Reclaiming lost ground:
Toward a research agenda for parking in Australian cities

Authors

Dr **Dorina Pojani**, The University of Queensland, d.pojani@uq.edu.au
Mr **Anthony Kimpton**, The University of Queensland, a.kimpton@uq.edu.au
Prof **Jonathan Corcoran**, The University of Queensland, jj.corcoran@uq.edu.au
Prof **Neil Sipe**, The University of Queensland, n.sipe@uq.edu.au

Abstract

Parking blankets a large portion of Australian cities. Yet until it becomes a point of contention, it is likely to remain largely unchallenged. Local planners and policy makers often find themselves confronted with the unenviable task of providing and managing parking space. This task is based on 20th century notions of private car ownership and mobility and coloured by a sense of entitlement to kerbside space by residential and business owners. However we argue that there is a growing need to both anticipate and plan for a future in which fewer Australians will gain driver's licences, vehicle-sharing arrangements (e.g., Uber, Lyft, and GoGet) will dominate the market, disruptive technologies (e.g., autonomous vehicles) will be introduced and urban space will be consolidated around transit nodes and corridors. The majority of existing scholarship examines these issues through the lens of car "mobility." However, we argue that parking and car-immobility is an important topic that warrants more attention. To this end, we propose an overarching research agenda to orientate scholarly endeavours to examine "car-immobility" across Australian cities.

Keywords Parking; Australia; research agenda; urban space repurposing.

Acknowledgement

Introduction

Substantial amounts of land across Australia's metropolitan areas are dedicated to accommodating motor vehicles. The City of Brisbane (inner city) provides 8,260 paid on-street spaces and the City of Melbourne 3,077 [1]. Importantly, not included in these counts are the unknown numbers of off-street spaces. In high-demand areas, parking spaces often cost far more than the motor vehicle itself (Erceg and Austroads 2007; Jakle and Sculle 2004), a point underscored with the sale of a single on-street parking in Sydney for $120,000 in 2015 (Bianchi 2015).

However, parking issues are not just an Australian problem. It has been estimated that a total of 30,000 km² of land is devoted to parking in Europe and 27,000 km² in the United States, much of which is located on highly-valued, centrally-located urban land (Inci 2015). Recent socio-economic and technological trends raise a suite of important questions concerning the future of such land currently dedicated for parking in metropolitan areas. These inter-related trends include (e.g., see Tucker 2015):

- *driving:* Fewer vehicle kilometres travelled and fewer young people getting a drivers' licence;

- *land-use policy and regulation:* Increasing levels of consolidation and higher densities in cities; promotion of Transit Oriented Development (TOD); replacing parking maximums with parking minimums; paid parking at suburban shopping centres; increasing demand for park 'n' rides at public transport interchanges;

- *vehicle-sharing arrangements:* Emergence of Uber, Lyft, GoGet, Flexicar, and Car Next Door); and,

- *vehicle technology:* The rise of autonomous and semi-autonomous vehicles.

To make cities more efficient and liveable, there is a growing need for Australian planners to engage with these emerging trends to develop new strategies that will more efficiently manage the allocation of space in metropolitan areas, which currently is dedicated to the accommodation of motor vehicles.

Notwithstanding the challenges and impacts of these trends for both individuals and urban planners, parking presents an ongoing problem for our cities. While on average, motor vehicles are parked 95 percent of the time, the majority of transport studies are focussed on examining vehicles only when they are in motion (Shoup 2006; 2011). Conventional transport planners deem parking as an essential part of the transport system, assuming that it provides substantial benefits to users (Erceg and Austroads 2007). In reality, generous parking allocations are

---

[1] Figures not to be used in a direct comparative manner given the difference in the size of the City of Melbourne (36 km² and houses 127,672 residents) to that of the City of Brisbane – defined as Brisbane Inner City (29.5 km² and houses 122,971 residents).

known to introduce inefficiencies into the system as well as adversely affect both transport and land-use. Yet the effects of parking on the transport system and land-use are often overlooked (Shoup 2011). A somewhat curious situation is that urban problems such as congestion and sprawl are prominent issues within academic scholarship and policy circles, but their connection to parking is seldom made (Ison and Mulley 2014).

The deficit in parking research and its role in land-use and transport planning underpins the impetus of this paper. To advance scholarly knowledge in this field, the authors' aim is to propose a research agenda for Australian cities. The agenda is situated in the context of an ongoing international movement to better manage parking and a growing recognition that the current levels of parking provision (particularly free or inexpensive on-street parking) are detrimental and come at a high social cost (Shoup 2011).

The remainder of the paper is structured as follows. The next section discusses some of the current strategies that are being employed internationally to manage parking before considering the parking problems present across Australian cities. We next draw on these domestic parking problems to identify a call for Australian parking research before stepping out a parking research agenda that is necessary to tackle this issue of rising importance.

International parking management strategies

Internationally, most strategies to manage parking have focused on the use of pricing mechanisms, where 'fair market prices' are charged for parking in order to reduce its demand (Shoup 2011). Some of the world's most progressive cities have adopted this paradigm to manage parking supply and demand (Litman 2006, 2014; Marsden 2006; Weinberger et al. 2010). For example, San Francisco, has established the SFpark program (first piloted in 2011), which uses smart pricing so that drivers can quickly find available spaces. To help achieve the appropriate level of parking availability, SFpark periodically adjusts meter and garage pricing up or down over the course of a day to align with demand. Evidence suggests that such demand-responsive pricing encourages drivers to park in underused areas and garages, reducing the pressure on overused locations (SFMTA 2015).

Other strategies to manage parking involve the introduction of new legal frameworks. California, for example, has adopted a law that requires employers to offer staff the option to choose cash in lieu of a parking subsidy. Firms that have complied with this requirement have seen the number of solo drivers fall and the number of car-poolers, transit riders, and cyclists increase substantially (Shoup 2011). New York and Brisbane are amongst many other cities to have introduced parking maximums (in addition to the more common parking minimums which have led to oversupply). Developers have begun to unbundle the provision of housing units and parking spaces. Some Japanese cities (such as Tokyo) have adopted a policy of requiring car purchasers to prove that they have an off-street location to park their car.

But the aforementioned "international parking movement" has yet to take root in Australian cities, despite the clear evidence that parking constitutes a major problem. To date, most evidence remains largely anecdotal wherein the majority of the current dialogue is played out in the media rather than centred within scholarly debates. A primary intent of this paper is to

ignite a research interest in this topic through which Australian parking scholarship can begin to contribute to debates within the international parking movement.

Parking problems in Australian cities

Both press coverage and empirical research point to the existence of parking problems in Australian cities and metropolitan regions. Free or under-priced parking is a classic example of the "commons" problem. When a resource is communally owned, the right of "first possession" means that anyone has a right to that resource once they capture it. Free on-street parking, as a "common good," is available to all drivers on a "first-come, first-served" basis (Epstein 2002). As parking demand increases, the kerb becomes crowded and it takes more time to find a vacant space. In Sydney's CBD, for example, the average cruising time is 6.5 minutes per car (Hensher and King 2001). While the space reserved for parking in many Australian cities has been estimated to cover between one third to a half of urban space, parking generally lacks this level of coverage within Australian planning policy (Brown 2015).

Furthermore, parking policies are rarely coordinated at the metropolitan scale. Instead they are decentralised and fragmented among multiple local governments (Young and Miles 2015). Occasions when outer-Melbourne local governments have charged similar parking rates to their inner-city counterparts to reduce their local parking demand evidence this lack of coordination. Such discrepancies have been found to exert detrimental effects because they have removed a key financial incentive for drivers considering public transport (Young and Currie 2006; Pourbaix 2009).

Conversely, metropolitan-scale projects also generate parking problems for local governments. For example, an audit of Melbourne park-and-ride lots suggested that parking demand exceeded parking supply by 50 percent (Hammer 2009). In a context where more than 40 percent of train riders reach their station by car (Plan Melbourne 2014), the overspill parking commonly spreads onto nearby streets, which are designed only to accommodate residential parking and the patrons of local businesses. Those park-and-ride commuters who are presumably unable to find onsite parking, exhaust local parking supply on most days for extended periods (Taylor and van Bemmel-Misrachi 2017).

The 2009 Victorian Planning Scheme was intended to centralise and coordinate metropolitan-scale development, and to tackle some of these parking problems. The Scheme included laying out minimum parking standards to ensure that residents had sufficient off-street parking such that they would not require on-street parking that was set aside for visitors. Despite these intentions, dispensation clauses within this Scheme that relax minimum parking requirements (e.g. Clause 52.06) are now the subject of more than 50 percent of all Victorian planning appeals (Taylor 2014). Frictions on this issue have increased since the adoption of the Melbourne 2030 planning strategy, which promotes Transit Orientated Development (TOD) by concentrating daily routine activities near public transport nodes.

Developers often appeal to relax minimum parking requirements near public transport nodes, arguing that the provision of parking imposes an undue financial burden on them, while new TOD residents are less likely to own cars. In response, existing nearby residents, who are

already frustrated by the scarcity of on-street parking near their homes, object that newcomers without off-street parking are likely to purchase cars despite their TOD-based location, and will then park on the streets thus overwhelming the local parking supply. Those living in inner city suburbs such as West End in Brisbane have also reported rising tensions over parking. Noticing that CBD commuters increasingly park on-street in the residential portions of inner cities, locals have called upon the local council to introduce central traffic area parking restrictions (*Brisbane Times* 2017). Frictions over parking have sometimes led to organised protests. Slogans on protest banners such as "*Fight the towers! Or kiss your car park goodbye*" highlight a further parking problem: a false perception among long-time residents that they own on-street parking spaces adjacent to their homes despite the basic fact that these are public commons (Taylor 2014).

This perception can create a "tragedy of the commons" scenario whereby some neighbours overexploit the commons at the expense of others. For instance, in Brisbane, local residents in the suburb of Balmoral recently reported a single householder keeping six cars, a caravan, a campervan, a boat, a tinny, and a Jet Ski all parked on the street curb across their nature strip. Impacts of this type not only absorb a disproportionate amount of on-street parking space but also block sight lines for oncoming traffic and force passing pedestrians to walk on the road (Lim 2014). Despite the way in which this particular resident was choosing to use this on-street space, the local council was powerless to intervene give that all the vehicles were less than 7.5 metres long and were therefore legally permitted to park on the commons indefinitely. In another recent Brisbane example, a household in the suburb of Wynnum appropriated an adjacent on-street parking space, which was being repurposed as a bikeway, by simply ensuring a car was continually parked in place to obstruct road workers. The council was similarly powerless to act until the bikeway line could be drawn (Elliot 2015). These so called 'road diets' that narrow the roadway to enable the insertion or enhancement of other infrastructure such as bike paths and footpaths (and networks thereof) have been adopted in Brisbane (*Brisbane Times* 2016) and Perth (Main Roads WA, 2016). Road diets have been principally motivated by a need to improve road safety (Pawlovich et al. 2006). Despite concerns that reductions in road capacity might increase commute times, road diets have been shown to create more active and liveable places (Gudz et al. 2016; Rosales 2006).

While minimum parking requirements in new developments may appease local communities, they can act to penalise both non-driving residents as well as the developers, since an off-street parking space, whether used or not, typically adds between 10 and 12.5 percent to the cost of a home (Litman 2006). This is significant in already unaffordable housing markets, such as those of Sydney and Melbourne. One enterprising townhouse owner in Melbourne applied to convert his three allocated, yet unused parking spaces, into a further three-story townhouse. Located in the suburb of East Ivanhoe where the median house price is AUD$1.7 million, this conversion of use may be a sound investment from the perspective of the local owner. However, the local council is concerned that approving this proposal will set a dangerous precedent. Other residents might start converting their off-street parking spaces into new residential developments, thus increasing the demand for on-street parking (Lucas 2017).

Similar to local residents, local business owners often perceive that they "own" on-street parking spaces adjacent to their premises or view those spaces as crucial to the vitality of their

business. Consequently, business owners have a strong preference for free or inexpensive on-street parking and resist any physical changes to this parking which may be proposed by local councils. For instance, business owners in Bundilla, Queensland recently appealed against the local council intending to transform angled parking to parallel parking on commercial strips in order to accommodate new bicycle lanes (Hill 2014). The business owners voiced fears that their business would not survive the road construction period and that reducing parking supply would reduce their customer base. Business owners in Toowoomba, Queensland have voiced similar concerns regarding the removal of parking on one roadside to accommodate new bicycle lanes (Hardwick 2014). In Melbourne, a business owner violently assaulted two local councillors at a council meeting for refusing to remove parking meters in the suburb of Yarraville (*ABC News* 2015).

A softer approach has recently been trialled in Brisbane, in the suburb of Toowong where parking lanes are temporarily converted to bicycle lanes (only during peak commuting hours). This experiment has been shown to benefit local cyclists but has been met with criticism by local café and restaurant owners, who claim that it has reduced levels of business since cyclists rarely stop for food and drink (Lill 2015). These perceptions, however, are not corroborated by data; most diners reach their destination on foot, and therefore the presence of a bicycle lane is inconsequential to cafés and restaurants (Yen 2017; Ninkovic et al. 2016; Yen et al. 2015). Notwithstanding these findings, local politicians often feel compelled to validate the concerns of their constituents. For example, a councillor in Melbourne recently argued that Sydney Street (a major destination in the city) would be transformed into a "thoroughfare" if parking lanes were to be replaced by bicycle lanes (Hastings 2017).

While much of the friction to date has been over the balance between on-street and off-street parking supply, commercial parking providers also exert an important and influential role. At the start of the decade, Brisbane, Sydney, and Melbourne each started to intensively remove on-street parking in order to improve traffic flow and encourage public transport commuting. Consequently, between 2011 and 2012 commercial parking providers opportunistically raised the average cost of CBD parking by 29 percent, 7 percent, and 4 percent, respectively (RACQ 2012). In Brisbane, parking costs have quadrupled between 2002 and 2012 due to some unique local circumstances. Compared to other cities, in Brisbane building approvals for new office space require fewer car spaces, and there are fewer competing commercial parking providers. Both these factors acted to limit supply thus leading to higher costs (RACQ 2012). In contrast, commercial providers charge considerably less in Darwin, Hobart, and Canberra where they must compete with more readily available on-street parking.

Typically, commercial parking providers charge flat rates throughout the day thus undermining the intended public purpose of supporting public transport ridership during the commute peaks (RACQ 2015). Due to the relatively high cost of parking in the Brisbane CBD, local car commuters increasingly park at inner-city commercial centres adjacent to train stations. In response, these commercial centres have begun to introduce countermeasures. For example, a major shopping centre in the suburb of Toowong (Toowong Shopping Centre) has introduced an increase in parking prices for stays longer than seven hours, and a large supermarket (Coles) in the suburb of Alderley provides free parking for the first two hours but then charges a fee of AUD$77 for times in excess of this (Clun 2017).

The importance of parking research in Australia

At first sight, parking may seem like a somewhat 'pedestrian' topic (pun intended). However, as seen through the previous anecdotal accounts, parking is arguably a key component of the urban transport and land-use system, both in Australia and worldwide. Despite the scale of problems that are generated as a consequence of poor parking allocation and management, parking remains an under-researched topic. While most prior research has tackled car "mobility," new research must turn to its antonym, namely car "immobility." By better understanding the dynamics of parking, new research is likely to confer significant economic, social, and environmental benefits to Australian cities, which are currently under rising pressure to achieve transport sustainability targets.

It remains crucial for Australian cities to embark on integrated analyses that unveil the role of parking within transport and land-use system. Previous studies and plans have tended to view parking in isolation and in doing so have arguably relegated it to an inferior place in transportation research and policy. It will be important that future research projects and urban or regional plans examine parking in conjunction with the social, economic, technological, and political trends that are, and will be, impacting future parking requirements and then develop an understanding of how future parking scenarios will influence metropolitan transport and land-use.

Decisions that concern parking reforms cannot be made without solid evidence on parking use, as well as on the factors that influence such use. Presently, this evidence base is scant and highly fragmented. New research must begin to assemble this evidence alongside developing new methods that will allow cities and metropolitan regions to: (a) better understand the cause and effect that parking exerts on transport and land-use; (b) develop policies and guidelines to better manage parking and the space it uses for improved sustainability outcomes; and, (c) incorporate future trends on parking into medium-to-long term planning for transport and land-use.

Parking research is significant and timely in that it would directly respond to a major challenge facing Australia's transport and land-use planners: 1) how to best use the space that is currently set aside to accommodate private motor vehicles; and 2) how to best repurpose this space if future parking requirements are reduced by the aforementioned trends in society, car-sharing services, vehicle technology and business models (e.g., paid parking at suburban shopping centres and selling units without parking). In this regard, this parking research is pre-emptive. More specifically, parking research will provide the necessary input such that planners and developers are better able to understand how parking policy can be used as a lever to achieve other urban sustainability objectives – including reclaiming lost ground.

Parking research has the potential to make a significant contribution to theory in both the fields of urban and transport planning by unpacking the complex interplay between parking, land-use, and travel behaviour. Furthermore, the research closely aligns with the urban sustainability agendas that most Australian cities are currently promoting, and has direct relevance to one of the goals identified in Australia's National Research Priorities, namely "Boosting Australian Transportation." Parking research would assist cities in ensuring that their road transport and transport systems are efficient, secure, and reliable. As stated in

Australia's National Research Priorities, this is essential to increasing Australia's access to domestic and international markets, for economic growth, job creation, and for everyday quality of life.

Towards a research agenda for parking in Australian cities

To advance scientific knowledge in parking, we identify four aims that future research should collectively attempt to address:

- Understand how driving trends, planning initiatives and regulation, and car sharing affect the amount, price and location of parking and to determine the extent to which these vary from city to city.

- Understand how the amount, price and location of parking affects travel behaviour and land-use and the extent to which there are variations across an urban area and from city to city.

- Drawing on an improved understanding of the parking/land-use/travel behaviour nexus, develop future scenarios that evaluate the impact of new land-use and transport policies. One example might be to reveal how the uptake of autonomous vehicles would impact parking, travel behaviour, and land-use.

- Develop evidence-based parking guidelines for land-use and transport planning. If planners want to encourage less parking, how do they achieve this goal? If planners want to repurpose existing parking how do they achieve this? What can planners do to make the transition easier from parking to alternate uses?

We propose a conceptual framework to guide parking research (Figure 1). As the diagram illustrates, we do not view parking as a standalone element of the transportation system but rather as an integral component of policy, technology, economics, society, and even urban design. From this conceptual framework, we next develop a more detailed inventory of proposed academic research tasks. Given the magnitude of these tasks, the assumption is that most research will initially proceed on a case study basis before sufficient momentum is achieved to permit broader city-wide and ultimately cross metropolitan comparative studies to be undertaken.

Task 1. Inventory existing on-street and off-street parking that exist for the case study area(s). This is likely to be a major data collection effort as many cities have a surprisingly poor understanding of parking availability within their boundaries. A number of existing datasets which can be used to cross reference local council parking inventories to provide a more reliable estimate of the number of parking spaces include: the motor vehicle inventory

developed by the Australian Bureau of Statistics (ABS) in 2013; household travel surveys from the case study regions; and basic demographic data from the ABS.

Task 2. Investigate the impact of social trends on the amount, location and price of parking in the case study area(s). Suggested social trends to be examined include: (a) less driving as evidenced by a reduction in vehicle kilometres travelled; (b) fewer youth obtaining a drivers' license; (c) the emergence of various forms of carsharing including Uber, GoGet, Flexicar, and Car Next Door; (d) paid parking at suburban shopping centres; and (e) the unbundling of parking from the sale of housing units. To complete this task, primary data collection will likely be necessary (e.g., surveying shopping centre and residential developers) in combination with drawing on existing secondary data from ABS and databases administered by other local councils and state governments.

Task 3. Investigate the impact of planning regulations and policies on the amount, location, and pricing of parking in the case study area(s). Suggested policies and regulations to be examined include: (a) initiatives to increase urban consolidation and development around public transport nodes (TODs); (b) replacement of parking minimums with maximums; and (c) provision of park 'n' ride facilities at key public transport stations. The main activity for this task would involve a review of exiting planning regulations and policies in the case study area(s).

Task 4. Examine the impact of the amount, location and price of parking on transport in the case study area(s) and identify opportunities for the reallocation of kerbside road space (for cycling paths and/or footpaths). Transport aspects to be examined include: (a) travel behaviour; (b) mobility; and (c) motor vehicle ownership. This task would likely require fieldwork in the form of interviews and focus groups with residents.

Task 5. Examine the impact of the amount, location and price of parking on land-use in the case study area(s). Land-use aspects to be examined include: (a) density; (b) land-use mix; and (c) accessibility. This task would also require primary data collection in the form of interviews and focus groups with developers, business owners, and residents to gauge their perceptions about the relationship between parking and land-use and to unpack attitudes of entitlement to kerbside space.

Task 6. Once data are available for a number of Australian cities, compare the results of the tasks above looking for similarities and differences with respect to how social trends and planning policies affect parking in different places. Conversely, similarities and differences could be discerned with respect to how the amount, location, and price of parking impacts on transport and land-use. At this point, generalisations could be made and ultimately a model could be developed.

Task 7. Based on an improved understanding deriving from Task 6 above, generate future scenarios based on an improved understanding of the factors affecting parking and, conversely, of the effect of parking on transport and land-use. The future scenarios would examine both short-term (within the next five years) as well as longer term (ten to twenty years) futures. The scenarios can include some emerging issues such as autonomous vehicles that might have dramatic impacts on transport, land-use, and parking. (The impact on parking

is based on one school of thought suggesting that, due to insurance and liability issues, most autonomous vehicles will be owned by mobility services rather than individuals. If this were the case, then there would be a need for fewer motor vehicles as most would be "in motion" rather than parked most of the time.) While such a future is speculative at this point, understanding its impact on parking requirements and future land-use/transport is what planners are trained to do, but they rarely get the opportunity.

Task 8. Develop a toolkit, preferably web-based, which metropolitan areas could employ to conduct their own analysis of current and future parking needs. Ideally, the toolkit should help provide a better understanding of links between parking, transport, and land-use, but it would also incorporate a scenario generating option to examine future needs in light of the trends noted earlier.

Task 9. Develop evidence-based policy recommendations that allow parking considerations to be fully integrated with land-use and transport policies with a view to short-term issues and as well as long-term futures.

Conclusion

Parking and the (re)allocation of kerbside space is an international issue of rising importance. Worldwide, the amount of land dedicated to the accommodation of motor vehicles is substantial and must now be carefully reconsidered in the context of progressing towards a sustainable urban future. Cities need to work out the best way to reclaim and repurpose parking space in a manner that enhances efficiencies and liveability whilst minimising social and economic disruption. Policy, planning, and urban design initiatives, such as parklets, road diets, and eventually the transition to no kerbside parking, can be effectively rolled out if planners and policy makers have an adequate understanding of the parking - land-use - travel behaviour nexus.

Research that helps this understanding should be high on the agenda of governments at all levels: local, state, and federal. The aim of this paper was to shed light on the issue of parking in Australian cities. We charted an agenda to orientate contemporary Australian research on parking, in the hope that it will act as a catalyst to inspire, guide, and encourage those interested in this field to produce comparable research across our cities.

References

ABC News. 2015. "Yarraville parking meters: Punches thrown after council meeting becomes violent." Available at: www.abc.net.au/news/2015-11-18/punches-thrown-in-dispute-over-yarraville-parking-meters/6950128. Last accessed 25 May 2017.

Australian Bureau of Statistics. 2013. "Survey of motor vehicle use, Australia, 12 months ended 30 June 2012." Report, available at: www.abs.gov.au/ausstats/abs@.nsf/mf/9208.0. Last accessed 15 September 2015.

Bianchi, C. 2015. "Kirribilli car spot sells for $120,000 at auction." *Domain*, 13 June. Available at: www.domain.com.au/news/kirribilli-car-spot-sells-for-120000-at-auction-20150613-ghn50z. Last accessed 6 October 2015.

Brisbane Times. 2016. "Cycling in Brisbane: Cycle safety plan under review halfway through lifespan." Available at: http://www.brisbanetimes.com.au/queensland/cycling-in-brisbane-cycle-safety-plan-under-review-halfway-through-lifespan-20160516-gowj9c.html. Last accessed 27 August 2017.

Brisbane Times. 2017. "Inner-city commuter parking threatened by two-hour limit." Available at: http://www.brisbanetimes.com.au/queensland/innercity-commuter-parking-threatened-by-twohour-parking-limit-20170823-gy2ktv.html. Last accessed 27 August 2017.

Brown, S. 2015. "Car parking perceptions and realities to be investigated by RMIT University survey." ABC News. Available at: www.abc.net.au/news/2015-12-10/rmit-university-car-parking-survey/7016712. Last accessed 25 May 2017.

Clun, R. 2017. "Why the new Coles at Alderley charges $77 for parking longer than two hours." *Brisbane Times*.

Main Roads, WA. 2016. Cycling Guidelines for Western Australia. Available at: https://www.mainroads.wa.gov.au/Documents/DRAFT%20for%20comment%20ER%20latm%20cycling%20guidelines.RCN-D16%5E23704574.PDF. Last accessed 27 August 2017.

Elliot, E. 2015. "Pair put the brakes on yellow line." *Wynnum Herald*.

Epstein, R. 2002. "The allocation of the commons: Parking on public roads." *The Journal of Legal Studies* 31(S2):S515-S544.

Erceg, J. 2007. "Guide to traffic management." Report, Austroads, Sydney.

Gudz, E., Fang, K., & Handy, S. 2016. "When a diet prompts a gain: impact of a road diet on bicycling in Davis, California". *Transportation Research Record: Journal of the Transportation Research Board*, (2587), 61-67.

Hamer, P. 2009. "Analysing the effectiveness of park and ride as a generator of public transport mode shift." Paper presented at 32nd Australian Transport Research Forum (ARTF), Auckland, New Zealand.

Hardwick, P. 2014. "New bike lane set to serve up pain for business." *The Chronicle*.

Hastings, E. 2017. "Plan to cut out street parking on Sydney Rd to make way for separate bike lanes." Available at: www.heraldsun.com.au/leader/north-west/plan-to-cut-out-street-parking-on-sydney-rd-to-make-way-for-separate-bike-lanes/news-story/b5fab2afa790e2cd74d4e3cc50ed5843?nk=f7c47b77dd143749946df0189db71069-1494462328. Last accessed 25 May 2017.

Hensher, D. & King, J. 2001. "Parking demand and responsiveness to supply, pricing and location in the Sydney Central Business District." *Transportation Research Part A: Policy and Practice* 35(3):177-196.

Hill, J. 2014. "Bikeway to rob parking spots." *Sunshine Coast Daily*.

Inci, E. 2015. "A review of the economics of parking." *Economics of Transportation* 4(2015):50-63.

Ison, S. & Mulley, C. (eds.) 2014. *Parking: Issues and Policies*. Bingley, U.K.: Emerald Group Publishing.

Jakle, J. & Sculle, K. 2004. *Lots of Parking: Land-use in a Car Culture*. Charlottesville, VI: University of Virginia Press.

Lill, J. 2015. "Bike trial triggers chain reaction." *Westside News*.

Lim, N. 2014. "Clash over caravans: Call for laws to restrict parking." South East Advertiser.

Litman, T. 2006. "Parking management: Strategies, evaluation and planning." Report, Victoria Transport Policy Institute, Victoria, BC.

Litman, T. 2014. "Parking requirement impacts on housing affordability." Report, Victoria Transport Policy Institute, Victoria, BC.

Lucas, C. 2017. "Owner of three car spaces in East Ivanhoe flats wants to build three-level house." The Age. http://www.theage.com.au/victoria/owner-of-three-car-spaces-in-east-ivanhoe-flats-wants-to-build-threelevel-house-20170402-gvc46a.html. Last accessed 25 May 2017.

Marsden, G. 2006. "The evidence base for parking policies: A review." *Transport Policy* 13(6):447-457.

News.com.au. 2014. "Look down to maximise your homes living space." Available at: www.news.com.au/finance/real-estate/look-down-to-maximise-your-homes-living-space/news-story/6da97ed50d20116de94e3307a7f37933 Last accessed 1 June 2017.

Ninkovic, M., Burke, M., & Yen, B. 2016. "Road-space allocation and value of parking in priority bicycle corridors: Kedron Brook Road, in Brisbane, Queensland, Australia." Cities Research Centre, TAP Project Report 2016-01.

Pawlovich, M., Li, W., Carriquiry, A., & Welch, T. 2006. "Iowa's experience with road diet measures: use of Bayesian approach to assess impacts on crash frequencies and crash rates". *Transportation Research Record: Journal of the Transportation Research Board*, (1953), 163-171.

Pourbaix, J. 2005. "Transport policy: take a lesson from London." *Urban Transit* December: 472-473.

Royal Automobile Club of Queensland. 2012. "Brisbane CBD Parking Prices compared with other Australian Capital Cities." Report.

Rosales, J. 2006. "*Road diet handbook: Setting trends for liveable streets*". New York: Parsons Brinckerhoff.

Royal Automobile Club of Queensland. 2015. "Brisbane, Sydney and Melbourne CBD Off-street Casual Parking Prices." Report.

San Francisco Municipal Transportation Agency. 2015. "SFpark pilot project." Report, available at: sfpark.org/about-the-project Last accessed 24 June 2015.

Shoup, D. 2006. "Cruising for parking." *Transport Policy* 13:479-486.

Shoup, D. 2011. *The High Cost of Free Parking*. Chicago, Il: Planner's Press.

Taylor, E. 2014. "Fight the towers! Or kiss your car park goodbye: How often do residents assert car parking rights in Melbourne planning appeals?" *Planning Theory & Practice* 15 (3):328-348.

Taylor, E. & van Bemmel-Misrachi, R. 2017. "The elephant in the scheme: Planning for and around car parking in Melbourne, 1929–2016." *Land Use Policy* 60:287-297.

Tucker, H. 2015. "Volvo will be the first car company with a driverless car on Aussie roads." *News* 22 July. Available at: www.news.com.au/technology/innovation/volvo-will-be-the-first-car-company-with-a-driverless-car-on-aussie-roads/story-fnjwucvh-1227450866566. Last accessed 6 October 2015.

Weinberger, R., John, K., & Rufo, M. 2010. "U.S. parking policies: An overview of management strategies." Report, Institute for Transportation and Development Policy, New York.

Yen, B. 2017. "Parking isn't as important for restaurants as the owners think it is." *The Conversation.* Available at: theconversation.com/parking-isnt-as-important-for-restaurants-as-the-owners-think-it-is-74750. Last accessed 25 May 2017.

Yen, B., Burke, M., Tseng, M. C., Ghafoor, M., Mulley, C., & Moutou, C. 2015. "Do restaurant precincts need more parking? Differences in business perceptions and customer travel behaviour in Brisbane, Queensland, Australia." Paper presented at 37th Australasian Transport Research Forum (ATRF), Sydney, Australia, 30 Sept - 2 Oct.

Young, W., & Currie, G. 2006. "Parking and urban development." 22nd ARRB Conference, Canberra.

Young, W., & Ferres Miles, C. 2015. "A spatial study of parking policy and usage in Melbourne, Australia." *Case Studies on Transport Policy* 3(1):23-32.