

Safe roads for cyclists: an investigation of Australian and Dutch approaches

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Abstract

Internationally, separated cycling infrastructure and low motor vehicle speeds are foundation elements to a safe cycling environment. Specifically, the approach to creating space for cyclists in the Netherlands is accepted as best practice and has directly contributed to the high cycling mode share. This study was a comparison of cycling guidelines in Australia and the Netherlands and case studies of two access routes to Monash University in suburban Melbourne. Key differences were identified in relation to design guidelines for priority in local street, mid-block road segment on arterial roads and intersections. While the Australian guidelines took an overarching principle of separation, the Dutch approach requires separation between cyclists and motor vehicles in most cases. Case study routes were partially compliant with the Australian guidelines with lower compliance in accordance with the Dutch specifications.

1. Introduction

Cycling can provide an efficient means of transport to relieve motor vehicle congestion, particularly for short trips (5-8km) (Li and Faghri, 2014; FLOW Project, 2016; Hamilton and Wichman, 2017). Increased short trips can improve urban mobility and achieve incidental health benefits, particularly when the cyclist shifts from motor vehicle to a bicycle

While these benefits are being realised internationally, there are barriers to increased cycling in Australia. In particular, the lack of bicycle infrastructure provision. Recent Australian research reports that the provision of cycling infrastructure, at both midblock and intersections compromises cycling safety and undermines key principles required to support cycling participation (Pucher et al, 2011; Mulvaney et al, 2015; Stevenson et al, 2015).

1.1. Australia – complex planning environment

Cycling infrastructure planning in Australia is complex as it traverses all tiers of government, with many roads under the jurisdiction of local or state government. National guidelines provided by Austroads (Austroads, 2014) are extended with additional standards in each state/territory. In Victoria, supplementary bicycle infrastructure guidelines are published by VicRoads in their Traffic Engineering Manual (VicRoads, 2016a and b) and further extended by local municipality strategies. This complicated, multi-layered approach makes it difficult for infrastructure planners and designers to identify the optimal solution for projects, particularly when routes cross between state and local roads.

What was not clear at the outset of this study was how the Australian infrastructure design guidelines aligned with the Safe System approach that underpins road safety in Australia. In the full presentation of this study, the analysis included a review of how the cycling

infrastructure approach in Australia aligns with the Safe System approach. *Cycling aspects of the Austroads Guides* (Austroads, 2014) was the key resource for practitioners designing cycling infrastructure in Australia that was analysed in this study.

In comparing the Australia approach to designing safe spaces for cyclists this study compared the Austroads resource to the Dutch approach which is recognised as best practice (Pucher and Buehler 2008; Portland Bureau of Transportation, 2009). The Dutch approach is detailed in the *Design manual for bicycle traffic* (CROW, 2007).

1.2. Dutch design approach

Five key principles underpin the Dutch approach to design for cyclists (CROW, 2007): safety, cohesion, directness, comfort, and attractiveness. Based on Maslow's hierarchy and adopted from Scheltema (2012), Figure 1 illustrates the stages the need to be fulfilled to meet the requirements of Dutch cycling amenity.

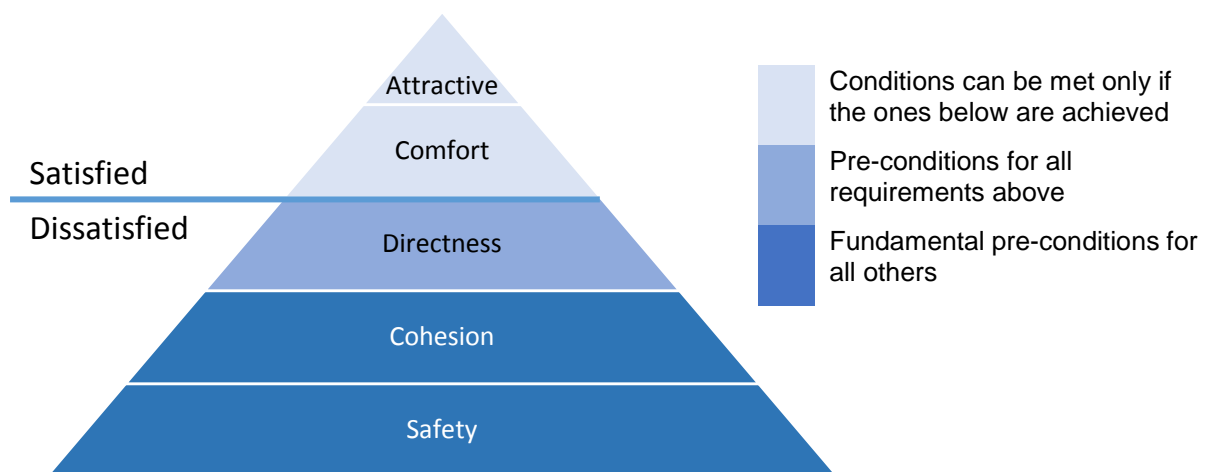


Figure 1. Dutch requirements for cycling amenity

Adapted from: Scheltema, N (2012)

This study investigated how the Australian approach to cycling infrastructure compares to international best practice in principle (design guidelines) and in practice (on-road implementation) and proposes action needed for increased cycling in Australia.

2. METHOD

This study used a mixed method approach to compare the Australian and Dutch approaches to designing cycling infrastructure. First, a desk-based comparison of cycling guidelines, followed by a case study of priority access routes in suburban Melbourne.

2.1. Comparison of guidelines

A comparative study was conducted of the cycling design guidelines using was made of the *Cycling Aspects of Austroads Guides* (Austroads, 2014) and the *Dutch Design manual for bicycle traffic* (CROW, 2007).

The comparison considered the treatments at midblock, intersections, local streets and road types across different speed zones (i.e. 50kph, 60kph, 70/80kph).

2.2. On-road naturalistic case studies

The Clayton campus of Monash University is a major work/study destination in suburban Melbourne. Based on the routes prioritised by the local council (Monash City Council) and the state government (Principal Bicycle Network, VicRoads), ten key routes were identified for assessment. One author (JD) conducted naturalistic observations along all ten routes.

In addition, two key routes were assessed for a detailed temporal-snapshot case study analysis. These routes had been previously identified as key access routes to Monash University (VicRoads, 2017a) Safe System Solutions, 2015 and 2017). Due to limited space, details of the case studies have been excluded from this abridged version of the conference presentation.

3. RESULTS

3.1. Comparison of Australian and Dutch cycling infrastructure guidelines

Across the road types assessed there were several areas where there was agreement between the design guidelines for the Australian and Dutch approach including:

- Bicycle lanes: delineated using line marking, signage and occasionally pavement colouration
- Cycle tracks: physically and spatially separated space for cyclists adjacent to the road

Beyond these early similarities, there were extensive differences in the two guidelines. Below is a summary of the key differences (Table 1).

4. DISCUSSION

There is a discernible difference in the way cyclists are positioned on the roads in Australia and the Netherlands that is likely to reflect the differences in historical, cultural and political experiences of each country. Safe cycling approaches in the Netherlands is underpinned by the five main requirements: safety, cohesion, directness, comfort and attractive and collectively these principles prioritise cyclists and recognise their physical vulnerability. In comparison, the Safe System approach that underpins the Australian approach to road safety offers some protection to cyclists through 'Safe roads' and 'Safe speed', however this is undermined by the 'Safe vehicles' pillar which can provide a 5-star safety rating to motor vehicles that are rated as marginal in pedestrian protection tests (ANCAP, 2017). This leaves an overreliance on 'Safe people' and safety through policy and education programs.

In comparing the two approaches, a fundamental difference was that the Dutch approach takes a holistic approach to cycling as a transport mode. Comparatively, in Australia the approach is more targeted and does not prioritise the entire end to end connected trip for cyclists, leaving gaps in the network, often at critical points.

Table 1. Key differences between Australian and Dutch cycling infrastructure guidelines

Guideline element	Australian approach	Dutch
Network considerations	Identifies important of a network but topic is given little consideration Five Dutch principles are listed with limited detail No regulated designs for mid-block or intersections	Dedicated chapter Includes detailed network modelling techniques and advice for policy and decision making
Local streets	No detailed infrastructure provision Suggests 40kph speed zone Cycling friendly speed humps preferred over horizontal speed control measures (create squeeze points) Kerbside parking is unregulated	Detailed infrastructure provisions Suggests 30kph speed zone Parking lane or indented parking should be delineated if parking is allowed along greater than 20% of road length Recommend critical reaction strip between parking and traffic lanes to protect cyclists from car doors
Mid-block treatments on arterial roads	No provision for cyclists Exclusive bike lanes including additional width for bicycle lane adjacent bicycle lane On-road cycling provision allowed without separation. Bike lane width from 1.8-2.7m permitted	50kph Bicycle lanes required on roads with one traffic lane each way (2x1) Separated cycle track on roads with two traffic lanes each way (2x2) 60kph Separated bicycle lanes only Recommends against bicycle lanes where motor vehicle parking is allowed 70kph and 80kph Separate cycle track adjacent to road On-road bicycle infrastructure not permissible over 70kph
Intersections and crossings	Key concerns listed: <ul style="list-style-type: none"> • Squeeze points • Left-turning vehicle conflicts • Areas where motor vehicles converge or diverge • Lack of continuity in protected infrastructure • Gaining position to turn right 	Detailed specific guidelines, for example; Roundabout with separated cycling infrastructure are preferred Signalised intersections are only appropriate for high traffic volumes (i.e. 10,000-30,000 vehicles per day) Physical barrier on approach to signalised intersections (i.e. 0.5m wide and at least 5.0m long)

There was a strong emphasis on safety in Australian policy. However there was a gap between the policy statement and the implementation on the road. Further, several elements of the Austroads guidelines for mid-block and intersection cycling infrastructure did not meet the Dutch best practice recommendations.

Distinct difference in the two approaches were evident in relation to provision for cyclists at various speed zones. There is a critical difference in the tipping point when cyclists are considered vulnerable road users and separation is essential. In the Netherlands, this point is reached at 50kph, compared to the Australian guidelines which permit cyclists to share the road with motor vehicles without provision in high speed zones.

5. CONCLUSIONS

While parts of the Australian guidelines accord with the best practice Dutch approach, there are many areas that do not. However, the guidelines do not wholly reflect the Safe System principles. Further, on-road the gaps in the cycling network create severance points which are likely to present a barrier to people cycling. For policy aims of increased cycling to be achieved safely, ongoing review of the Australian guidelines is needed to ensure cycling infrastructure implemented meets the known best practice approach.

6. ACKNOWLEDGEMENTS

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