White line fever: a sociotechnical perspective on the contested implementation of an urban bike lane network

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In this paper we discuss the introduction of the Launceston Bike Network, a local government project progressed in Tasmania, Australia. The project's implementation became subject to intense community conflict, or what we refer to here as white line fever because it arose in relation to the white traffic lines used to mark the on-road bike lanes. Our analysis of textual data gathered from relevant documents and interviews with key stakeholders relies on the development of a sociotechnical perspective. Adopting this perspective allows us to recognise the various agencies emerging collectively from the technical and social aspects and interactions analysed. The findings add to how cycling and infrastructure might be reconceptualised as an urban sociotechnical system, and assist in its transition towards the transport mainstream through policy and planning.

Key words: *bike lanes, cycling, sociotechnical, Australia, contested, infrastructure*

Introduction

Cycling in Australia appears to be on the rise, with sales of bikes now outstripping that of cars (Australian Bicycle Council 2010) and over half of Australian households owning at least one bike (ABS 2009). However, the modal share of cycling as the usual form of weekly commuting to work or full-time study in Australia lags well behind many European counterparts, and with cycling comprising just 1% of all trips taken, is comparable to rates in the UK, USA and Canada (Austroads 2010).

A key national strategy aims to 'create a comprehensive and continuous network of safe and attractive routes to cycle' as 'countries that have achieved significant levels of cycling activity have benefitted from extensive and sustained investment in their cycling networks' (Austroads 2010, 22). Investment by Australian local governments in cycling infrastructure has nearly doubled between 2007 and 2011 (Australian Bicycle Council 2012). However, when cycling infrastructure projects have been implemented in Australian cities, unanticipated community opposition has resulted in perverse and costly outcomes (Vreugdenhil 2011). In 2010, for example, after opposition from local residents, businesses and a school com-

munity, the Adelaide City Council agreed to remove $400,000 of newly installed bike paths (ABC News 2010). Such a response is problematic as the strategic objectives of Australian government (at local, state and Commonwealth levels) are to increase cycling numbers with a national goal of doubling the modal share of cycling transport over the period 2011 to 2016 (Austroads 2010).

In 2010, residents of Launceston in Tasmania became embroiled in a divisive public debate involving the Launceston City Council and the introduction of its Launceston Bike Network project, which aimed to deliver a comprehensive and integrated network of on-road bike lanes (Launceston City Council 2009). The bike network received extensive reporting and attention in the local press through letters, articles and opinion pieces, demanding Council revisit what had previously seemed a straightforward case of minor physical infrastructure provision. This contestation over the bike lanes involved the white, on-road line markings in what we describe here as white line fever. It had the hallmarks of a 'hot' situation where, in ' "hot" situations, everything becomes controversial . . . These controversies, which indicate the absence of a stabilized knowledge base, usually involve a wide variety of actors' (Callon 1998, 260). This

investigation sought to understand the controversy and how the introduction of the bike lanes destabilised the sociotechnical relations of Launceston's urban road transportation system.

In this paper first, using cycling and urban studies literature, we develop a sociotechnical system perspective for illuminating our case study. Second, a summary of the study location, bike lanes and the events surrounding the implementation provides a snapshot of the local context in which this case has unfolded. Third, we describe the development of two research questions and the methods used to generate the study findings. Fourth, the findings are presented with extracts from the data. Fifth, these findings are discussed through the sociotechnical perspective. Finally, our conclusions reflect on this research and its implications.

Cycling in the city

Considerable research has been conducted on cycling in relation to transport behaviours and infrastructure provision in urban contexts (Daley *et al.* 2007; Hunt and Abraham 2007; Pucher *et al.* 2010). However, little or none has been published on the associated implementation controversies. Horton, Rosen and Cox note that cycling and society have until recently remained 'remarkably unthought' in the social sciences (Horton *et al.* 2007, 1). They call for research agendas to rethink cycling in all its diversity, seeking to unsettle, reinvigorate and expand horizons.

Important work has moved the conceptualisation of cycling beyond the usual scripts of environmental, health, infrastructure and governmental endeavours promoting sustainable transport. For example, Spinney (2007 2009) and Wood (2010) have illuminated the everyday practices of cycling, and the juncture of technology, the body and cycling spaces. This re-conceptualisation of cycling as a highly experiential and embodied act has sought new connections between cultural and transport geography. Jones (2005) narrates a commute to work, bringing together hitherto unexplored aspects of affect, embodiment and cycling as performative of the city (see also Jones 2012). For Jones, the 'thrills and chills' and everything in between offer an ever more immediate motivation (or demotivation) for cycling than all the environmental and health programmes and benefits pushed by government bodies. Cupples and Ridley also contend that the affective nature of cycling has been largely overlooked as '[p]eople cycle because it works for them affectively, just as mountain climbing and marathon running works affectively for others, rather than because of a rational response to a sustainable transport strategy' (2008, 260). Such sustainable transport agendas promoted by cycling advocates and governments alike can, in missing this point, lapse

into overly simplistic binaries with cyclists regularly portrayed as being 'good' and car drivers being 'bad' for the environment (and health and sustainability).

The need to acknowledge a combination of social and technical forces at play in our case study informed the decision to adopt a sociotechnical perspective. Thomas Hughes coined the phrase 'the seamless web' to emphasise both the networked nature of technology and society and the need to move the then emerging studies of science and technology (STS) to encompass 'a host of actors and institutions' (1986, 281). Out of the broader STS view of science, technology and society as highly interlinked and interactive came further conceptual developments during the 1980s and 1990s to generate theories about large technological systems (LTS) and actor network theory (ANT): '[in] both perspectives the dynamic is that heterogeneous elements are gradually linked together, emphasising coevolution' (Elzen *et al.* 2004, 23).

For urban studies, the city is a sociotechnical process; one of the greatest

> 'sociotechnical hybrids' of all . . . utterly infused with, and dependent on, the heterogeneous filaments and capillaries of infrastructure networks, all working within subtle patterns of layered interconnection and mediation. (Graham and Marvin 2001, 214)

Graham and Marvin's work has been characterised by Coutard and Guy (2007) as an 'advanced base' for researchers in this area but one pervaded by a degree of technological pessimism. They suggest that

> an STS perspective would require to give more attention to the inherently ambivalent nature of technological devices and systems, to the mutual shaping of technologies and their social uses and hence their 'social effects'. (2007, 728)

More recent calls also ask scholars to engage with the overlooked opportunities offered by using the STS and sociotechnical approaches to examine cities (Moore and Karvonen 2008; Yaneva and Guy 2008).

Sociotechnical transition in cities has been linked to transition theory (Elzen *et al.* 2004; Geels 2004), given the changing nature of infrastructure provision, which, until recent decades, has been largely an engineering 'command and control' undertaking (Hodson and Marvin 2010). Lately, constraints in critical infrastructure in cities have combined with various pressures (social, economic, environmental) requiring a sociotechnical approach. Still, questions around the nature of transitions remain. Shove (2012), drawing on transition theories and innovation studies to analyse the recent history of cycling in the UK, questions how 'old' sociotechnological regimes can all but disappear, only to re-emerge. She argues that innovation studies focusing on emerging new technologies do

not handle these questions adequately, but these question are critical for cities and remain 'important for academics and policy makers interested in developing and promoting more sustainable sociotechnical systems' (2012, 363).

The introduction into Launceston, Tasmania, of the decidedly 'low tech' white lines to encourage a space for the 'old' regime of cycling to re-emerge might seem an unlikely starting point for an urban sociotechnical analysis, but we suggest it is important for several reasons. First, as Shove outlines above, this ground is not well covered by (sustainable) sociotechnical transition theory. Second, the hotly contested nature of the introduction offers an illuminating 'flashpoint' to be researched before it subsides and not least as sites of destabilisation and possible reinvention. Finally, cycling needs to be rethought in new and different ways and, as urged by Horton *et al.* (2007), reimagined outside of its pre-existing conventions.

Situating the Launceston Bike Network

Launceston is a regional centre in northern Tasmania. It is the state's second largest city, with a population of 100 000. While smaller than many cities in Australia, in particular the state capitals, Launceston has features common to most with a central business district (CBD) connected by arterial roads radiating outwards from inner through to outer suburbs and beyond. Prior to the roll-out of the bike network in 2009, there were two roads in Launceston with bike lane markings that extended over just two kilometres in total length. Implementation of the 50-kilometre Launceston Bike Network (see Figure 1) therefore signalled a landmark development in the otherwise slow evolution of the city's on-road bike lane infrastructure.

Impetus for the project came from the Australian Federal Government's $42 million funding package for National Bike Paths Projects (part of its wider economic stimulus package released in response to the global financial crisis). The Launceston City Council successfully applied for a grant under this scheme in 2009. However, additional funding contributions were made by the Tasmanian State Government and the Launceston City Council.

The bike lanes that appeared from late 2009 in Launceston are on-road spaces designated for cycling. A white traffic line separates the spaces for cycling and the spaces for driving. The cycling space is invariable situated towards the road margins – adjacent to the kerb line or roadside car parking – with the driving space occupying the middle ground. Up close, the line has the same geometry, texture (non-slip), colouration and luminescence as other road traffic lines, such as the centre road traffic line. Bike lane widths are generally 1.5 metres but may reduce to 1.2 metres or increase to 1.8 metres. The presence (or

not) of bike lanes and their widths are contingent on the overall road widths. The bike lanes are typically broken up by entry and exit points. There are also combinations of dashed lines, bike symbols and words to signal the beginning and end of the bike lanes (Plate 1).

From mid-2010, as more of the bike lane markings appeared, so also did the volume of related letters and articles published in the local press, *The Examiner*. While most were strongly against the changes, letters of support were published regularly too.

Methods

The research investigation centred on two questions:

- What happened with the bike network introduction?
- How did the introduction of the bike lanes destabilise Launceston's (sociotechnical) network of urban transport?

The first question invites empirical description but the second then allows the investigation to move beyond the dichotomy of the social and the technical.

Answers were sought through conducting semi-structured, open-ended interviews and a content analysis of relevant documents. A purposive sampling method was employed to identify key informants comprising: two council officers and three aldermen, two residents from the troubled Penquite and Normanstone Roads, three Charles Street residents/business owners where the implementation appeared less troubled, four cyclists, and two car drivers. The transcribed interviews were thematically analysed to identify key themes to explore the processes at work and generate explanations to the research questions.

Findings

What happened with the bike network introduction?

The bike network arrived by way of on-road line markings, which then sparked an on-going and heated community debate. As an alderman summarised at interview:

> The two biggest ones [conflicts] have been Penquite Road and Normanstone Road . . . There was a thousand signatures to a petition on Penquite Road. And Normanstone Road, quite a number of the residents and quite a number of road users including ambulances and so on were concerned about the changes. (Participant 1, alderman)

In accounts of driving in Normanstone Road at the time, participants reported safety concerns due to complicated results arising from the 'simple' addition of bike lanes. Across the width of Normanstone Road were new
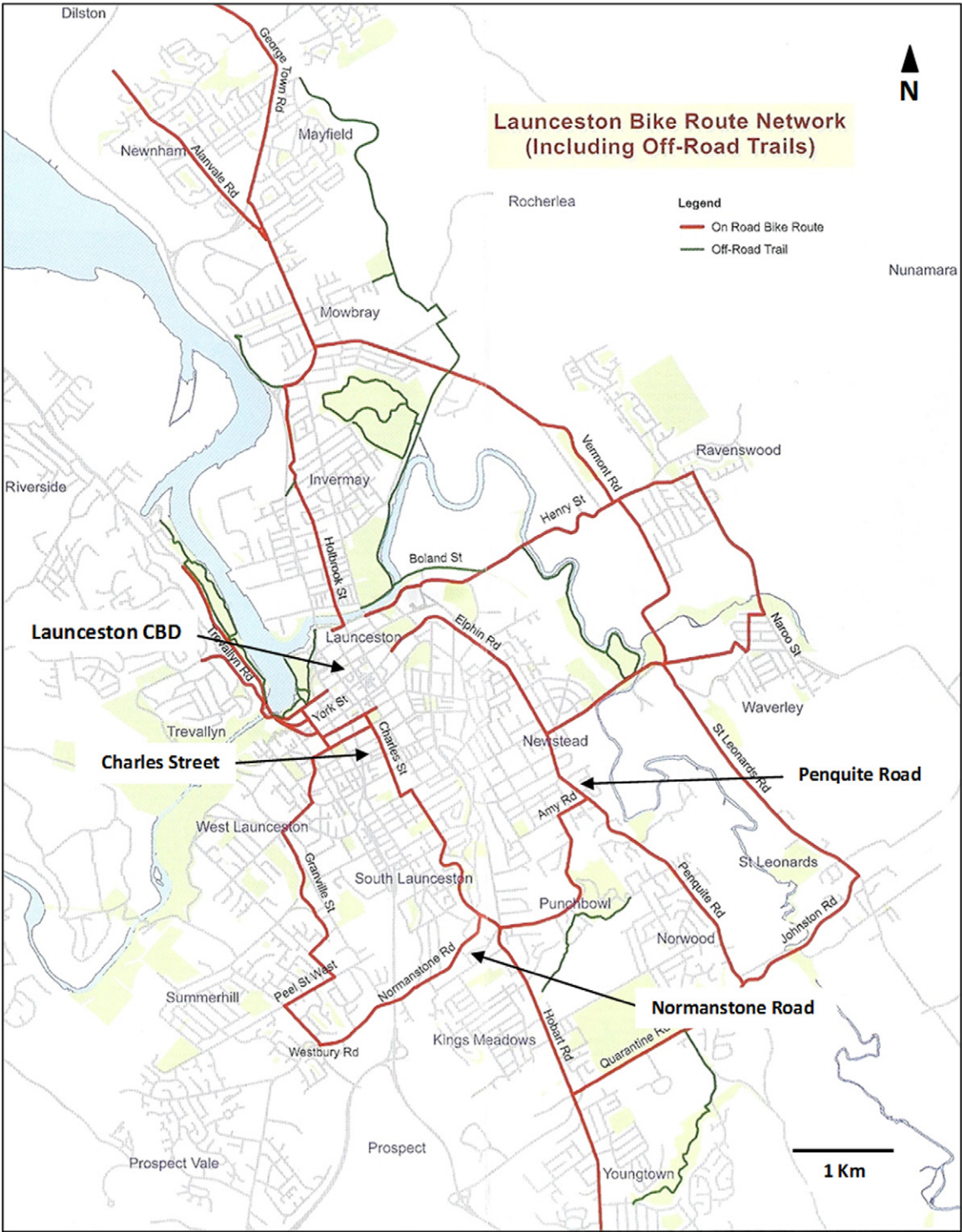
Figure 1   Launceston Bike Network map
Source: Adapted from Launceston City Council (2011)

**Plate 1   A typical Launceston bike lane (Charles Street)
seen from points of (a) entry and (b) exit**
Source: Authors' own images

line markings for car parking spaces, bus-stop zones, road
lanes and the bike lanes. The discrete technical solutions
for each addition combined to give the road an unantici-
pated complexity. Described as having been 'perfectly
safe, uncomplicated' (Participant 13, resident), Norman-
stone Road became 'changed, so radically' (Participant 3,
alderman) with the additions. The widespread criticism
and safety concerns prompted a Council decision to
return the road to its original condition within weeks of its
completion (Plate 2).

Penquite Road was complicated too by a 'black spot'
crash reduction scheme that saw additional layers of tech-
nical solutions add to the complexity of the road mark-
ings. Residents again became actively involved and a
community petition against the changes halted work
while Council held two public meetings and engaged
consultants for an independent review. All research par-
ticipants talked about the process of consultation and
communication:

**Plate 2   The three roads comprising (a) Penquite Road
(with bike lane markings); (b) Normanstone Road
(returned to original condition without bike lane
markings); and (c) Charles Street (with bike lane markings)**
Source: Authors' own images

It was that perhaps there wasn't proper consultation done. There was a bit of angst, the line marking changes overnight in Normanstone Road. The same in Penquite Road where people felt they weren't consulted. (Participant 2, alderman)

Beginning with the concerns of safety and consultation, our analysis revealed that the focus of the network designers served to prioritise the significance and hence exaggerate the power of the technical. In Penquite and Normanstone Road, in particular, there seemed to be an excessive faith placed by the designers in the capacity of the technical processes and materials to provide on-road solutions to a multiplicity of traffic needs, delivered primarily as right-turn lanes, bus-stop zones and designated car parking as well as bike lanes. By exaggerating the power of the technical to define, control and resolve issues, the role of the social was diminished. So, for example, the power and the possibilities of communication and consultation were underplayed.

Still, the suggestion that an overly technical focus diminished a consultation process has but a limited capacity in helping us understand how the conflict happened as it did. Urban scheme introductions by local authorities are replete with stories where poor consultation is blamed because wishes are not fulfilled. Here too, the implication of the usual suspects of communication and consultation tells just part of the story. Adding a second question with a sociotechnical perspective provided richer, deeper insights.

How did the introduction of the bike lanes destabilise Launceston's (sociotechnical) network of urban transport?

In this context, the presence of the 'white lines' was critical to how things unfolded. Many letters to the press focused on these lines:

How do you turn a relatively free-flowing arterial road skirting the city into a grid-locked, confused, dangerous, obstacle course? Introduce a bike lane down one side, narrow the road with white lines and assorted markings . . . In fact let's do it to every street in Launceston. (*The Examiner* 2010a)
It is completely irresponsible and foolhardy in the extreme to encourage more unprotected and vulnerable cyclists to share a carriageway with vehicles . . . [a] white line painted on the road is not a means of protection. (*The Examiner* 2011a)

In another instance it was 'the white lines creating a dangerous situation for cyclists and motorists alike' (*The Examiner* 2011b). Moreover, this addition of white lines was deemed a 'desecration' of the road and likened to vandalism (*The Examiner* 2010b). Roads provide more than a psychosocial or spiritual connection; they actually constitute subjects and identities in manifesting their sense of being as much as wellbeing in actual practices and engagement with things. One alderman, reflecting on the relationship people have with *their* road, commented:

We realised people love *their* road, they have a personal relationship with *their* road. They know their road; it is part of the security that makes up their life. (Participant 3, alderman)

Cyclists evinced similarly powerful relationships with the road and its markings. The lines were viewed as enabling a space for safer, more confident cycling but still 'a compromise solution, a line at the edge of the road does not necessarily constitute an appropriate cycle lane' (Participant 9, cyclist). While not ideal for everyone, it was said to be a simple and straightforward solution in the face of complicated alternatives. A key advantage was the provision of a legitimate space, defined by the white line:

Yes, OK, they are not perfect for everybody and not everybody is going to really want to ride on the roads because you've put the bike lane in place. Some of those people would still be reluctant to do so, but for most people it provides for that legitimisation, if you like, of being on the road and that extra bit of confidence. (Participant 4, council officer)

For cyclists such a space could, in turn, become territory to be claimed.

I definitely feel safer in the lane, that is my space then, I can sort of claim that. (Participant 6, cyclist)
I appreciate having the space and I like to defend that space. (Participant 4, council officer)

New spatial relationships were thus constituted, shaping what interactions might then occur with and among various road users. Drivers and cyclists alike commented on the potential for an undesirable 'them and us' divide. One of our interviewees captured the motorist's response to cyclists returning to the traffic lane (as the bike lane ends) with: 'Hang on, you bloody cyclists. Grrrr, get back in your lane!' (Participant 8, cyclist). The white lines were implicated in conflicts over encroachment and marginalisation (Plate 3). Drivers mentioned issues of negotiating their now narrower, tighter driving lanes. Cyclists felt they were often corralled in marginal spaces at the margins of the road where 'verges are cracked, undulating, badly contoured and you have driveways' (Participant 9, cyclist).

Cycling in the bike lanes was also problematic with the lanes 'disappearing' at road junctions or as roads narrowed. Conceived as interconnected city-wide, the bike network at street level is manifestly discontinuous:

Plate 3 Encroachment on the Launceston Bike Network
Source: Authors' own images

Quite often . . . they will just stop and there is no direction as to where they go, or if they are going to start again. (Participant 10, car driver)

The magic cycle lane that . . . just appears out of nowhere . . . and the cycle lane might be here, but disappears, nothing in between . . . [It] just vanishes (Participant 8, cyclist)

For experienced cyclists, drilled in merging into and out of the traffic flow, the discontinuities were less problematic, though strict observance of cycling the full length of the space was not always followed as opportunities to merge back into traffic were often taken early. For less experienced cyclists anticipating a more sustained, seamless separation from car traffic behind the white lines, the intermittent, start–stop nature of the network could be disconcerting. On a positive note, with or without cyclists, the simple presence of the lanes was seen to act as a constant and visible reminder to drivers as to the *possible* presence of cyclists.

Discussion

If bike lanes can act to make cyclists and cycling appear in (and disappear from) the urban landscape, we would stress that they might be more powerful as actors co-constituting complex relationships here than initially intimated. This case study links bike lane infrastructure with materiality, power and affect, compelling us to extend our consideration of what might comprise the technology of cycling. Spinney rightly points to the importance of the technology of the bike 'in defining *how* we are in a place and consequently the potential meanings of place' (2007, 41). Recognising the place of technology of road infrastructure in how we experience road space as both cyclists *and* drivers – and incorporating it into a sociotechnical complex – requires us to go beyond the usual instrumental meaning associated with bike infrastructure. Cupples and Ridley, while acknowledging that infrastructure such as bike lanes matters, also contend:

A focus on infrastructure and the hard boundaries of cycling lanes is part of the attempt to discursively retain a human/nonhuman binary . . . The obsession with cycle lanes can be seen as a will to produce a rational spatial order and leads to a neglect of affective and embodied dimensions of cycling . . . (Cupples and Ridley 2008, 259)

Our case study, however, reveals how it is the simple material of the bike or a road (right down to the lines marking its surface) that can still possess the human in the constitution of multiple sociotechnical cycling and driving arrangements. We feel that there are vital and productive powers associated not only with cycling but with the physical infrastructure of the bike lanes themselves, and that a sociotechnical focus helps dispel any human/nonhuman binary.

Latour (2005) urges us to resist talking of the social as an entity of its own particular type. Instead, in the example he gives of car drivers slowing down in the approach to a school, Latour (2005, 77) sees little difference between one response formulated in relation to a '30 mph' sign or 'moral law' and another to which is added 'a carefully designed concrete slab' or speed hump that causes the driver to decelerate to protect the car's suspension. Of this sociotechnical composite, he asks:

Should we say that only the first connection is social, moral and symbolic, and that the second is objective and material? No. But, if we say that both are social, how are we going to justify the difference between moral conduct and suspension springs? They may not be social all the way through, but they certainly are *collected* or *associated* together by the very work of road designers. One cannot call oneself a social scientist and pursue only some links – the moral, legal and symbolic ones – and stop as soon as

there is some physical relation interspersed in between the others. That would render any inquiry impossible. (Latour 2005, 78)

Similarly, with our study into the highly conflicted roll-out of the Launceston Bike Network, any distinction positing a world of road design and engineering with all its physical materiality of concrete and cambers as separate from that of public perception, emotions and affects cannot be sustained. In fact, the white lines have been actively complicit in the scripting and re-scripting of sociotechnical relations of transportation through such material practices as the cycling now afforded there as much the discursive contestation over it.

Despite the benefits conferred by bike lanes (perceived or otherwise), by occupying spaces at the margins, cycling might continue to be viewed as outside the traffic flows and not part of the mainstream. The difficulty of (re)gaining ground against the 'obduracy' of existing urban sociotechnical transport regimes cannot be underestimated (Shove 2012). This obduracy, or embeddedness, is evident in the multitude of heterogeneous, networked elements such as infrastructure, transport policies, design processes and longstanding cultural practices (Hommels 2005).

In Launceston's controversy the seemingly benign white lines had a capacity to challenge and destabilise the obduracy of the existing transport regime. Marked out along the margins of the roads and by no means continuous, their presence nevertheless carved into people's sensibilities every bit as much as they carved up their 'loved' road spaces (such that more rounds of consultation and communication were unlikely to mediate). While not unusual or sophisticated technology, the agency and power of the white lines to unsettle the city has been most evident in inducing all manner of contestation and changes in transport relations and behaviours as part of a reconfiguration of the urban sociotechnical fabric.

In some instances it is the lines themselves that have been reconfigured or even removed (perhaps to return). Indeed, the visitation of these infective agents did produce a 'white line fever' as discussed, yet in its wake the city's sociotechnical system has gained a possibly more resilient constitution.

Sociotechnical analysis of urban systems permits 'context-dependent and often conflictive appropriation processes' to be explored but also offer hope 'that we might begin to identify urban technological politics that break free from an intellectually and politically disabling technological pessimism' (Coutard and Guy 2007, 713). Our exploration of a sociotechnical system of transport undergoing smaller and larger acts of destabilisation brings the hope that, out of this state of flux, there can be a re-invention of cycling as an everyday practice for the people of Launceston.

Conclusions

This case study into the highly contested introduction of a network of on-road bike lanes offers valuable insights as more cities move to fit bike infrastructure into their existing road systems. It reveals the close-coupling of the social and technical aspects to cycling infrastructure provision, and an array of attendant problems and possibilities. The adoption of a sociotechnical perspective to move beyond potentially limiting binaries suggests benefits in its broadening the methodological toolkit of cycling research. In light of the findings, it is worth rethinking the place of on-road infrastructure including bike lanes as integral parts of a cycling sociotechnical ensemble.

Controversial introductions of urban infrastructure abound with examples calling into question the adequacy of consultation efforts. Our case was no exception, but by moving beyond questions of consultation, it shows how seemingly small interventions can trigger surprisingly divisive responses. The ensuing controversy can be productively 'hot' with a destabilised *status quo* allowing collective values to be tested and reoriented.

The hope from studies such as this one is that urban transport policy and planning practice will become more attentive to the possibilities offered by sociotechnical perspectives foregrounding the heterogeneous, interlinked and dynamic nature of such ensembles. Indeed for Launceston, which was so unsettled by the changes discussed above, on-going encounters with these white lines may help overcome resistances and construct new sociotechnical relationships in the urban landscapes of everyday transport.

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