

What can New Zealand learn from Cycling in Europe?

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Abstract:

With the current significant investment in cycling in New Zealand, many people hope that we can grow cycling usage levels to match those found in several parts of Europe. A lot of focus here is on physical treatments such as protected cycleways and 'Copenhagen lanes', but will that be enough to initiate significant travel behaviour change?

The authors have spent considerable time exploring cycling practice in many parts of Europe, via study tours and living there. Based on first-hand observations and discussions in best-practice locations such as The Netherlands, Denmark and Germany, it is evident that other factors beyond separated cycleways will be necessary to raise the take-up of cycling in New Zealand.

This paper will highlight some of the factors believed to be essential to ensuring increased cycling in New Zealand. These factors include land use planning, speed and traffic volume management, traffic-free areas, network completeness, safety prioritisation, choice of bikes available, and public transport integration. Examples of how these are applied in Europe will be presented, with a particular case study looking at the Netherlands. This will be contrasted with discussion about their current implementation in New Zealand, particularly in one of our most cycle-friendly cities, Christchurch.

Introduction

New Zealand has recently experienced significant growth in investment in cycling, both at a national level (NZTA 2015) and in local plans such as in Christchurch (Wilke *et al.*, 2014). With this current investment many people hope that, in the long term, the country can grow cycling usage levels to match those found in several parts of Europe. A lot of focus in New Zealand is on physical treatments such as protected cycleways and 'Copenhagen lanes', but will that be enough alone to initiate significant travel behaviour change?

The authors have spent considerable time exploring cycling practice in many parts of Europe, via study tours and living there. Most recently, the first author spent three months based in Western Europe in 2015, including one month in the Netherlands and additional time visiting the UK, Germany, France, Austria, and Switzerland. Opportunities were sought to visit key cycling locations and to meet with local cycle practitioners and academics. Based on these first-hand observations and discussions in best-practice locations (such as the Netherlands, Denmark and Germany), it is evident to the authors that other factors *beyond* just separated cycleways will be necessary to raise the take-up of cycling in New Zealand.

This paper will highlight some of the factors believed to be essential to ensuring increased cycling in New Zealand. Others have provided quite extensive lists of infrastructural and promotional factors deemed to contribute to cycling levels in best-practice locations, e.g. Pucher & Buehler (2008). This paper will only focus on a few key factors, outlined below. Examples of how these are applied in Europe will be presented, together with discussion about their implementation in New Zealand.

While this paper is focused on cycling, it should also be noted that many of the features discussed here would also benefit the **walking** environment as well. Increasing the ease, comfort and desirability of *both* walking and cycling goes a long way towards improving the liveability of our urban environments.

Case Study: The Netherlands vs Christchurch

The Netherlands is acknowledged as the country with the most extensive cycling provision in the world, and this is reflected in the uniformly high levels of cycling across the country. Therefore, it is particularly instructive to look at the key factors that have contributed to this success. Similarly, Christchurch is often considered one of the top cycling city in New Zealand, and is very familiar to both authors, so it will be assessed against the same criteria. After general observations about each factor, the discussion below will provide a comparison between typical provision in the Netherlands and how well (or not) Christchurch is doing; similar lessons can be drawn for other cities in New Zealand.

While visiting the Netherlands, a few colleagues there have asked our thoughts on how various Dutch cities differ *between* each other. Certainly, they often have different little ways of doing things in terms of the markings used, or calming features, or certain traffic signals. However, what was really noticeable after a while was the **consistency** from one city to the next at a higher level in simply providing for cycling. Basically it seemed to boil down to the *same* aspects time and time again, and these are discussed below.

Key Factors Influencing Cycling

Although the case study will look at how the Netherlands is providing for cycling, it is important to appreciate that many other European locations are implementing similar policies. For example, Frankfurt (Germany) isn't a place that usually springs to mind when thinking about cycle-friendly places of the world, but it currently boasts about 15% of trips made by bike. In that respect, it reflects many of the same reasons that can be seen elsewhere around Europe for why cycling

levels are generally higher than in New Zealand. Some representative photos from around (non-Dutch) Europe will be used in this paper to illustrate the common factors noted throughout the continent. The photos could have easily come from many other European cities visited that have also encouraged high levels of cycling, such as Münster (Westphalia, Germany), Bristol (UK), and Odense (Denmark).

Away from the cycleways observed, the pieces of the puzzle that **don't** involve a specific cycle facility are actually more critical to getting a complete cycling network in a city. For example, it is difficult to recall **any** city (big or small) visited that didn't contain each of the following to some degree:

- A **30 km/h speed zone** (or 20 mph in the UK), typically in residential or shopping areas.
- One-way traffic streets that allowed cyclists to ride **against the flow** (whether via formal street treatments—paint or physical provision—or just by signs).
- A **traffic-free area** in the central city for only pedestrians, cyclists and maybe public transport.

By contrast, in New Zealand it is difficult to think of many places at all that contain **any** of these features as part of their network (e.g. kudos to Wellington, Hamilton and lately Christchurch for their lower speed zones). Motor traffic has traditionally been “king” in New Zealand, and getting these kinds of concessions has historically been difficult. That's not to say that there weren't busy arterial routes for motor traffic in the European cities visited, far from it. But they were mostly located around the periphery (underneath the central city was another common option), and drivers certainly didn't expect easy travel through residential areas or the central city. It is also those busier and faster routes that are commonly fitted with physically separated cycling infrastructure.

Cycleway facilities

Many people focus on **separated cycle facilities** when talking about Europe and it's true that there can be plenty of them to find. Not all of them are necessarily the gold-plated standard often seen in best-practice design guides though. Many of the facilities observed around Europe are simply separated by means of a wider paint line, or a low kerb, or a series of bollards of some kind. Sometimes, effectively the footpath area has simply been divided in two by paint or tiles, and sometimes there is no real separation between pedestrians and bikes at all.

Putting on a “safety auditor's hat”, one can find plenty of things to be concerned about in the design of these facilities (or lack of design). However, *people are using them regardless*. Obviously no-one wants to create an even greater risk (attention to detail at intersections is particularly important), but we need to be careful not to get too hung up about the absolute safety of everything we build and imagine potential risks that are non-issues.

- **Netherlands case study:** Separation on arterial roads in the Netherlands is the one attribute that the public elsewhere in the world typically identify. And it's fairly systematic that, if there is a busy road, there will be a separated bikeway running alongside it. Sometimes it's one-way each side, sometimes it's two-way on one side, sometimes it's even two-way on both sides; basically it depends on the demand and the desire lines. More importantly, when cyclists get to a busy intersection, there is usually either a separate signal phase for the bikes, or they get to go under/over the road (in fact, Europeans overall are big users of vertical “grade separation” for all transport). That's not to say that there aren't ordinary painted on-road cycle lanes in the Netherlands - actually there were plenty observed and they generally worked fine - but it was rare to see them on anything but low-medium speed, moderately trafficked streets (even rarer to see them right up to intersections) and even then there was the impression that the Dutch authorities were looking at how to improve them.

Comparison with Christchurch: This approach is a key part of what is being done with the city's Major Cycleways programme; many of them follow busier streets that require some level of separation. The biggest headache will be removing on-street parking to achieve them; many Dutch arterial corridors seemed blessed with a little more space than New Zealand to fit everything in, including parking if necessary. Signalised crossings are the main tool of choice in Christchurch (although grade separation can be found elsewhere in New Zealand); the challenge is how to provide all of the necessary space and timing that all the different travel modes will want - something will have to give...

Land use planning

When providing for cycling, it's easy to get hung up on the various design details in how to build best-practice cycling routes. However, they will all be of limited use if we haven't also considered the bigger picture of planning our city overall. A key issue is the relative proximity of trip origins to destinations.

For example, one could build a really nice cycleway, say from Halswell into central Christchurch, with good width pathways and safe road crossings and intersection treatments (and indeed, this is starting to happen, with the Little River Link and Quarryman's Trail major cycleways in planning). However, even then it's still a **10 km** bike ride from Halswell all the way into town. For many people, that seems like too long a distance to ride, so they won't bother (and the main road into town is actually more direct anyway, providing another reason to travel by car or bus instead).

Observations from European cities would suggest that, as well as providing good cycling routes, if we want to encourage more cycling we have to consider:

1. Making it easier to do **short trips** (3-5 km max) from home to other key destinations (including public transport connections)
2. Making it more **advantageous to bike short trips** instead of driving (in terms of time/distance)

Good mixed-use higher-density land use planning is therefore an important part of encouraging more trips by bike (see Figure 1); if this is not in place then there will always be a limit to how many trips can be made by cycling - because most other trips are too far (*although public transport and electric bikes can fill some of that gap; see below*). Most European cities for example have population-weighted densities at least double that of their New Zealand counterparts (Loader 2015).



Figure 1: Higher density in Zurich, Switzerland makes everything closer to bike to

- **Netherlands case study:** Although not picked up initially, on reviewing photos taken in the Netherlands, much of the building stock shown comprised 3-4 storey structures - contrast that with the typical 1-2 storey buildings you see around New Zealand. Not surprising really when you have to fit over 16 million people into something a quarter of the size of the South Island, but it still provides a very *human scale* to communities. And those buildings might be a mixture of shops and offices down below, with apartments above. The net effect is that often it is easy to live quite close to where you work, shop, go to school, catch a train, etc; resulting distances are easy to cycle. The entire main urban area of Utrecht (pop. 300,000), for example, fits within a circle approximately 9 km in diameter; by contrast, the circle to encompass urban Christchurch (pop. 350,000) is at least four times as large in area...

Comparison with Christchurch: Building a fantastic cycle network will only get you so far. We also need to concentrate our land uses better around the central city and the key suburban centres, so that more people are already within easy reach of popular destinations by bike. The worry is that statutory plans like CERA's Land Use Recovery Plan (CERA 2013) do not adequately address the potential problems of further sprawl, and there appears to be too little focus on building up rather than out.

Speed and traffic volume management

Local streets with lower speeds and volumes are prevalent in almost every city observed in Europe. A **30 km/h speed zone** (or UK 20 mph) is most common in residential or shopping areas (see Figure 2), sometimes in limited zones and sometimes with a blanket-wide city restriction. The encouragement factor for would-be cyclists is strong; the safety benefits for **all** road users (Koorey 2011) are hard to ignore. In Germany, where a cycleway is provided, cyclists must use it, but legislation does not allow such infrastructure to be established when a 30 km/h speed limit exists.



Figure 2: A residential area of Freiburg, Germany – so 30 km/h is plenty

Local street networks can also be less attractive for rat-running by through-traffic by means of various **traffic management restrictions**, including street closures, pinch points, and one-way streets. Those restrictions generally do not apply to people on bikes (e.g. contra-flow cycling, bypasses), to whom the network is thus more permeable. At a policy level, this favours cycling over motoring.

- **Netherlands case study:** This is the bit that many people overlook when they talk about cycling in The Netherlands, yet really it's the backbone of their whole network (*we'll come back to that word "network" later*). A common strategy that Dutch planners talk about is "**unravelling**" (like a rope). In that respect, they want to keep the motorised "strands" out of the local streets as much as possible. Indeed, some routes like the *fietsstraat* ("bicycle streets" where cars are 'guests') only allow driving at biking speed, others you can only drive one-way, and others are cut in the middle so that you can't drive all the way through. Invariably there are also speed humps/platforms, cobbles or textured surfaces, and the ubiquitous 30 km/h speed limit to help keep traffic speeds down (or 60 km/h in rural areas).

Comparison with Christchurch: A few "neighbourhood greenway" treatments (Koorey 2012) are being used on some of the quieter Major Cycleway routes, but the potential is there to make whole local neighbourhoods more bike friendly too. In many places we've already done the hard work of calmed street reconstructions (e.g. Papanui East, Addington, Straven, Charleston); now these need to be reinforced with 30 km/h speed limits (great to see it happening for the central city at least). Traffic volumes could also be further reduced on many streets relatively easily by making more use of short one-way restrictions or by "breaking" some in half with simple closures. Unfortunately, where such closures have already been implemented in Christchurch, sometimes bikes are excluded too...

Traffic-free areas

A traffic-free area in the central city for only pedestrians, cyclists and maybe public transport is a very common feature of most European settlements (see Figure 3). Time and again, the evidence shows that this brings about positive economic benefits for those people working, living and trading in these areas (*and is just a generally nice place to be...*).



Figure 3: People on foot and bike enjoy a traffic-free area in Vienna, Austria

- Netherlands case study:** There's a general philosophy in Dutch cities that the closer you get to the centre, the fewer cars there should be. That typically translates into a central area (often the historic old part of town, but not always) that is only for walking and biking (except for service/delivery vehicles usually within prescribed off-peak time periods). Where are the cars? Sometimes there's a big underground carpark tucked away, but a lot of it is simply about the fact that it's now much easier to get there by bike or public transport. Certainly the retailers don't seem to be losing out...

Comparison with Christchurch: There only seem to be 'baby steps' in regards to making central Christchurch traffic-free, according to the "Accessible City" strategy. There is a move to make the Four Aves used more than the one-way streets, which might help. And it looks like we have managed to largely reclaim Oxford Tce back to active modes as a shared space. However, it is still unfathomable why traffic is then still allowed to drive the entire length of (say) Manchester St or Hereford St through the central city. If cars have to be there, it should be about **access, not thoroughfare**. Or we could make more use of one-way restrictions to motor traffic on minor streets too.

Network completeness

As touched on earlier, "**network**" is the key word there; it's no good having a lot of great major cycling routes if most people still can't get to them. Ideally a **complete, permeable network** is provided from all origins to all destinations. Obviously this is a long-term game, depending on the level of investment available, but some European examples (e.g. Munich) have demonstrated that the cycle-friendly network can be expanded fairly rapidly if some of the above techniques for traffic restriction and speed management are considered.

- Netherlands case study:** The aim with Dutch cities is that virtually every street is bikeable by one means or another, so that you don't have to think too hard about where the "cycling route" is. This was certainly the impression gained when biking around there; you didn't question whether the next street would be OK to bike on; you just assumed that it would. Signage was also reasonably comprehensive to help get to the main destinations.

Comparison with Christchurch: The Major Cycleway programme will add about 100 km of high-quality cycling routes to our network, but there is closer to 2,000 km of streets in the whole city. So the work to "complete" the network will continue; already there's been some

research done at Canterbury University to help identify the missing connections most in need (Martin 2015). Many streets (e.g. relatively quiet local streets) won't require much changing at all, but could benefit from low-cost measures like simple traffic management (islands, barriers, etc), network signage, one-way restrictions, and 30 km/h speed limits. The City Council's \$500,000 "targeted improvements fund" of the last couple of years was a relatively unheralded but strategically useful pool of money for minor cycling improvements (like the separator posts). It's not entirely clear if there is ongoing funding of this nature, although there is some money allocated at least five years away to "Local Cycleway: Development Connections".

Safety prioritisation

There often seems to be an unwritten rule in New Zealand (and sometimes it's there in the project brief): "sure, you can provide for cycling here - but only if motor traffic efficiency won't be compromised". While it was thankfully removed in the final version, it was notable that even the consultation draft of the 2015 *Government Policy Statement on Land Transport* (NZ Government 2014) had as one of its objectives "Extension of the dedicated cycle networks in the main urban areas **without reducing general traffic capacity**". This is really the nub of the problem here (and indeed, much of the developed world) - the lack of **priority of safety over efficiency**. Instantly that probably rules out half of the things observed around Europe, where a more holistic (and sometimes deliberately "pro-bike") approach is taken.

- **Netherlands case study:** A much discussed feature in the Netherlands are roundabouts where circulating pedestrian and cycle paths have priority over crossing traffic. It is self-evident that if you modelled these using conventional tools they would prove to be worse in terms of delays to motorists than a roundabout with motorist priority. Similarly, one-way restrictions would mean that a motorist has to drive further around the block. But the Dutch are much better at looking at the **bigger picture** - someone often has to lose out (and in New Zealand, for too long it has been the active modes). Instead they focus on safety first, with their "Sustainable Safety" national strategy a very useful blueprint (Wegman & Aarts 2006), and to do that effectively often means that **mobility has to take a back seat**. Alternatively, more is spent to grade-separate everyone so that no-one loses.

Comparison with Christchurch: This one has yet to be tested significantly here, but certainly a few designs to date for major road crossings could restrict existing traffic movements somewhat (although clever design can help minimise the efficiency loss, such as seen at the new Matai St East signalised crossing between the Fendalton Rd and Kilmarnock St intersections). So it will be a test of wills against those (both public and practitioners) who see such "disbenefits" as intolerable. Some NZTA and Chch Transport Operations Centre staff in particular will need to revise some of their objectives to achieve this. Mind you, Christchurch has had a lot of practice at traffic delays in the past few years... The strategic prioritisation could also occur at the national policy level and, arguably, that would be the better place to start favouring safety over efficiency.

Public transport integration

Biking can only get you so far (maybe a bit further on an e-bike...); for most people they need motorised assistance to travel longer distances. Therefore, if we are to truly reduce our reliance on driving to places, then the **public transport provision** needs to be just as good too and **well integrated with the active modes**. Europe does this especially well in most cities. Some trips suit a bike or walk, some trips suit a bus, tram or train, and some trips suit a combination (the greater prevalence of folding bikes in regular usage around Europe shows that people are doing the latter). It was interesting to see that some of the railway companies are trying to have a finger in all pies

by also offering car and bike share schemes at the train stations. Public bike-share schemes (discussed below) make cycling start to become an extension of public transport (see Figure 4).

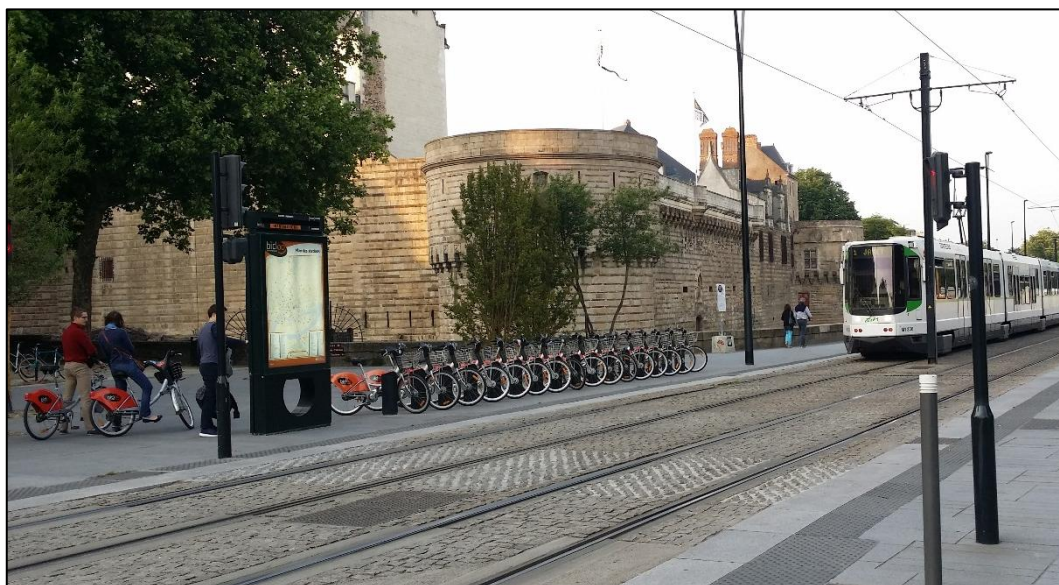


Figure 4: Public bike scheme complements public transport well in Nantes, France

- **Netherlands case study:** The Dutch have a fairly comprehensive rail network that links various towns and suburbs together, as well as buses/trams for the local connections. There are a few choices about linking this with bikes; travellers can take their bikes with them on the train (or folding bikes on buses/trams) or they can use the extensive ‘OV-Fiets’ bike hire scheme that allows them to pick up another bike very cheaply at virtually any railway station (paying for it using their same public transport smartcard). That allows ‘PT+bike’ to compete with the alternative of driving your car (especially as car-parking can be quite limited and expensive).

Comparison with Christchurch: Actually, one thing that has been done very well is to provide bike racks on all bus routes in Christchurch. And the recent “Spark Bikes” public bike share scheme might come in handy for some bus passengers arriving in the central city. The elephant in the room is the lack of commuter rail (or rapid transit of some kind), leaving long-distance commuters to have to put up with buses that are often stuck in the same traffic as everyone else. Coming up with a viable efficient alternative from the likes of Rangiora and Rolleston might be able to reduce the growing car numbers that stream in every day - not many people are going to bike all the way from there. Although Christchurch has worked wonders with their bus system over the years, at some point soon the city is probably going to have to bite the bullet and look at either heavy rail (on separate corridors) or light rail (on streets) to complete the mix. If other ‘small’ places like Freiburg and Canberra can be implementing it (not to mention our own Wellington), then there is no reason for Christchurch not to either.

Continuous improvement of infrastructure

Observing some of the more cycle-friendly parts of Europe for the first time can be somewhat intimidating if contemplating how to replicate the system in New Zealand. There is a desire to want to jump straight to providing what they have, whilst also realising that this might be costly and politically difficult. But what you see in Europe certainly didn’t happen overnight, and certainly isn’t staying still either - **ongoing review and improvement of existing infrastructure** is an accepted part of providing for cycling there. The key is to take the lessons learned and plan for how the next project will be a little bit better (and budget for improving the existing stuff at some stage).

- **Netherlands case study:** The Dutch certainly weren't perfect the first time they started building cycleways in the early 1970s. Even now, they will take great pains to point out the flaws in what they have got (and what's going to be improved). Through trial and error they've learnt what works and what doesn't (*interestingly there's often relatively little formal research accompanying these lessons learned*). So some of the facilities observed there may be second-generation (or even third generation) versions of what they first tried. It didn't all happen overnight; they just kept chipping away incrementally at it. And while to our eyes it may all look truly impressive, they are continuing to improve on it all the time too.

Comparison with Christchurch: Visitors to Christchurch from other parts of New Zealand (or similarly cycle-deprived places) often marvel at what the city already has provided for cycling. It's sometimes hard to appreciate by local eyes, but there is a good base. So it's not starting at zero; e.g. the country's first cycle lane was painted in Kilmarnock Street in about 1975. No doubt there will be stumbles along the way; many would already say that the Ilam Road cycleway pilot was not the best design. And parts of other existing facilities like the Railway Cycleway are far too narrow for current or future demand. But it is notable that both of these sections currently have plans to further improve their design and capacity in 2016-17.

Other Factors

The litmus test for whether cycling was working in most cities visited was the presence of **women cycling** as much as the more traditional male demographic we see in New Zealand. The impression generally was that in most places there was little to differentiate the amount of cycling being done by each gender (see Figure 5). Similarly, it was heartening to see a wider range of age groups represented too; children at one end of the spectrum (often unaccompanied) and elderly at the other. All of this indicates that cycling has reached the level where it is nothing “special” or difficult – it's just what people do when they need or want to.

Choice of bikes available

The other way that cycling can be seen to be taken seriously is when it is being used as a viable form of transport for business purposes as well. **Cargo bikes** and other “work bikes” are still relatively rare in New Zealand, whereas they are much more likely to be found in the mix in Europe (and lately their electric “e-bike” alternatives). Whether they are delivering goods or people, they serve a useful function in the way that a city gets around (this is particularly so for businesses within traffic-free areas who need things delivered).



Figure 5: At least as many women as men on bikes in Copenhagen, Denmark

Biking is also viewed as a viable transport option by enabling people without a bike handy to access one through a **public bike-share scheme**. In the same way that one can elect to catch a taxi, or bus, or tram, such a scheme allows someone to choose to bike somewhere instead (which often makes more sense both time- and cost-wise than the other modes mentioned). As a way of growing “opportunistic cycling” (i.e. you suddenly need to be somewhere that would be handy to get to by bike), it’s a great solution. Most major cities visited in Europe had a public bike-share scheme available to use. Let’s hope that Christchurch’s own “Spark Bikes” scheme is equally successful.

Helmet-wearing legislation

The other elephant in the room when it comes to cycling in Europe vs New Zealand is **cycle helmets**, or more specifically their mandatory compulsion (the afore-mentioned bike-share schemes can also be adversely affected by this). New Zealand and Australia continue to be the only countries in the world with full mandatory helmet laws (some other places have children-only or state/province-specific laws). Irrespective of your views about the effectiveness of helmets in a cycle crash, the effects of a mandatory law on the perception and take-up of cycling cannot be ignored. There are plenty of people cycling with helmets in Europe, particularly road-training or MTB riders, children and their care-givers. But there are also more people cycling without one – and no-one seemed to have an issue with it. In fact, *culturally* it makes cycling **no big deal** – it’s just a part of life: Have bike, can ride... Politically the helmet question is a hot potato in New Zealand (*and we suspect that many typical members of the public suffer a bit from “Stockholm syndrome” on the topic after 22 years of helmet legislation*). But perhaps, when our planned “all ages and abilities” cycling infrastructure has become more commonplace, we can have a more mature discussion about the impacts and necessity of such a law.

Europe is different?

The common response to suggesting doing some of the things mentioned here is *“but that’s Europe; we’re not like them”*. This seems to be a rather defeatist approach, because all humans are capable of changing their ways. The typical Kiwi of 2016 does all sorts of things that their predecessor from a generation ago wouldn’t dream of (e.g. what we eat and drink, such as curries and cappuccinos). One might argue that the typical European mediaeval town provides an advantage in restricting motor traffic in the central city, but that didn’t stop many of them from letting countless cars come in anyway until they had a change of heart a few decades ago. The key is to let people **see** what the alternative could be like, and give it a fighting chance (see Figure 6) – many Europeans were initially pretty sceptical about these initiatives too.



Figure 6: "Bicycle street" in Frankfurt, Germany; encouraging cycling has to be a deliberate policy

Ultimately, the Europeans observed were not really any different to the typical New Zealander. They may have some different customs and practices, but the underlying human behaviours are no different. Some of them acted a bit recklessly or carelessly, some of them ignored road rules, some of them clearly weren't very proficient using their chosen travel mode. And still they tried to go about their daily business, or catch up with friends, or just sit and watch the world go by. Having a less car-oriented place with more cycling options tended to make the cities visited all the more pleasant while these activities occurred. Even Kiwis on their 'OE' typically blend in with their transport choices and are no longer "wedded to their cars", as many people here would have you believe.

It's fair to say that we can't always unquestioningly adapt things that we see overseas directly as they are. But they do provide ideas for what we *could* try and certainly some inspiration for what a cycle-friendly (or shall we say people-friendly?) city might look like...

Conclusions

In summary, we believe that the above factors lead to the cycling numbers that are seen in Europe, particularly in the Netherlands. Dedicated facilities like separated cycleways are important, but they will under-deliver the amount of cycling if strategic planning in New Zealand does not also consider factors such as land use planning, speed and traffic management, network permeability or completeness, safety prioritisation, and public transport integration.

Greater cycling numbers also lead to other things noticed in Europe, namely:

- People of all ages and genders on bikes, and wearing all kinds of "normal" everyday clothes
- A huge range of bikes to cater for everyone's different needs, from pannier racks, to electric bikes, to cargo-bikes, and so on
- A huge bike parking problem - despite the thousands of parking spaces provided, they are invariably very full
- Fairly casual behaviour by many riders because (like cars in many other countries) they are often the "dominant species". Hence, lots of cellphone use while riding (which is legal in some countries) and ignoring of red lights, pedestrian crossings, and so on (although generally manoeuvring to avoid hitting anyone). Given that this is a 'human nature' problem worldwide, it's not clear that this can ever be fully fixed.

- Conversely, fairly good behaviour by motorists (in terms of speeds, giving way, waiting, etc). But it's by no means perfect; plenty of 'boy racers' were observed, as well as what would be considered inappropriate passing manoeuvres or inconsiderate parking.

A lot of effort could be put into addressing this list of behavioural items (whether it's a case of encouragement, enforcement, marketing, etc), but it may not result in a great increase in cycling numbers. Instead, many of these things naturally arise out of dealing with the factors described elsewhere in this paper - these are the things that will increase cycling numbers in New Zealand.

Acknowledgments

The lead author would like to acknowledge the support of his previous employer, the University of Canterbury, for financially supporting his overseas study trips, including the 2015 sabbatical to Europe.

Statement of Competing Interests

The authors are both employed in undertaking work for clients to plan and design cycling provision around New Zealand.

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