

The inevitability of automobility: How private car use is perpetuated in a greenfield housing estate

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Abstract: Ongoing advances in technologies of connectivity have strengthened our capacity to envision urban environments less dominated by private car use. Yet many cities remain attached to, and defined by, the automobile. In challenging this status quo, we must understand the complex and varied ways private car use is reinforced in different urban environments. This paper provides such an understanding in the context of a low-density, and currently car-dependent, city. It presents a detailed analysis of the system of automobility to demonstrate the way private-car use is unintentionally perpetuated through contemporary practices of planning, developing and inhabiting cities. A newly constructed suburb in Sydney, Australia, provides the case for analysis. The suburb—Oran Park—is a master-planned estate intentionally designed to encourage alternative transport modes that is rendered ostensibly car-dependent as a result of a confluence of historical and contemporary structural and practical influences. The paper combines a detailed examination of the planning, transport and land-use context of the suburb with survey data from 300 of its residents. The paper’s novel contribution is to analyze these data sources using a social practice approach. The analysis lays bare the inevitability of automobility’s reproduction in the estate—describing the litany of elements that are both infrastructural and cultural and that, in orchestration, reproduce private car use. These elements are deconstructed to inform future challenges to the hegemony of the private car.

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1 Introduction

This paper contributes to a body of literature with a normative goal to push our increasingly urbanized societies beyond private car dependency and towards more sustainable and healthier ways of travelling. This position is based on the fact that the demands of climate change and the personal pleas of our bodies and communities require an urgent reduction in kilometers travelled by private car. Achieving this shift necessitates a deeper understanding of the complex and varied ways automobility is reinforced in different urban contexts. This paper provides such an understanding in the context of a low-density, and currently car dependent city.

The aim of the paper is to present a detailed analysis of the system of automobility to demonstrate the way private-car use is unintentionally perpetuated through contemporary practices of planning, developing and inhabiting cities. The paper’s novel contribution is that it uses tools and concepts from

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social practice theory (Reckwitz, 2002; Shove et. al, 2012). A newly constructed suburb in Sydney, Australia, provides the case for analysis. The suburb—Oran Park—is a master-planned estate intentionally designed to encourage alternative transport modes that is rendered ostensibly car-dependent as a result of a confluence of historical and contemporary structural and cultural influences. As such it provides a telling case from which to evaluate challenges to private car use. The paper combines a detailed examination of the planning, transport and land-use context of the suburb and the city with survey data from 300 residents. These data sources are analyzed using a social practice approach to lay bare the inevitability of automobility's reproduction in the housing estate—a story which can then be deconstructed and therefore avoided in future attempts to challenge the car and encourage change.

The next section of the paper introduces the conceptual background to the analysis by visiting the concept of automobility and the approaches applied in social practice theory. This is followed by a detailed review of the case study site, and an analysis of the transport practices of its newly arrived residents.

2 Conceptual background: Automobility and theories of practice

The way we travel, including the dominance of the private car in transport practices, has been explored and explained by multiple theories using an array of empirical approaches. Most often found in scholarship within sociology and cultural studies, automobility is a term used to describe the complex, self-reinforcing socio-material system that underpins transport practices, with a particular emphasis on the pivotal role and dominance of the private car. In the automobility paradigm, the private car fronts an autopoietic (or self-sustaining) regime that determines not only the way we travel and the spaces in which we travel, but also “the formation of gendered subjectivities, familial and social networks, spatially segregated neighborhoods, national images and aspirations to modernity and global relations ranging from transnational migration to terrorism and oil wars” (Sheller & Urry, 2006, p. 209).

The system of automobility is evident in automobile societies in different ways, and social scientists from a series of epistemologies have used the conceptualization of automobility as a system to demonstrate and challenge the dominance of the private car. An example is the well cited socio-technical system proposed by Geels (2012) and Geels et al. (2012). Here, automobility exhibits itself an interdependent and coordinated set of structures. The system includes technology, infrastructure, land-use planning, user practices, cultural meanings, politics, and technical and scientific knowledge. The car is replicated, therefore, by these structures, which are cemented and reinforcing. Other scholars have concentrated specifically on the politics of automobility, infusing the systems approach by emphasizing the way automobility represents a regime of power that has become relatively unquestioned and (almost) politically, economically and culturally subliminal (Mattioli et al., 2020). Automobility, therefore, is replicated by assumption, and accepted as a truth by those with the power to influence its command (for example, Böhm et al., 2006; Hopkins & Stephenson, 2016; Legacy et al., 2017; Paterson, 2007; Walks, 2015). Taking the subjectivity of automobility's dominance one step further have been a series of compelling reflections on the role of the individual agent in perpetuating automobility (for example, Freudendal-Pedersen et al., 2016; Jensen, et al., 2014; Kent, 2014a; Sheller, 2004; Sheller, 2012; Sheller & Urry, 2006). These perspectives draw from recognition that the most powerful and enduring systems must also “appeal to our intuitions and instincts, to our values and desires, as well as the possibilities inherent in the social world we inhabit” (Harvey, 2007, 5). Essentially, while automobility is reproduced by a series of structures (including patterns of land use) that determine the extent of the opportunities it affords, fundamental to its perpetuation is the way private cars satisfy very human desires for flexibility, reliability, comfort, privacy and autonomy, when compared to other available transport options (Kent, 2014b). These perspectives emphasize the way cars determine the very basic rhythms of everyday life,

as well as punctuate the key personal moments and aspirations, for a substantial collective of people (Edensor, 2004).

Tracing the imprints of the automobility system on its more personal expressions, and vice versa, highlights a common tension in social studies: the interplay between structure and agency, epitomized by the theory of structuration (Giddens, 1984). Automobility, and particularly its autopoietic nature, lends itself to conceptual tools that reflect a structurationist approach—it is reinforced by wider structures of, for example, economy, urban planning and politics, yet is also entirely dependent on the experiences and appreciations of real, everyday, people. With its focus on practices, social practice theory provides such tools (Reckwitz, 2002; Schatzki et al., 2001; Shove et al., 2012).

Theories of practice have become increasingly popular in scholarship on sustainable transport and have been used to explore ways of moving beyond automobility (Birtchnell, 2012; Büscher et al., 2016; Watson, 2012). Whilst there remains debate about the precise character of practice theory and its value (see Kent, 2021, for a review of debates relevant to transport), it is relatively settled that a practice lens can shed considerable light onto the persistence and fracturing of automobility (Meinherz & Binder, 2020; Shove et al., 2012). This is, in part, because practice theory is particularly critical of the view that behaviors are the result of either individual decision-making processes or overbearing and unavoidable forces of structure (Urry, 2012, p. 533; Welch, 2016). Instead, routine human action, like driving a car, is understood as a collective of social practices influenced as much by the wider environment as it is by personal preferences or individual processes of deliberation (Hitchings, 2011; Hui et al., 2016). Driving a car to do the shopping, for example, is the product not only of the location of shops relative to homes but also of personal preferences for flexibility, comfort and convenience (Kent, 2014b). These things interact to define each other, with the outcome being private car use. Watson (2012) has argued that this way of thinking usefully moves transport scholarship beyond the attitudinal focus of psycho-social approaches characterized by increasingly complex models of individual behavior change. Similarly, a focus on practice enables consideration of influences beyond external forces, including structures of technological change, political economy and built form (Urry, 2012).

The social practice approach uses a scaffold of three key ideas:

1. the linkage of practice **elements**;
2. the **bundling** together of practices; and
3. the **recruitment** or **defection** of practitioners to or from a practice (adapted from McLaren, 2018).

2.1 Elements

In social practice theory, practices—the things people do—are made up of elements. Elements are constituent parts of a practice which, through their interdependencies, make the practice what it is. It is this focus on the interdependencies between elements of practice that enables a social practice approach to transcend the dichotomy of structure and agency, replacing the dualism of what and who with an emphasis on practical happenings, or how. The trajectories of elements determine the endurance of a practice as it extends beyond individual instances of action and towards a practice sustained over time (Shove & Walker, 2007; Birtchnell, 2012).

Elements have been listed in various formats throughout the literature and the ability to tailor elemental structures and their labels to context is a generally accepted and appreciated characteristic of social practice theory. For Reckwitz (2002, p. 249), for example, they include “bodily movements,” “objects,” “ways of knowing” and “states of emotion.” For Shove and Pantzar (2005, p. 58), they are “skills,” “images” and “materials” and for Shove et al. (2012, 8) they are “competences,” “meanings” and “materials.” Common to most elemental schemas is the incorporation of material structures, cul-

tural interpretations and individual capacities. In this paper, the terms used for elements of practice are “structures,” “assumptions” and “symbols” (a detailed description of these elements is provided below in section 4). In using practice theory to understand automobility, therefore, one must examine not only the practice but also its elements. Driving is practiced, for example, because an individual’s hand has ignited the car, the road rules determining which side of the road is used have been legislated and engineered into streets, societal expectations of access to autonomous travel have been established, and a community of bodies has become accustomed to the comfort of travelling by private car. These details are expressions of elements—they are the evidentiary proof that the practice exists.

2.2 Bundling

A useful feature of a social practice approach is its ability to pinpoint for examination peripheral practices that may, at first, seem unrelated to a practice under examination. The factors influencing, for example, where we live and how we work, are linked to transport practices because they shape the travel we will need to do. Referencing Latour’s Actor Network theory (Law, 1994), this mess of interconnectedness is referred to as a bundle of practice (Hargreaves, 2011, p. 87). For example, for some people, the practice of driving to work cannot be naturally extracted from the practice of working as a corporate professional since their profession depends upon on-call availability for private phone calls on the way to work and the ability to be flexibly responsive to client demands for on-site attention during the day. Similarly, for some, the practice of driving a child to Saturday morning sport cannot be naturally extracted from the practice of responsible parenting, since they rely on the car to navigate the child’s multiple commitments timetabled around a careful balance of providing opportunity. In this sense, driving a car is a working component of a lifestyle that has expressions that are seemingly unrelated to transport.

These examples highlight two life projects that, for many, define identities, roles and priorities—working and parenting. Social practice theory recognizes that not all practices are equal and entities of practice that regularly take precedence in prioritization of both time and energy are labelled “dominant projects” (Shove et al., 2012, p. 78). Any practice bundled to a dominant project is likely to occupy a position of particular fixity, both because of the temporal regularity with which it is performed, and the weight of responsibility endowed on it being successfully executed (Hui et al., 2016).

2.3 Recruitment

The final idea underpinning a social practice approach is recruitment. For a practice to endure, it needs to recruit a cohort of practitioners. More importantly for a dominant regime such as automobility, for a practice to recede, it must be abandoned by practitioners. The emphasis on recruitment places the practitioner—the person doing the practice—at the center of analysis, allowing for the development of richly detailed accounts of routine, assumptions and upheaval. Conceptualizing automobility as an extraordinarily successful process of recruitment (or failed defection) also places an emphasis on the need for alternative mobility modes to compete—spatially, skillfully and temporally—for the awareness and allegiance of a relatively committed cohort of people currently driving cars.

Section 4 uses tools from social practice theory to demonstrate automobility, displaying how the private car continues to punctuate planning and practice in a greenfield suburban housing estate in Sydney, Australia. Prior to this, Section 3 describes the case study site.

3 Case study introduction

This section seeks to reveal how automobility has been (unintentionally) perpetuated in the development of Oran Park—a new suburb of Sydney. The review first provides a broad synopsis of the urban planning, housing, employment and transport context. This wider context is then complemented by an analysis of the actual transport practices in Oran Park.

3.1 Planning Oran Park, Sydney, Australia

With a population of 5.4 million, Greater Sydney is the largest metropolis in Australia and one of the fastest-growing regions in the Western world (Greater Sydney Commission, 2017). Strategic planning in Sydney has long advocated for higher density residential development in existing urban areas as the key to satisfying the increasing demand for housing associated with ongoing population growth. This demand, however, is positioned as insatiable, and as such new residential construction endures in various greenfield sites on Sydney's outskirts. The North-West and South-West Priority Growth Areas (PGAs) epitomize this process, and were established in 2005 to manage growth on Sydney's urban fringe. By 2040, these PGAs will house an additional 500,000 people (Department of Planning and the Environment, 2018). More recently, the Australian and NSW Governments, together with eight local government authorities in western Sydney, announced renewed focus on the west through the Western City Deal (Commonwealth of Australia, 2018). This is a 20-year agreement between Australia's three-tiered system of government to deliver various infrastructure projects to western Sydney. The deal builds on the federal government's \$5.3 billion investment in Sydney's second airport—a major development proposed to drive investment and infrastructural provision in Sydney throughout the next 20 years.

The local government area (LGA) of Camden is partly within the South-West PGA. It is located approximately 60 kilometers from the Sydney Central Business District, covering 200 square kilometers, spanning six postcodes and 30 suburbs. Historically Camden was a small community, separated from greater Sydney by predominantly rural land used for agricultural purposes. More recently, the area has been nominated in multiple metropolitan and local plans as a locality with potential to provide significant residential supply, and targets for dwellings have been attached to this process. Relative to its historic size and context, contemporary Camden is undergoing rapid transformation to the built environment and considerable population growth. In addition to targets imposed by the PGA planning process, several other precincts throughout the LGA have been nominated as ready for renewal, resulting in a forecasted 192.67% population increase for the LGA between 2010 and 2036 (Greater Sydney Commission, 2017). This is the largest forecasted percentage increase in any LGA in Australia for this period, and as such the area represents an interesting site from which to explore the social and cultural expressions of such a rapid and large-scale shift.

Oran Park is just one of several master planned estates within the Camden LGA. Covering 300 hectares, it was the first precinct to be developed in the South West Growth Center. Development was led by family-owned Greenfields Development Company (GDC) and the NSW State development agency, Landcom. GDC is owned by the Perich family, who were also the primary land-holders in Oran Park prior to its development. The estate is in the northern part of the Camden LGA, approximately 10km from the historical center Camden, and 6km from retail and business hub, Narellan. It is 40km southwest of Sydney's second CBD, Parramatta and 20km south of the site of the proposed second airport. Prior to 2010 the land was used as a dairy farm, and was also well known as a car racing circuit.

As part of the South West PGA, Oran Park was subject to the special Precinct Planning Process under the former State government led Growth Centers Commission (GCC), which included the release of a Structure Plan, Indicative Layout Plan and, finally, a Development Control Plan (DCP). Planning

at the DCP level articulated a strong vision for Oran Park to be a healthy built environment (Kent & Thompson, 2014) and it was assessed as such by the NSW Ministry of Health (Sydney South Western Area Health Service, 2008). The final masterplan for the site was designed using a best-practice healthy planning design guide at the time: “Healthy by Design” (Heart Foundation, 2004). The vision for the site articulated in the DCP also reflects this: “the Oran Park Precinct will establish itself as a high-quality urban environment founded on the principles of community pride, well-being, healthy living and educational excellence” (Department of Planning and the Environment, 2007, p. 15). Furthermore, the precinct’s urban design principles state: “The Precinct is to be a sustainable community where reliance on private vehicles is reduced through public transport, walking and cycling options” (Department of Planning and the Environment, 2007, p. 17). The DCP contains both general objectives and specific controls for the site. General objectives reference the delivery of healthy residential neighborhoods through less car use, and include the provision that the majority of residential lots be located within 400m walking distance from an existing or proposed bus stop. Specific controls include the condition that all dwellings should be located no further than 400m from a public park, articulate minimum requirements for off-street shared cycle and pedestrian pathways, and mandate the planting of shade providing street trees on every street.

By 2036 it is anticipated that Oran Park will house over 21,000 people. Most will live in free-standing houses. Future plans also provide for 50,000 m² of retail and 150,000 m² of commercial floor space, three schools, the new administration headquarters for Camden Council, a retirement village, a library, aquatic center and an integrated health care facility. The vision for Oran Park as articulated by its developers is for the precinct to be “self-contained” (Landcom, 2019), that is, a suburb where residents have little need or desire to leave on a day-to-day basis. Rezoning of what was previously rural and recreational land occurred in 2006, construction commenced in 2007, and the first residents arrived in 2010. In 2020, Oran Park was home to over 10,500 people.

3.2 Housing context

Oran Park is a greenfield estate. The term greenfield comes from the practice of rezoning large tracts of land from farming and/or recreational uses to use for residential purposes. Other defining characteristics of greenfield estates are their peripheral location relative to greater metropolis, a low-density housing type designed for single-family occupation, and a relationship with the greater metropolis of functional dependence, requiring travel to access employment and services. Oran Park displays all of these characteristics.

Sydney, like other Australian cities, has traditionally relied upon greenfield development to house population growth. The city experienced rapid growth throughout a period of relative stability in the 1950s, 60s and 70s and it was during this time that lower density development spread in a relatively unchecked way out into greenfield sites in a series of rings further and further from the central core of the city (Johnson et al., 2017; Spearitt, 1978). In many ways it was the assumption of access to the private car that enabled this dispersion. It was also during this period that Australians developed and intensified their obsession with home ownership, which has become not only the dream but the expectation for the majority of the population (Forster, 2006).

Throughout the 1980s and early twenty-first century, economic, political, social and cultural factors have converged such that greenfield development has been challenged (Bunker et al., 2018). Today, urban containment through consolidation has been the desired metropolitan planning outcome (Gleeson et al., 2012). Often these preferred outcomes are justified by the need to curb the congestion associated with private car dependency by improving jobs-housing balance, decreasing distances between commonly accessed uses and providing the critical mass for investment in public transport infrastruc-

ture. Despite this stated intention, new low-density residential construction endures in greenfield sites on Sydney's outskirts, with decisions usually positioned as necessary to accommodate the demands of a growing population and provide families with a more affordable housing option (Randolph & Free-stone, 2012). Unofficially the practice also continues at the insistence of a powerful development lobby catering to the demands of a hungry market seeking the prize of home-ownership without the sacrifice of privacy and space implied by life lived in a higher density neighborhood. More recently, significant price pressures in Sydney, as well as the Covid-19 pandemic, have contributed to re-ignition of the appeal of life in the outer suburbs. The city's house prices generally display a downward gradient from the core to the periphery, and demand for more affordable housing on its outskirts has heightened considerably as first-home owners struggle to save the deposit required to live elsewhere. Precincts such as Oran Park, therefore, are desirable for their promise of a detached family home available in the same price bracket of an apartment in established areas closer to the city. The sacrifice for space, however, is access, with new residents accepting the peripheral location of their new home, and the need to travel to access employment and services.

3.3 Economic context

Sydney has a pivotal role at the nexus of the Australian economy and the rest of the world—evidenced by the fact it is the preferred location for corporate headquarters, banks and the regional head offices of transnational companies (Pfister et al. 2000; McGuirk & Argent, 2011; McNeill et al., 2005). The Sydney economy is dominated by knowledge industries including banking and finance, research and development, creative industries and information technology (Beer, 2012). Traditionally employment has been overwhelmingly concentrated in the inner core of the city, primarily in the CBD but also in several key business precincts within a 10 kilometer radius of the CBD. Planning policy to date has attempted to challenge this concentration and encourage dispersal of employment uses throughout the metropolis—policies pursued, in part, to encourage better jobs-housing balance so that people can live close to where they work and avoid extended commute times. The lure of the well-serviced Sydney CBD has been too great for the knowledge economy, however, and in recent times the inner core of the city has actually strengthened as an employment hub (Randolph, 2004; Profile ID, 2017). This has contributed to the fact Sydneysiders have long commute times relative to other global cities.

It is not only the location, but also the nature of employment that influences transport practices. In a shift that has only recently gained pace in Australia, labor markets have become more flexible (Campbell & Burgess, 2018). The workforce is now more dominated by fixed term contracts and casual positions (Haas & Osland, 2014), and the gig economy based on short-term contract work, freelancing and self-employment has become more commonplace (Lewchuk, 2017). The impact is a less predictable commute for the individual, with little incentive to base residential location decisions on the location of employment.

3.4 Transport context

Sydney experienced its most rapid period of growth in the golden age of the automobile. The city is relatively low density and “sprawling,” reflective of an historical assumption of universal car ownership. The legacy is long distances between uses, concentration of activity around the urban core and a scattered geography of major and minor centers that is difficult to retrofit with alternative transport. This is coupled with a distinct cultural expectation of private car access and use that is now, quite literally, cemented into urban form.

The result of these structural and cultural appreciations of automobility is a city that mostly travels

by car. In 2016/17 just under 70% of trips and almost 80% of distance travelled in Sydney were by private car (Bureau of Transport Statistics, 2016). These trips are done on an hierarchical road network crowned by a series of freeways that today both orbit and penetrate the city, demanding continuous widening and extension to accommodate the demand derived from the freedoms and comforts they offer.

The provision of freeways and roads has co-existed with a very public government push to discourage car-dependence. Transport planning in Sydney has acknowledged the issues associated with auto-mobility and promotes investment and support for public and active transport as the preferred mode for traversing the city. The dream of a usable and widespread public transport network is often articulated throughout the tranche of strategic plans currently guiding development of the city. The key strategic land-use plan for Sydney, for example, carves Sydney up into a “Vision of Three Cities” where “people can access the jobs, education and services they need within 30 minutes by public or active transport” (Greater Sydney Commission, 2017). The accompanying strategic transport plan for Sydney “Future Transport 2056” is written as though the notion of a less private car-dependent city is a given. The plan references the 30-minute city idyll and assumes that improvements to customer satisfaction with the existing public transport networks will automatically mean “more people will choose to travel by public transport, walking and cycling” (Transport for NSW 2018a, p. 43). The underlying assumption about Sydney’s current state of private car reliance is that a series of technological fixes, such as automated vehicles and MaaS platforms, will emerge to decrease congestion. At every turn, strategic land use and transport planning in Sydney denies both the existing structural and cultural imprints of Sydney’s car dependence, replacing the reality with an optimistic vision of a city made mobile by private car alternatives. The practical reality defies this vision, with the transport practices of Oran Park an example of how this comes to be.

3.5 Transport in Oran Park

Cars have had pride of place in Oran Park since 1962 when the site was home to the Oran Park Motor Racing Circuit. The main grand prix circuit was 2.6 kilometers long and the track hosted its first Australian Touring Car Championship in 1971—an apparently legendary battle between Australian car racing royalty Bob Jane and Allan Moffat (Willis, 2010). The development of Oran Park celebrates its heritage as the former raceway through public art, such as an artistic rendition of a checkered flag where the old finish line used to be, and commemorative street naming after famous racing car drivers. Residents live in streets named after racing legends such as Peter Brock and Alan Moffat. They relax in Wayne Gardner Reserve; and watch their children play on the pedal cars on the miniature racetrack opposite the home display center.

While celebrating its car racing history, the Oran Park precinct has been designed explicitly to encourage reduced car dependence and encourage walking and cycling (Figure 1). Planned in collaboration with the state government Ministry of Health, the precinct design used the Heart Foundation’s Healthy by Design guidelines to incorporate a best practice approach to the provision of walking and cycling networks. At 1.5 meters, most footpaths are wider than standard. The cycling network is made up of 2.5-metre-wide share ways on key roads, and bicycle routes are planned to enable easy access to key destinations such as schools, retail and public open spaces. Walking and cycling routes are as direct as possible, well signed, well-lit at night, and mostly shaded by emergent tree canopy during the day.

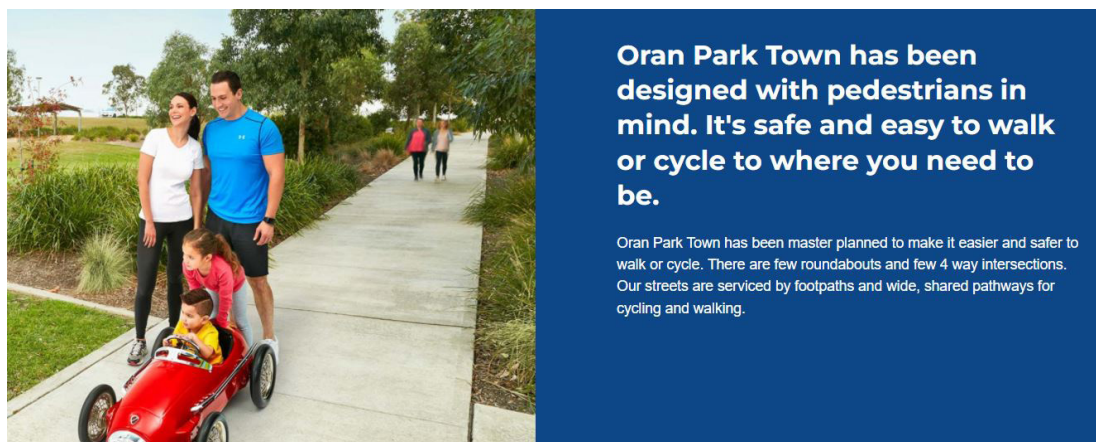


Figure 1. Marketing material from Oran Park Town website, a site maintained by the developer, Greenfields Development Company, accessed 07.11.18

Although the precinct itself is designed to be accessible by bike and on foot, once residents need, or simply want, to leave Oran Park, the car becomes a necessity. The obvious trip outside the precinct is the journey to work. It is likely that employment options in the area are only supporting a small percentage of the growing community. Reflecting the centralized geography of employment described above, over 65% of residents do not work within the Camden LGA, let alone within their own walkable neighborhood (ABS, 2016). Even for those who do work locally in the Camden LGA, travelling to work by car is very much the norm—over 95% of Camden’s workers either drive or are driven to work (ABS, 2016). Primary data on transport practices other than the commute is scarce, there are several factors, however, to suggest these trips would also be car dependent. In short, there are activities occurring outside of Oran Park that, quite reasonably, make up modern life. No matter how happy life is in the new precinct, the residents of Oran Park will inevitably leave their neighborhood from time to time. They will visit family and friends, drop by an old favorite cafe, see a preferred doctor or hairdresser, pick up something from a discount hardware store, or simply explore a new place. Analysis of the transport options available in Oran Park demonstrates just how difficult it currently is for residents to leave the precinct using any other mode than a private car. The closest train station to Oran Park is the Leppington station, 13 km away. There are plans to provide Oran Park with a train station, however the proposed site is currently a vacant lot and the NSW State Transport Minister has previously said that construction on the station “could be decades away” (McInnes, 2017). This reflects Sydney’s legacy of ongoing temporal mismatch between the provision of housing and infrastructure that has dominated planning discourse since at least the mid 20th Century (Forster, 2006; Spearitt, 1978). The cycles of the property market in Sydney generally outpace those of infrastructure provision, meaning houses are approved, constructed, sold and occupied at a faster rate than the government can both promise and provide infrastructure.

The only other alternative to the private car is three bus routes. None of them are direct to commonly accessed destinations such as the Leppington station and at peak times buses come approximately every 30 minutes. This is reduced to hourly outside of peak times, with services ceasing to operate between 9 pm and 5:30 am. In short, the frequency of services and connectivity to the wider network is inadequate to stimulate regular public transport use, and as a result the precinct is currently car dependent.

3.6 Practicing automobility in Oran Park

It is against this structural and cultural context of housing, employment and transport that the practice of automobility has flourished in Oran Park. The following section aims to demonstrate this, with an analysis of demographic, attitudinal and transport data from Oran Park's residents. Data for this analysis was collected using a survey instrument designed to explore the interplay of the transport context with the behaviors, attitudes and wellbeing of the newly established community. The survey consisted of eight sections including questions on the respondent's commute past and present (time, mode, time of day, access to parking), transport attitudes and reasons for relocating to Oran Park. Administration of the survey was approved by the Human Research Ethics Committee at the University of Sydney (project number: 2016/639). It was available online to residents of Oran Park between April and July 2017. Only permanent residents over the age of 18 were eligible to participate. Participants were recruited through a combination of hard copy posters and postcards delivered to residents and local businesses, and postings on social media. The survey was self-administered and took an average of 18 minutes to complete.

The survey was completed by 317 people. Assuming only one person per household participated, this is a response rate of 20.3%. A detailed review and analysis of the survey results, including methods of analysis, has been published elsewhere (Kent, 2018; Kent et al., 2019). The aim of this paper is to explore elements of automobility's reproduction through social practices and as such many of the results are omitted from this piece to enable a more robust application of theoretical concepts. The next section provides key descriptive results of relevance to this paper.

3.6.1 Demographics

Table 1 shows frequencies for demographic variables from the survey sample. Whilst the sampling frame for the survey meant that it was not feasible to apply quotas to achieve representativeness, analysis of the sample characteristics against Australian census data for Oran Park confirms the sample is adequately representative of the Oran Park population. As is often the case with situated, survey-based research, the sample was dominated by female respondents (70%). This is not reflective of the gender split in Oran Park or the Sydney GMR. It is more likely a product of the fact women are more likely than men to participate in research about domestic matters.

Table 1. Summary characteristics of study participants

	% Survey sample	% Oran Park*	%Sydney GMR*
Employment status			
Workforce participation rate	82	72	62
Gender			
Male	30	49	49
Age group			
18-34	51	34	24
35-44	26	17	15
45-64	17	14	24
65 and above	5	5	14
Household composition			
Households with children	61	58	46
Household tenure			
Fully owned or owned with a mortgage	68	64	65
Rented	32	35	34
Other	0	1	1

*2016 Australian Census

3.6.2 Reasons for choosing Oran Park

To measure reasons for relocation to Oran Park, the survey asked respondents whether they agreed or disagreed with a series of 12 statements on a 5-point scale from 1 (“not important at all”) to 5 (“extremely important”). Table 2 shows the percentage of respondents indicating the statement was either “important” or “very important.” Several variables related to quality of life and affordability feature, taking priority over concerns regarding transport such as proximity to work. The importance given to “being able to drive everywhere” in resident’s stated reason for choosing Oran Park (almost 85% of the sample rating this as either “important” or “very important”) suggests that the community has willingly bought in to automobility in the same way they have bought into a better-quality house.

Table 2. Reasons to live in Oran Park

“How important were the following when choosing to live in Oran Park?”	% important
Better quality housing/new build	89.5
Family friendly area	89.5
Attractive urban environment	86.7
Being able to drive everywhere	84.3
Being able to afford a bigger home	77.8
Being close to schools	71.0
Being close to paid work	60.9
Good public transport access	58.9
Being close to family	50.4
Being close to friends	37.1
Being close to where you study	31.9
Returning to the neighbourhood of my childhood	13.3

3.6.3 Transport – commute characteristics, car ownership, and transport attitudes

Through the survey instrument, travel behavior was variously measured through a series of questions on commute trips and non-work trips, both before and after relocating to Oran Park, as well as questions on attitudes to transport.

Regarding characteristics of the commute, respondents were asked to estimate the amount of time, past and present, it takes them to get to work “*on most days*.” In addition, respondents were asked to list vehicles currently available to the household, and access to parking both onsite and at their place of work or study.

Table 3 shows that most participants travelled to work or study by car. Those who did commute by public transport from Oran Park were more likely to drive to the train station or bus rather than walk. In effect, 95% of respondents started their commute in a private car. Table 3 also shows that commute times, on average, increased substantially on moving to Oran Park. Commute time increased by an average of 14 minutes one way with a large increase in the percentage of very long commutes (<80 minutes) and a decrease in short commutes (>20 minutes).

Table 3. Commute characteristics

Mode of travel to work/study	% Before moved	% Present
Car by self or others	67.1	74.4
(of which car with others)	(3.9)	(5.1)
Car to public transport	13.7	19.3
M/C or scooter	0.5	0.6
Walk	3.9	1.1
Walk to PT	14.2	4.0
Work at home	0.5	0.6
Estimated commute travel time one way	% Before moved	% Present
0-20 mins	39.9	21.6
>20-40 mins	30.3	25.6
>40-60 mins	17.8	26.7
>60-80 mins	5.8	6.3
>80-100 mins	3.4	13.1
>100 mins	2.9	6.8
Estimated commute travel time minutes one way	Before moved	Present
Average	35.2	49.2

Table 4 contextualizes this journey to work data alongside data from the 2016 Australian Census for the Camden local government area, Sydney as a metropolitan area and several similar estates in the south west PGA. This table also adds data on car ownership.

Table 4. Commute characteristics and car ownership relative to other geographies

	Oran Park	Camden Council area	Sydney GMR	Harrington Park - Kirkham	Gledswood Hills - Gregory Hills	Leppington - Rossmore - Catherine Field
Main method of travel %*						
Train [^]	8.1	7.3	16.2	7.0	11.1	9.1
Bus [^]	0.9	0.8	6.1	0.6	0.5	0.5
Car/truck - driver/passenger	74.5	75.6	57.5	76.7	73.9	67.8
Motorbike	0.1	0.3	0.7	0.3	0.3	0.4
Bicycle	0.2	0.2	0.7	0.2	0.0	0.0
Walked only	0.6	0.9	4.0	0.7	0.2	2.1
Other	0.8	0.9	1.1	1.1	1.1	1.3
Worked at home	3.1	3.8	4.4	4.3	2.9	8.3
Car ownership %*						
No motor vehicles	0.9	2.3	10.7	1.2	1.0	2.6
1 motor vehicle	19.1	21.7	35.4	14.8	14.8	19.8
2 motor vehicles	46.2	43.5	31.1	46.4	55.7	31.1
3 or more motor vehicles	23.3	26.8	14.9	33.5	21.7	35.5

*% may not sum to 100 due to proportion not stated.

[^]includes train and bus as main mode, exclusive of access mode to station or stop.

This data has limitations in that it reflects only the mode choice for the journey to work. It does, however, demonstrate that the patterns of commute mode and car ownership displayed for Oran Park generally echo those of other estates in the locality and the Camden LGA more generally, particularly when compared to Sydney as a whole.

To measure attitudes to transport, the survey asked respondents whether they agreed or disagreed with a series of 27 statements on a 5-point scale from 1 (“strongly disagree”) to 5 (“strongly agree”) (based on Handy et al., 2005). This data is presented in table 5.

Table 5. Transport attitudes

“To what extent do you agree or disagree with the following statements”	Agree and Strongly Agree (%)
Travelling by car is safer overall	77.4
I feel free and independent if I drive	77.3
I like driving	63.3
To me the car is nothing more than a convenient way to get around	58.0
Travel time is generally wasted time	55.7
It does not matter to me which type of car I drive	54.3
The only good thing about travelling is arriving at your destination	50.2
The travelling that I need to do interferes with doing other things I like	47.9
My commute is a real hassle	45.2
Public transport can sometimes be easier for me than driving	40.6
I prefer to walk rather than drive whenever possible	34.8
Travelling by car is safer overall than walking	30.6
My commute trip is a useful transition between home and work	28.6
Getting there is half the fun	27.7
Travelling by car is safer overall than taking public transport	26.2
Walking can sometimes be easier for me than driving	26.2
I use my commute time productively	24.7
I like riding a bicycle	23.3
I like taking public transport	22.3
I prefer to take public transport rather than drive whenever possible	21.5
I like to drive just for fun	19.6
To me, the car is a status symbol	11.4
Getting stuck in traffic doesn't bother me too much	8.2
Riding a bicycle can sometimes be easier for me than driving	5.5
I prefer to ride a bicycle rather than drive whenever possible	4.1

Driving a car dominates attitudes to transport. Of note is an appreciation for the safety and independence of the car, rather than the object of the car itself. Residents do not value the car as a status symbol, and find travel time to be wasted. This is not, therefore, a group of people loving every moment in their prestigious automobile as much as they are a group that simply assumes they need automobility to navigate life. Travel is about getting from A to B and the car is the safest, most convenient way to do that. Alternative modes—particularly cycling but also public transport—are not valued.

This section has provided the context and the evidence for the transport practices imbued in a greenfield estate. It has painted a picture of an estate in which automobility is an inevitability. From the concentration of jobs within several hubs around the center, and the casualization of the workforce, to the patterns of land release and temporal cycles of population growth—all point to a precinct and city difficult to service and therefore navigate with modes alternative to the private car. This inevitability is certified by the transport context which is characterized by a planning intention to shift away from the car but an ongoing structural provision that, in reality, asserts the opposite outcome. And finally is the context of Oran Park itself, housing a population that has willingly chosen home ownership over accessibility, accepting long commutes and car dependency as a given in their new lives on Sydney's periphery.

The following section takes this context of automobility and conceptualizes its endurance using a social practice approach.

4 Reproducing automobility in a greenfield estate

4.1 Using social practices to conceptualize stasis and opportunities for change

Matt Watson (2012) proposes three key mechanisms of change in practices. They are:

- changed elements,
- changed bundles and
- changes to recruits—the people doing the practice.

This framework has been used effectively in the past to examine the emergence of a new transport alternative—car sharing (Kent & Dowling, 2013). The framework is further refined here to examine both mechanisms of continuity, or reinforcement, of practices, as well as to question opportunities for change into the future.

4.2 Elements

As described above, practices are made up of elements which co-exist over time to ensure the practice extends beyond individual instances of action. In this study, the terms used for elements of practice are “structures,” “assumptions” and “symbols.” For a practice to shift, the elements comprising the practice need to change. Table 6 describes each element type and, drawing from the context review provided in section 3.0, lists examples of elemental expressions that reinforce automobility in Oran Park.

Table 6. The elements of automobility in Oran Park

Element	Element expressions that reinforce automobility in Oran Park
<p>Structures: The infrastructural, land use, policy and planning structures that support practices of private car use in Oran Park.</p>	<p>Transport and land use context</p> <ul style="list-style-type: none"> • A <i>public transport network</i> that is deficient. • A <i>democratic system</i> that promotes voter-responsive policy making which, in Sydney, favors ongoing investment in the road network. • Predominate existing <i>urban form</i> that is low density and disconnected from existing employment and other opportunities. • A <i>geography of employment</i> concentrated in the Sydney CBD resulting in long commutes from outer suburban areas. <p>Housing context</p> <ul style="list-style-type: none"> • A <i>housing market</i> that preferences localities connected to employment and service uses and renders greenfield estates on the city outskirts more affordable. • A <i>lag</i> between cycles of housing construction and cycles of infrastructure provision forcing new residents into a period of car dependency that comes to define life in their new locality. <p>Labor market</p> <ul style="list-style-type: none"> • Increased <i>casualization and precariousness</i> of the workforce, discouraging people to choose where they live based on where they work. • A <i>knowledge-based economy</i> which favors congregation of activity in key business districts.
<p>Symbols: the images of automobility in Oran Park</p>	<p>A celebration of cars:</p> <ul style="list-style-type: none"> • The estate’s name reflects its heritage as a famous car racing track. • Street names and playgrounds named after racing car drivers. • Marketing material features children driving cars (see Figure 1).
<p>Assumptions: the habits, transferred competences and expectations of automobility.</p>	<ul style="list-style-type: none"> • Acceptance of long commutes • Assumption of private home ownership <p>Freedom of choice:</p> <ul style="list-style-type: none"> • Freedom to prioritize a housing type and lifestyle rather than sustainable mobility in the residential relocation decision. <p>Attitudes to transport:</p> <ul style="list-style-type: none"> • Preference to drive rather than take public transport or walk. • Appreciation of the flexibility of the car.

Table 6 is not intended to be exhaustive however it does well to demonstrate the sheer breadth, complexity and depth of elements that, in concert, reinforce automobility in Oran Park—this is a key feature and strength of the social practice approach. For the practice of automobility to be questioned, or subdued, in Oran Park, shifts would need to occur in a critical mass of these reinforcing elements. What does this critical mass look like? Taking the elements outlined above, none emerge as either easily amended, or even currently conceptualized as impermanent by influential agents. Amendment is particularly unlikely in the time frames demanded by the problems of climate change and increasing congestion associated with automobility. Reflections on the relative tenacity of elements are as follows.

First, the structures of automobility defining the transport network, the concentration of employment in the center and the provision of low-density housing on the periphery represent a history of prioritization of private car use that has essentially shaped Sydney's low-density urban form since its proper development throughout the 20th Century. Oran Park itself is evidence that this prioritization continues despite attempts to strategically plan for its reversal. Automobility is also a key outcome, if not an acknowledged one, of the economic and political structures that determine the cycles of infrastructure provision and liquidity of the housing market that results in housing construction outpacing the local provision of jobs, services and transport alternatives. Finally, in Sydney, ongoing automobility is a product of the global trend towards the casualization of the workforce and its precariousness, which calls into question the logic of basing residential location decisions on access to a particular place of employment.

Second, how fixed, and indeed influential is the symbolism of the car and the way it defines the brand that is Oran Park? The fact this has endured against an explicit attempt to plan and market a precinct supportive of walking and cycling is evidence that cars are a welcome legacy. Avoiding this celebration of the car in Oran Park is unlikely to influence transport practices directly. Indeed, of all the elements, this symbolism seems to be the most open to change. Oran Park's residents, for example, do not seem to value their own car as a status symbol. The fact the estate celebrates the symbol of the car, however, does, demonstrate a certain ignorance by the precinct developer to an irony that characterizes the endurance of automobility beyond the boundaries of Oran Park, telling the story of a city perpetuating structures of automobility while simultaneously claiming to be in the pursuit of a shift to alternative modes.

Third are the assumptions of private car use, and the extent to which they are embedded in residents' choice of Oran Park as a place to purchase a home and raise a family. There is evidence of a cultural attachment to private home ownership as well as private car use, as indicated by respondents' preference to purchase a new house. These attachments are deeply entrenched in the Australian way of life (Baum & Wulff, 2003). They are linked to cultural attributes such as a "fair go" that have defined European Australia since it was settled as a convict colony in the 18th Century (MacKay, 2018). For many Australians, the attachment to home ownership and private car use is now resignation to the inevitability of a car-dependent life. For this study's participants this is reflected in the acceptance of the need to drive to access the opportunities of greater Sydney and the willing endurance of long commute times. There is some evidence that the fixity of assumptions as elements of the practice of automobility are open to change. Studies demonstrate a definitive market in Australian cities for a more "urban" lifestyle where a detached dwelling is exchanged for a higher density, walkable neighborhood and a lifestyle less dependent on the private car (Newton et al., 2017). Complementing these studies has been research suggesting delays in licensure and car ownership in new generations (Delbosc & Currie, 2013), as well as the capacities of technology to replace or at least "clean up" the need for corporeal movement. It is difficult to determine the impact of these various shifts in the meanings attributed to home and car ownership. Indeed, they seem to symbolize changed assumptions around automobility in Australian cities. Yet in the absence of the material system required to deprioritize the car, alternative mobility futures will continue to struggle, rendering the potential shift an aspiration rather than a reality in practice.

4.2.1 Changing bundles

Changes to practices also require shifts in relationships between practices. Mobility is ostensibly “complex and contingent, emergent from the overall coordination of daily life” (Watson, 2012, p. 491). It is this contingency that underpins theories of automobility, including an emphasis on the self-generating hegemony of the private car. Mobility as a practice is *intensely* bundled to other practices because of its regular and mandatory performance, and its importance to the operation of daily life.

This intensity of bundling has two implications for the fixity, or resistance to change, of mobility practices more generally, including the actual mode of mobility. First, copious links to other practices ensure mobility is performed regularly. It is this repetitive implementation that usefully demotes travel to the subconsciousness of habit, meaning it is less likely to be questioned and therefore changed. Second, mobility enables dominant projects, ensuring its successful execution is less likely to be left to chance, and therefore less likely to be the subject of the kind of experimentation required by any variation. This bundling makes mobility practices difficult to shift. Its elements remain unquestioned, with reliability the goal over innovation. And in Oran Park, the private car dominates these elements, as demonstrated in Tables 3, 4 and 5. A limitation of this study is that the primary data presented only demonstrates the way automobility is attached to the dominate project of working, and to the project of securing housing. Behind the closed doors of Oran Park’s homes we would no doubt witness the bundling of automobility to other dominate projects of life, including caring for family and socializing, as households negotiate multiple commitments using the only feasible mode of transport that is available to them—the private car.

Any imminent demise of the automobility regime would be heralded by a decoupling of the car from other practices, including those associated with dominate projects. The litany of elements and practices linked to and enabled by private car use in Oran Park exposes the depth of what is required to provoke the extrication of driving a car from commonplace dominant projects. This way of thinking about automobility reveals the inadequacy of transport policy that fails to consider wider contexts such as housing, education and employment uses. While transport infrastructure is essential to encourage change, the concept of practice bundling demonstrates why the provision of transport infrastructure alone can sometimes fail to engender change. Transport needs to engage with the structures that determine systems such as those of housing provision, ways of working, and expectations of caring and schooling.

4.3 Recruiting to alternative modes

The third way practices are reinforced is by the presence of a cohort of more or less faithful practitioners—in this case people who drive cars. It may sound obvious, but in order to deflate the system of automobility, more people must drive cars less. In a social practice approach, this is called defection. Defection from one practice to another requires first the existence of an alternative, and secondly a weakening of faith in the existing practice. There are two obvious reasons an imminent defection from automobility is unlikely in Oran Park.

First, to defect from the car people must find other means of mobility—whether that be by other modes or by accomplishing tasks requiring connection without physical movement. These alternatives do not yet exist in Oran Park, and as a result, defection to alternative modes is not only unlikely but, to an extent, impossible.

Second is the degree to which residents of Oran Park are faithful practitioners. In car-dependent cities, recruitment to automobility occurs early on—today’s young drivers were likely driven by parents eager to conform to certain standards of safety and opportunity. Some suggest that new generations

may be less likely to drive however evidence for this trend is limited to delayed rather than abandoned licensure (Delbosc & Currie, 2013). Analysis of the assumptions of automobility (Table 6) demonstrates the extent to which Oran Park has recruited a cohort of practitioners yet to lose faith in the freedoms of the private car.

5 Discussion and conclusion

This paper aimed to present a detailed analysis of the system of automobility in situ. While automobility need not be inevitable in newly constructed estates, its perpetuation will only be interrupted through an appreciation of the complex practices that reinforce its dominance. The paper applied concepts and tools from social practice theory to explore how automobility continues to be reproduced in a new suburban development constructed on the periphery of a currently car-dependent city. The analysis demonstrates why a shift to sustainable transport modes is unlikely in Oran Park. First are several reinforcing elements circling the way the precinct was planned and the way life is lived in greenfield Sydney. These range from structures of political economy, infrastructural provision and land-use planning to more agential elements such as the assumptions of the new estate's residents and the symbolism of the private car celebrated in its urban design. Second is the probability that private car use in Oran Park is intensely bundled to other key practices, such as employment, and extending to ways of caring for family and friends. Importantly, this way of thinking about automobility demonstrates the inadequacy of transport policies that focus only on the provision of alternative transport infrastructure without also addressing the other structures and cultural attributes that define transport practices and, in this case, support automobility. Finally is the failure of alternative transport modes to compete with and attract recruits. The residents of Oran Park are accustomed to the private car and have very little opportunity, nor demonstrated inclination, to abandon it as their primary mode of travel.

This analysis reveals a litany of barriers faced by cities seeking to make transport a more sustainable and healthier practice than private car dependency allows. It does, however, hold several recommendations for future attempts to plan for a less car dependent future.

From a policy development and practitioner perspective, of use is this story's exposure of the depth and breadth of elements that, in orchestration, reproduce private car use. While the interdependency of transport and land use is accepted as integral to plans to puncture automobility's existing dominance, it would be unusual for transport professionals to engage with land use decision making at some of the less traditional footholds exposed in this analysis. As two examples, industrial relations reform to provide more certainty to the type and therefore location of employment, for example, is rarely considered within the remit of a transport portfolio. Yet the casualization of the workforce and emergence of the gig economy has wide ranging implications for the way people locate their home relative to where they work. The urban design of children's play space to replace pedal cars and mini car racing circuits with balance bikes and toy train tracks would, similarly, not be considered a transport issue. Yet embedding symbols of sustainable transport within the detailed design of new urban areas sends a subtle yet important message about transport cultures.

From a research perspective, the paper provides an example of how the social practice approach can be applied in developing comprehensive and applied understandings of transport. First, the concepts of elements and bundling allow for the ordering of complex influences on the complex practice of mobility. Day-to-day travel may seem as simple as the decision to walk or drive a car to the shops, yet the vast cultural, psychological and structural shapers of that decision can seem overwhelming. The social practice approach provides a way to unpick this breadth. Second, and related, is that the social practice approach allows transport research to transcend the alluring dichotomy of structure and agency that continues to

dominate how we think about the determinants of mobility practices. Oran Park is a story of a failure to provide infrastructure as much as it is a picture of a cultural preference for the traditional freedoms and comforts associated with car use. The implication is that the challenge of sustainable transport transitions require an understanding of both the structural and agential determinants of transport practices, and the social practice approach provides tools and concepts to enable such analysis.

While this paper has combined a detailed case study review with basic demographic, travel and attitudinal data, the analysis is missing the color that could be provided by more ethnographic, qualitative methods. Interviews with the residents of Oran Park and observations of everyday life in the precinct would serve to clarify some of the assumptions proposed here on the attachment of automobility to life projects. Similarly, the application of a political and policy science lens to the multitude of policy environments revealed by this analysis as shaping transport decisions would also serve to take the analysis a step forward from examination to fruitful intervention.

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