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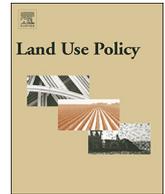
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Special issue on global transitions of urban mobility and land use

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1. Introduction

Worldwide, urban areas dedicate huge amounts of land to accommodate vehicles, both moving and parked. While parking has its benefits for motorists, it also has deleterious effects on urban liveability and environment. Despite growing interest in parking issues, including the recent publication of *Parking: An International Perspective* (Pojani et al., 2020), this remains an under-researched field. For example, the relationship between parking and mode choice, particularly car use, is not systematically examined, and certainly not with large datasets. While the planning community is aware that conventional minimum parking policies have potential impacts on housing, land use, and transport patterns, there is little to no evidence of who uses residential on-street parking. Nor is there clear evidence of the extent to which off-street parking, or requirements for it, actually offset on-street parking use.

The existing evidence is also limited in terms of decision-making by developers regarding off-street parking supply, and the consequences of off-street parking standards. The literature does not systematically quantify cruising for parking despite the fact that this is typically seen as a major policy problem. Moreover, most studies look for cruising where it is most likely to occur, leading to selection bias. The literature on Park and Ride (P&R) is fragmented, although this is a commonplace strategy adopted for the purpose of persuading motorists to switch to public transport before entering the inner city. Studies to date fundamentally assume that P&R facilities convert motorists into park-and-riders – although, in reality, park-and-riders may be a self-selected group.

Meanwhile, innovation in parking is happening quietly on a wide variety of fronts, including technology, public policy, and design. With regard to driverless cars, there is a presumption in the literature that this technology will create lots of space at the curb and solve some of the current parking problems. Debates tend to focus on the promise of green, people-friendly, public spaces that will be freed-up by the demise of the car from the urban environment. This perspective overlooks peak-time traffic conditions, collection and drop-off space requirements, and the transition period where both automated and non-

automated vehicles operate. It also offers little insight into the ways in which new services create the conditions for them to co-opt the curb. The parking reduction trajectory is critical.

Given these research gaps, the aim of this Special Issue is to place a much-needed spotlight on parking. The eleven articles, specially commissioned by the editors of the Special Issue, draw on a select set of international case studies, including Australia, the United Kingdom and the United States. The articles are classified under three broad themes: (1) *parking behaviour*; (2) *parking policy*; and (3) *parking futures*. The authors employ a variety of methods, both quantitative and qualitative. Quantitative methods range from descriptive statistics of Census data (population and buildings) to complex models and simulations, often with a spatial component; qualitative methods include observation and interpretation. A brief overview of the key findings follows.

2. Key findings

Within the *parking behaviour* theme, Millard-Ball et al. provide evidence that cruising in San Francisco is nowhere near as large a problem as previously thought. Cruising is, in fact, minimal because, where parking is perceived to be scarce, drivers are likely to stop short of their destination and take the first available space. Scarce parking leads to more walking rather than more cruising. Kimpton et al. question the appeal, success, and continuing development of P&R facilities in Brisbane – in particular the expansion of existing lots. The study refutes the theory that these facilities serve primarily car-dependent residents without immediate access to public transport. On the contrary, park-and-riders tend to be located closer to P&R facilities, thus exhausting the parking supply intended for others. However, new P&R facilities purposely located to intercept motorists on their established routes can persuade them to take public transit. One study confirms existing theory: Manville and Pinski show that, in the US, bundled parking¹ is associated with less transit use and more driving.

With regard to *parking policy*, Taylor's analysis reveals that in Melbourne, where zoning traditions privilege lower-density housing, the majority of on-street residential parking use is by residents of

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¹ Referring to the situation where parking spaces are directly associated with a given property.

detached housing. By contrast, residents of new flats and apartments account for little on-street parking use, are excluded from on-street permits, and have closely controlled off-street parking spaces. Most users of on-street parking have sufficient off-street parking, but half use garage space for storage or housing purposes. The findings unsettle conventional policy assumptions and throw further doubt both on the broader capability of conventional, predict-and-provide parking policies. **Gabbe et al.**'s study set in Seattle examines what happens after minimum parking standards are eased or eliminated in a city, thus extending prior research. The results show that minimum parking requirements constrain developers, though not uniformly. Reducing requirements leads to less parking provision, and presumably cost savings for developers and lower housing prices for consumers. In a theoretical contribution from the US, **Marusek** muses on the visual governance of space and place, as well as the legitimacy and belonging represented by the lines painted on asphalt which create parking bays.

Looking into diverse *parking futures*, **Spurling** predicts that, rather than parking conveniently disappearing from cities, it is instead likely to change in various respects. Without accounting for these aspects of the future, plans for sustainable, smart cities could fall into a similar trap as in historical versions of automobility and parking, that is, the trap of overlooking dormant vehicles. **Marsden et al.** consider new technologies which are all competing for access to the curb in British and Australian cities. As the curb is becoming more contested and congested rather than less, a future vision that fits the area will need to be negotiated. This cannot be left to technology providers of smart algorithms. In a similar vein, **Zhang and Wang** forecast the parking demand-reduction trajectory in the era of driverless cars and shared mobility services. They also predict substantial growth in the competition to curbside parking access for loading and unloading passengers, and argue that 'sharing' rather than 'automation' is the key to reducing parking demand. Expanding on this, **Rosenblum et al.** identify and outline five developments and the pertinent technologies helping to catalyze change in cities: unbundling parking costs, reducing parking minimums, pricing and allocating curb space dynamically, designing hybrid parking structures, and preparing for the autonomous era and MaaS (mobility as a service). These trends – in some cases well-developed and in other cases still nascent – indicate a growing awareness that the problem is not one of parking shortages, but rather one of mismanagement of parking resources. Finally, **González-González et al.**'s contribution provides a list of potential policy measures and packages to guide the introduction of autonomous vehicles in cities, paying special attention to the reduction of parking demand.

Based on these findings, a set of recommendations for researchers and practitioners is compiled below.

3. Recommendations for research and practice

This Special Issue's contributions notwithstanding, many gaps in the scholarly knowledge of parking remain. More and better ways to investigate parking issues are needed. For example, cross-comparative work is needed to reconcile the public value placed on creating better places with the private value that can be extracted from movement and curbside access, potentially informing the development of a decision making tool(kit) to assist in identifying desirable futures for public spaces. Moreover, there is a need to test approaches to better manage parking supply that respond to evolving mobility needs as well as diversifying parking preferences. Closer attention should be paid to how on-street parking is allocated and priced; and to forms of unbundling of parking from housing markets. With regard to off-street parking, intercept surveys of drivers or car licence plates in parking lots should be conducted to quantify park-and-ride behaviour. Emerging forms of shared parking or secondary parking markets should be explored by directly monitoring parking use or collecting self-reported data. This would also elucidate the interaction between residential parking supply and other nearby parking. The parking effect of new technologies, such as electric vehicles and bike-sharing (not covered in this SI), should be studied more in detail.

Meanwhile, policy makers should focus less on the mitigation of cruising, and more on the correct location of P&R facilities, the selective restriction of private vehicular access to urban environments, and the introduction of pick-up/drop-off zones for shared mobility services. Overall, individual parking requirements should be lowered, particularly if new developments are focused in neighbourhoods with good walkability and transit options. Practitioners need to keep in mind that decisions which are being taken at the early stages of introducing smart mobility innovations can hardwire ways of working into streets which become difficult to undo. It is therefore important to examine the likely long-term impacts even if the impacts from small pilot systems seem inconsequential.

To conclude, this Special Issue provides a point of reference by showcasing the latest international research on parking. The Guest Editors would like thank each of the contributing authors, the referees, and the editorial team at Land Use Policy.

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