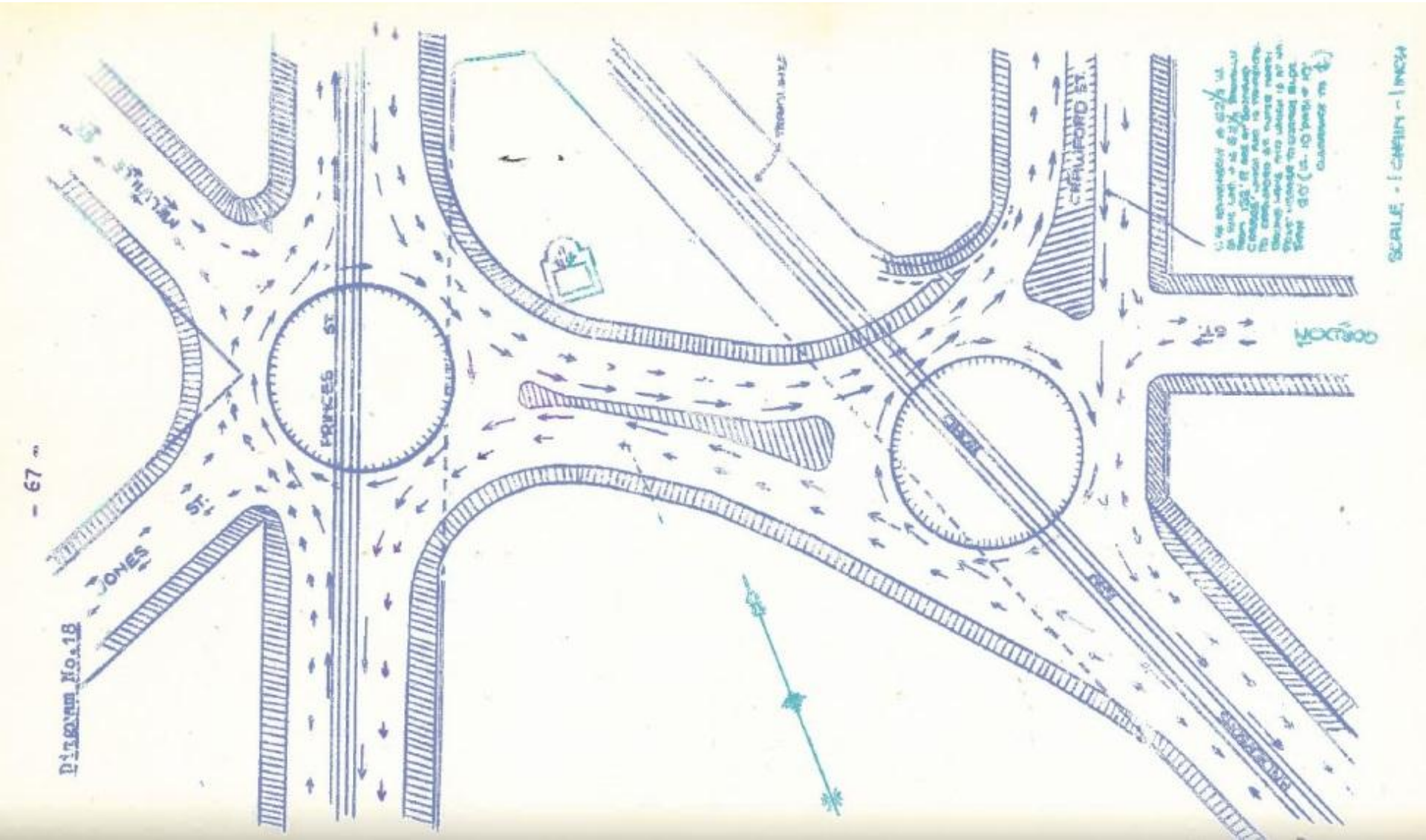
Wilke & Koorey, 2005



- Multi-lane 2.6x more hazardous than single lane

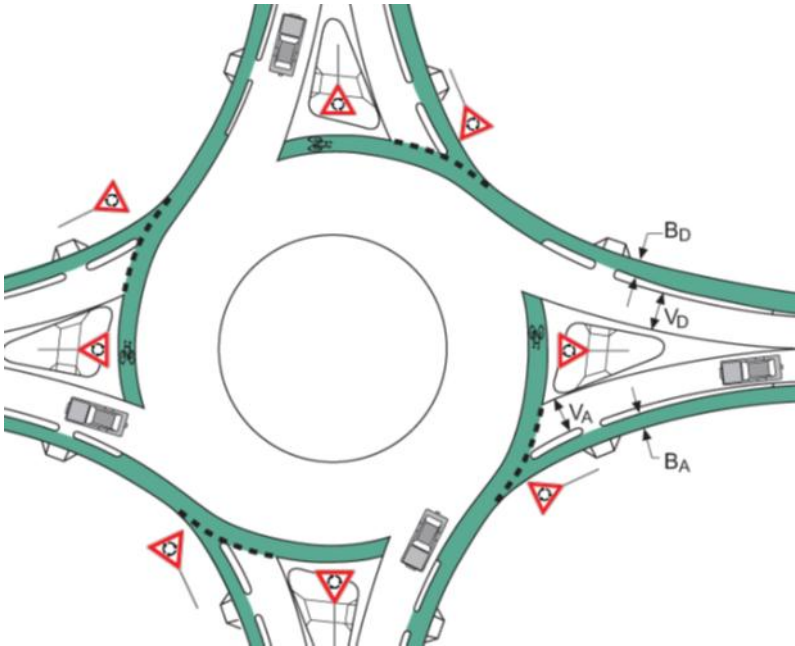
Swedish VTI, 2000

1944 ideas for Andersons Bay Road



Background

- 2011 presentation by Tony Barton (VicRoads) on the ‘two schools of thought’
  - Cyclists take the lane at roundabouts, or
  - Bicycle lanes at roundabouts should provide separation
- Austroads guidance allows for bicycle lanes
- Some jurisdictions do not favour bicycle lanes



Caveat

- There are some strongly held opinions within the profession
  - for and against bicycle lanes
- When research does not directly measure crash rates, critics possibly unconvinced
  - Our research did not undertake before / after studies on crash rates
- More before / after research is needed of roundabouts that undergo change

Research brief

- Objective evidence of the effectiveness of on-road bicycle lanes
  - Near roundabouts, and
  - On roundabouts
- Support formation of Austroads policy and design guidance
  - Aim is for this to be included in future revision of Austroads guides

Method

1. Review literature and crash data
2. Identify measures of effectiveness
   - Which quantifiable items will inform research?
3. Undertake fieldwork
4. Analyse data
5. Report on findings

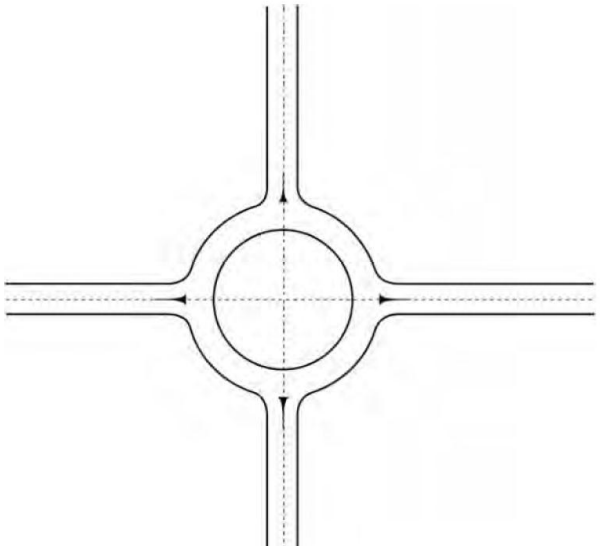
Literature review

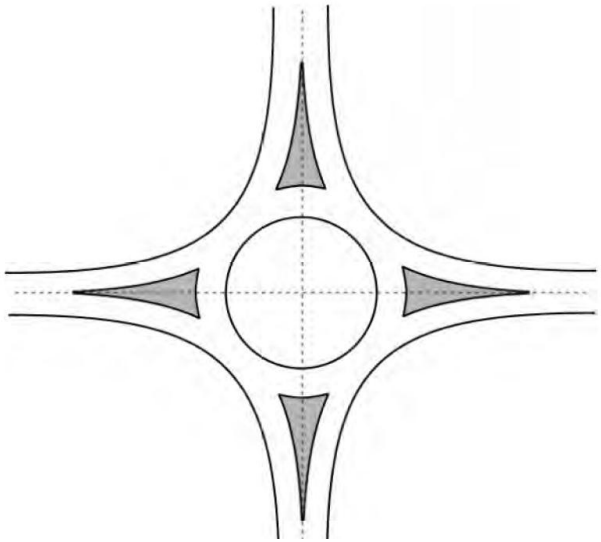
Radial

- Minimises speed
- Maximises safety
- Used in continental Europe

Tangential

- Encourages speed
- Maximises efficiency
- Used by English-speaking nations





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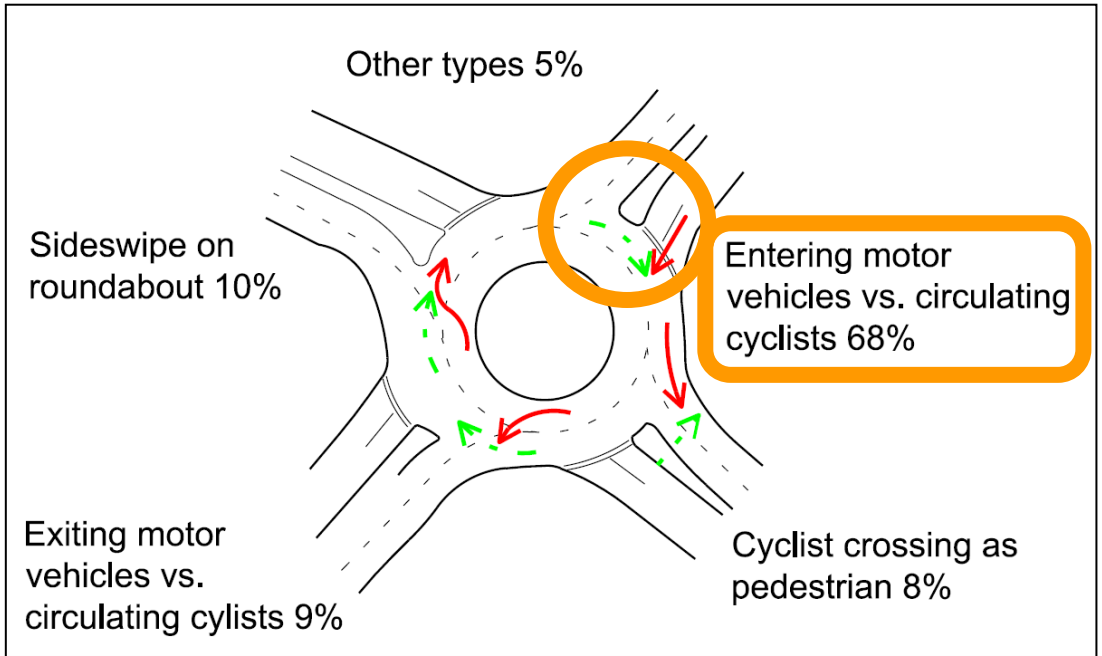
Fundamental difference in design philosophy

Crash analysis

- Entering motorist failing to give way to circulating cyclists most common
- Strong evidence that cycling to the left within roundabouts is detrimental to safety



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Crash analysis cont'd

- Operating speeds and crash rates (for all users) are related
  - If we reduce speeds sufficiently, the discussion about cycle lanes would be moot
- Increasing roundabout size and speed = cyclists increasingly struggle to cope

Lateral tracking

- One of the measures of effectiveness
- 1183 measurements of cyclists proceeding straight ahead
  - How cyclists track through roundabouts varies hugely between sites (median distance 34%-78% at different roundabouts)
  - Where bicycle lanes are present, only a minority use them (10%-42%)

Lateral tracking – before / after

- Before / after study at one site shows significant change in lateral tracking:
  - Truncation of bicycle lane from limit line
  - 10 m before
  - 20 m after

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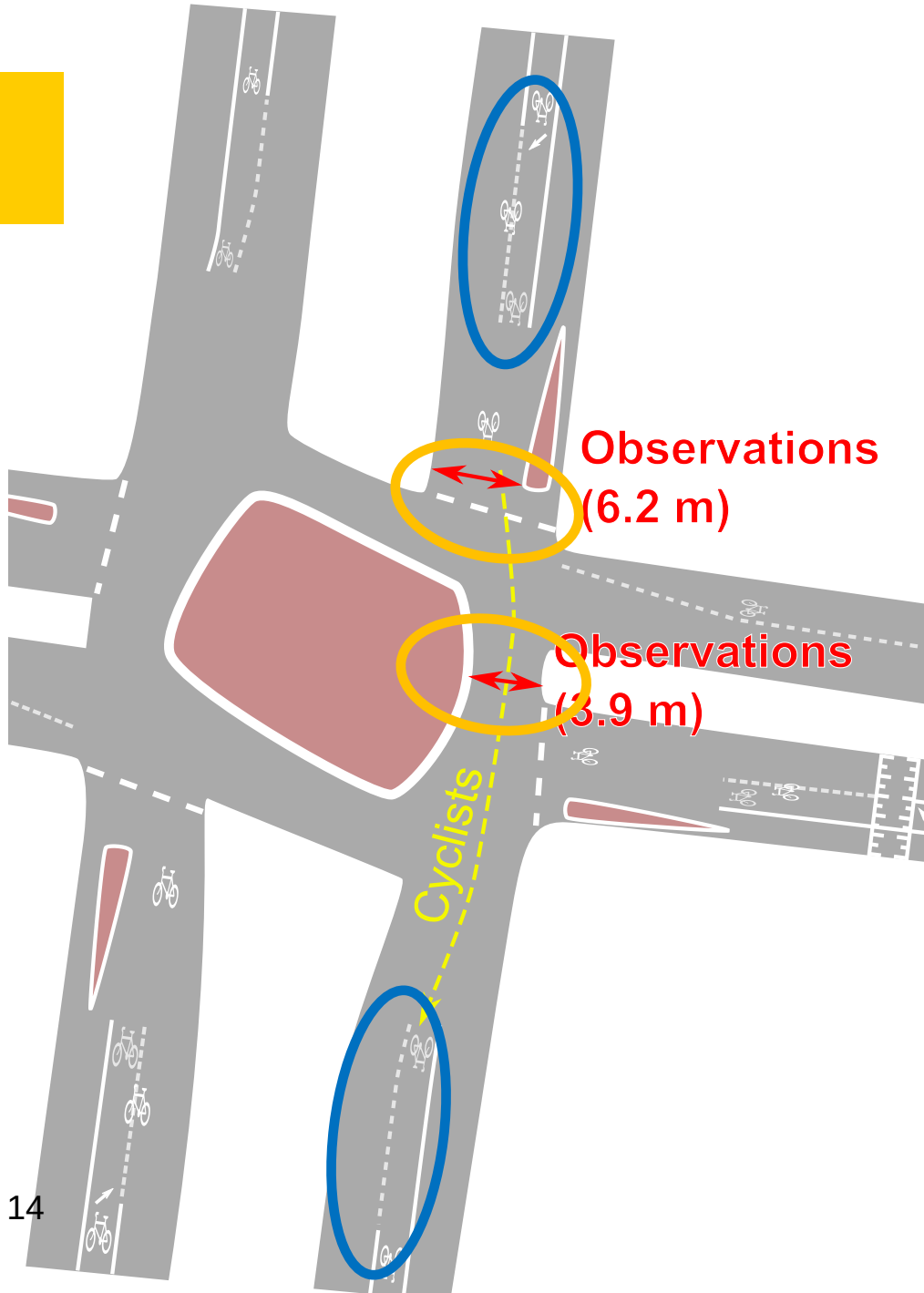
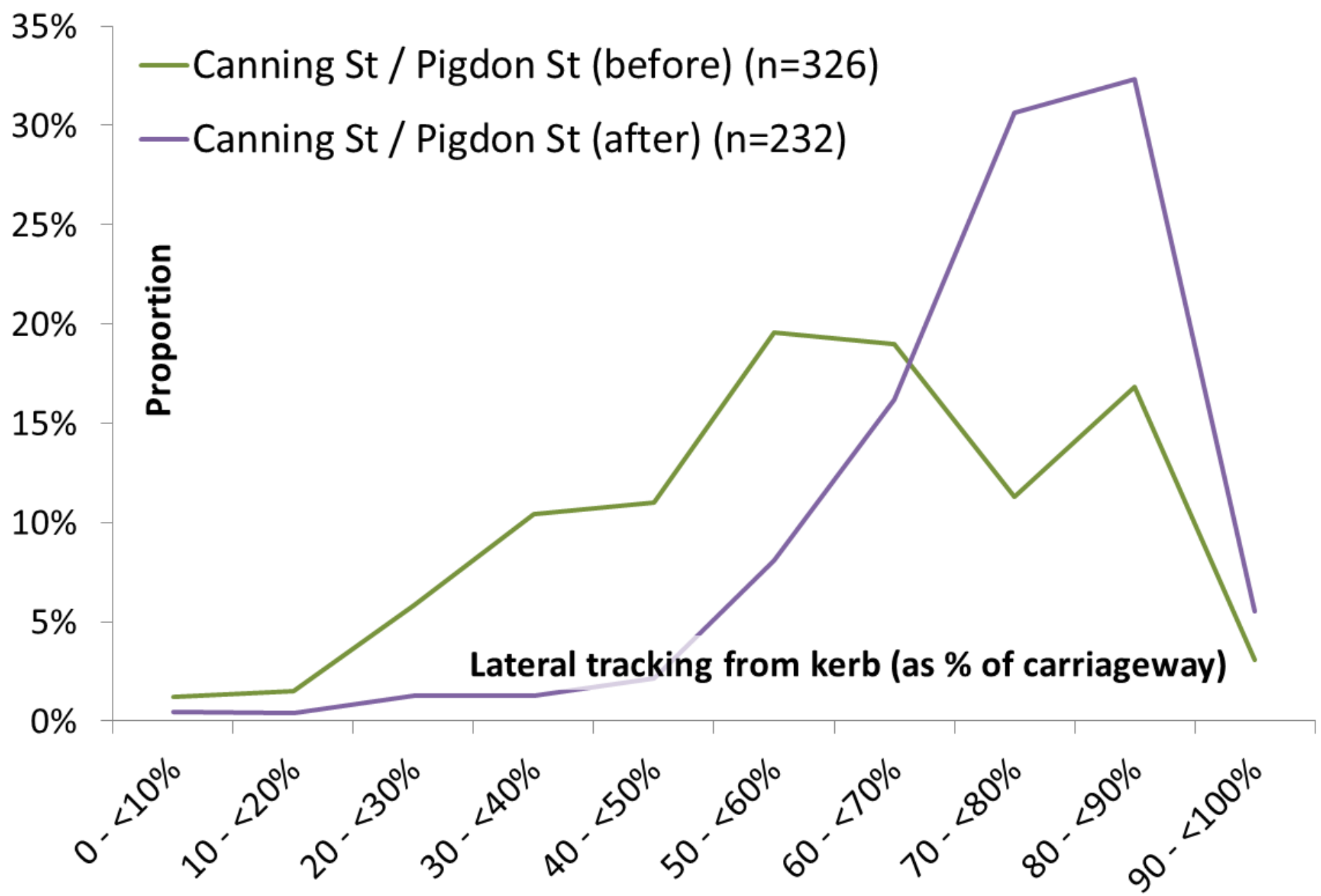
Lateral tracking

- Truncation of bicycle lane from holding line
  - before 10 m
  - after 20 m




Canning St / Pigdon St (before) (n=326)
Canning St / Pigdon St (after) (n=232)
Proportion
35%
30%
25%
20%
15%
10%
5%
0%
Lateral tracking from kerb (as % of carriageway)
0 - <10%
10 - <20%
20 - <30%
30 - <40%
40 - <50%
50 - <60%
60 - <70%
70 - <80%
80 - <90%
90 - <100%

Recommendation – geometry

- Achieve equitable speeds between cyclists and motorists

(equitable = cyclists and drivers travelling at similar speeds)

  - Vertical deflection
  - Horizontal deflection
  - Restrict visibility
  - Consider radial design philosophy (Europe → lower speeds)

Recommendation – lane sharing

- Where equitable speeds are achieved, encourage lane sharing
  - Shared lane markings
  - Advanced stop boxes
  - Truncated bicycle lanes

Recommendation – no bicycle lanes

- Avoid bicycle lanes at low speed roundabouts
  - Strong evidence that cycling to the left within roundabouts is detrimental to safety
  - Aim should be to achieve equitable speeds that enables lane sharing
  - Truncate cycle lanes on roundabout approaches (around 20 m behind hold line)

Recommendation – bike paths

- Where equitable speeds cannot be achieved, consider bike paths
  - Need to provide good LOS even during peak traffic times
  - Could be at grade or grade separation
  - Likely that some cyclists will still use circulating lanes, so design should allow for this

Recommendation – bicycle lanes (?)

- Are there options at higher speed roundabouts?
  - Where off-road provision not viable
  - Where off-road provision has poor LOS
  - Lane sharing not acceptable to many cyclists where speeds are high
  - Use cycle lanes with ‘reinforcement’ (colour, audio-tactile lines, physical separators)
  - Paucity of evidence for this (either pos or neg)

Most important learning

- Negotiation speed is the crucial issue
  - Increases safety for every roundabout user
- Radial (European) design philosophy is based on speed reduction
- When speeds are low, the question of bicycle lanes doesn't arise
  - Lane sharing is possible
  - Safety improves for everyone

Project status

- Draft report has been out for stakeholder consultation
- Publication planned for 2013

Discussion & thank you

- Questions please

- Thank you for listening
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