

## ARTICLE

# COVID-19, commuter territories and the e-bike boom

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## Abstract

The appearance and integration of e-bikes in public space is a source of much debate worldwide. This paper offers insights to these debates by reflecting on how Deleuze and Guattari's concept of assemblage as territory helps us to understand the uptake of e-bike commuter cycling during the Covid-19 pandemic through empirical material from a study conducted in Sydney, Australia. Here we conceptualise commuter journeys in terms of processes of deterritorialisation and reterritorialisation; experienced through the affective territories generated by e-bikes. The disclosure of commuter cycling sensations generated by the pandemic disruptions to commuter routines provided an important lens through which to understand the uptake of e-bikes. The paper concludes by showing the utility of the concept of territory as a means of theorising changes to everyday mobility practices.

## 1 | INTRODUCTION

Electric bikes (e-bikes) are part of a motorised “micro-mobility” trend disrupting public spaces in usually car-dominated Western cities by diversifying urban transport modes for individual users. The appeal of e-bikes is not difficult to grasp. They are power-assisted, which means, unlike a motorbike, they still require physical effort from the rider but the effort required is approximately a quarter that of a regular bicycle. This helps to overcome commonly reported barriers to commuter cycling including topography, travel distance and arriving at work sweaty or breathless (Lopez et al., 2017). Worldwide, e-bike sales soared in 2020 in the early days of the COVID-19 pandemic, building on strong market growth in the previous decade (Statista, 2015). Global demand for e-bikes quickly outstripped supply as some commuters sought to avoid public transport, while others working at home wanted to spend more time outdoors (Woodcock et al., 2020).

Sydney, Australia, was no exception to this global trend. Surveys conducted after the first lockdown in March 2020 suggest that cycling participation boomed, including in the City of Sydney (Fuller et al., 2021). The cycling boom was

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encouraged and to a degree facilitated by the City of Sydney, which quickly put in place “pop-up” cycleways. This was very much in line with the Lord Mayor of Sydney Clover Moore’s vision for the city since election in 2004. City of Sydney cycling vision statements have sought to prioritise movement by walking, cycling and mass transit systems, rather than motor vehicles. Vision statements were accompanied by cycleway construction and implementation of transport behaviour change strategies (Robinson & Daly, 2011). None of these strategy documents anticipated the COVID-19 pandemic, of course, but they were nonetheless well prepared to capitalise on the triggering of e-bike uptake. Taking the pandemic disruption as our reference point, this paper aims to better understand the uptake of e-bike commuter mobility.

E-bikes are not new technology. However, personal e-bikes have only become a significant presence in urban mobility in the past decade. What is known about personal e-bike use is primarily based on questionnaire surveys (Fishman & Cherry, 2016). Personal e-bike use is reported to be a fun, practical and safer option for travelling longer distances more frequently than a pedal bike but without precluding health benefits (Bourne et al., 2018). E-bikes are primarily used for transport, replacing conventional bikes and motor vehicles (Winslott Hiselius & Svensson, 2017). Older adults also report participating in recreational e-biking (Wolf & Seebauer, 2014). Commonly reported barriers to e-bikes included the perceived risk of riding with motor vehicles, poorly maintained cycling infrastructure, the stigma of assisted technologies, lack of exercise, weight, maintenance and costs (Haustein & Møller, 2016).

Qualitative research points to the paradox surrounding the uptake of e-bikes and sensations of speed. For some e-bike riders, the powered micro-mobility facilitated feelings of safety by enabling travel with the traffic flow (Dill & Rose, 2012). For others, speed heightened the feeling of vulnerability, and increased the potential for conflict when travelling in proximity to motor vehicles, pedestrians and pedal bikes (Dozza et al., 2016; Jones et al., 2016). These studies are important to help support e-bike use as active travel amongst various target groups, particularly commuters and older adults.

Our paper has four sections. First, we review geographical literature investigating the uptake of cycling. We extend geographical research that conceives cycling mobility as an ongoing socio-material arrangement by connecting it to Deleuze and Guattari’s notion of territory. Second, we outline how our cycling sensory ethnography combines online semi-structured interviews, sketches, mapping and video-recordings made with commuters who purchased and rode e-bikes because of the COVID-19 lockdown in Sydney, Australia. Third, we offer an interpretation of how individuals carve out “home” territories for themselves by means of the processes of deterritorialisation and reterritorialisation. To conclude, we outline the empirical and conceptual contribution.

## 2 | CYCLING GEOGRAPHIES AND ASSEMBLAGE THINKING

In advancing critical perspectives on the uptake of e-bikes during the pandemic, we draw on two bodies of geographical literature. First, in the context of urban sustainable transport policies, geographers have made significant contributions to the dilemmas surrounding the uptake of cycling as sustainable transport by addressing how cycles (Aldred & Jungnickel, 2013) and cyclists (Aldred, 2010) are discursively constituted as a “problem” in Western societies that privileged automobility. Recent writing, drawing on theories of socio-technological transitions (Vreugdenhil & Williams, 2013; Wild et al., 2017), illustrates how the privilege of automobility can manifest as organised opposition to bike lanes, popularly known as “bikelash”.

Cupples and Ridley (2008) and Jones (2012) alert us to the importance of the embodied dimensions of cycling. For Jones (2012), the embodied, non-cognitive dimensions of pedalling, that let the rider go with the flow, are more important in encouraging or discouraging people to ride bikes to work than environmental education policies. Extending this work, Barrie et al. (2019) offer insights to the transformative potential of the affective dimensions of cycling, including digital self-tracking technologies and social media in the minutiae of everyday cycling routines. McIlvenny (2015) argues that joyful, shared everyday mobility experiences are underpinned by a moral order, or responsibility gap, that can be envisaged as a felt distance between riders guided by routines and rhythms of practice and neurological response. Lloyd’s (2017) study of cycling rage in mountain bikers points to the importance of how people cycle in creating mobility hierarchies. When attention turns to the multiplicity of cycling styles, e-bike users and pedal cyclists share the same cycleways but not necessarily the same experiences, identities and claims to a territory through repetition of everyday pedalling routines and rhythms. This is of relevance in our research because it suggests that roads and cycle lanes are not organised solely by the rules of the road, but an ongoing embodied process of what Deleuze and Guattari (1987) call territorialisation.

Our focus on processes of territorialisation is a contribution to geography’s ongoing engagement with Deleuze and Guattari’s (1987) assemblage thinking, which explicitly specifies territory as the first form of the assemblage,

As Anderson and McFarlane (2011) discuss, assemblage thinking has taken different trajectories within geography as a descriptor of socio-spatial orders (Allen, 2011), as a geographical research ethos (Kinkaid, 2020) and as a non-Euclidean spatial concept (Dewsbury, 2011). Drawing on Deleuze and Guattari (1987), Cox (2019) and McCullough et al. (2019) employ the concept of cycling assemblage to de-centre the human subject, shifting the focus to the ways in which bodies, bikes, transport infrastructure policies and publics come together in a “machinic relation” to achieve mobility. Here, we build the analytical potential of the concept of territory as the first form of the assemblage to serve as an affective spatial rendering of the ongoing transformation of everyday mobility (Dewsbury, 2011; Waitt & Stanes, 2022). For Deleuze and Guattari, territory is not specifically a matter of place or space, though it can have manifestations of that quality. Rather, territory is an experiential concept that refers to a shifting feeling of being in a space that has the value of “being at home” that is identifiable as a specific point in time and space (Deleuze & Guattari, 1987, p. 326).

This feeling of being at home is not given; it needs to be produced. In *A thousand plateaus*, Deleuze and Guattari describe how a child’s territory emerges from chaos through the spatial orientation of the affective force of the periodic rhythms of whistling:

A child in the dark, gripped with fear, comforts himself by singing under his breath. He walks and hails to his song. Lost, he takes shelter, or orients himself with his little song as best he can. The song is like a rough sketch of a calming and stabilising, calm and stable, center in the heart of chaos. (Deleuze & Guattari, 1987, p. 311)

For Deleuze and Guattari (1987), places are differentiated not through co-ordinates on a map but through the desires and sensations associated with routines and rhythms, including commuting. Our interviews showed that the desire for safety and efficiency is uppermost in the minds of most cyclists. In turn, this influences the effective habits cyclists form to organise the materials and forces of their surrounding environment into the durable sensations of experiencing the time and space of journeys as a “home” territory. The process of territorialisation – that is, the process of becoming “at home” in each situation – involves the hierarchical distribution of space that privileges certain modes of transport and (literally) squeezes others. This is the inherent tension in all territories.

Yet, becoming at home, even for familiar journeys, is always a precarious achievement. The familiar knowledge of a journey’s time and route may be rendered unfamiliar by an encounter with new relations of materials and forces that transforms the body’s capacity to affect and be affected. Deleuze and Guattari (1987) refer to this transformative potential as two movements caught up in one other: deterritorialisation and reterritorialisation. Although these terms derive from the notion of territory, they are not strictly speaking spatial concepts. To be deterritorialised, then, does not mean to be removed from a space; rather, it means losing the feeling that one is in one’s proper place, i.e., “at home”. Living outside of one’s territory may result in despair and anxiety. Yet, Deleuze and Guattari argue that new possibilities of living are impossible except at the price of deterritorialisation, which can be understood as an overcoming of a dependency on being always “at home”.

Deleuze and Guattari’s assemblage thinking points to the importance of new sensory modalities and perceptual routines “that insert themselves into the old assemblages and break with them” (Deleuze & Guattari, 1987, p. 83). Kullman (2015) offers a perspective on the affective qualities of “arrhythmia”, namely the emotional ripples that erupt when a slower cyclist is moving in proximity to a motor vehicle. Deleuze and Guattari insist that deterritorialisation is not only bound up in the everyday, but also turning points that break connections with the past, such as a pandemic. The affective force of reterritorialisation is not conceived as a return to the original territory, but rather a return to the feeling of being at home following a disruption.

We argue that the uptake of e-bikes during the pandemic may be understood in terms of the processes of deterritorialisation and reterritorialisation, rather than a behaviour change organised by policy. When the uptake of e-bike mobility is conceived as a process of territorialisation, the cycling territory or assemblage is held together by ongoing experimentation with the affective intensities of cycling rhythms that cut across sensory registers to sustain a “liveable order”. Here we might distinguish between different rhythms: seasonal, night and day, rush hours, circadian and muscular. Disruption of the rhythms that hold together a territory may generate moments of heightened affective intensities as their worlds are un-made and sense of self lost. The territorialising rhythms of mobility are inherently those of restoring and displacing. The adoption of e-bike mobility is conceived as a sensuous process that is mindful of different capacities for bodies to act and be affected through past as well as present connection with commuting and cycling.

### 3 | METHODS

Our sensory analysis builds upon the methodological work relating to mapping the embodied dimensions of cycling mobility (Waitt & Stanes, 2022). A group of 30 participants consented for our project entitled: “The reactivated bike: taking up cycling in Sydney during the pandemic”. The cohort included four who had newly begun e-biking. Recruitment occurred through the Sydney Bike Commuters social media group. Between July and December 2020, fieldwork was conducted with participants. In the pandemic context, our cycling sensory ethnography combined an online semi-structured interview with video methods and follow-up online conversation. Taking our lead from Bissell (2018) to open up conversations around the sensuous dimensions of commuter cycling, the online semi-structured interviews were conducted in the presence of participants’ e-bikes and were combined with sketches of their commuter routes. The semi-structured interview comprised six topics: cycling background; e-bike type; reasons for using the e-bike; experiences of riding during lockdown in March 2020; and experiences of riding when lockdown measures eased, which in Sydney occurred from May 2020. At the end of each semi-structured interview participants were asked about their background. Video-data enables insight into cyclists’ rhythms and routines that forge territories and sense of self. Reviewing video-outtakes with participants online created opportunities to engage with cyclists’ ephemeral sensations of mobility on-the-move, specifically of their flow, physical effort and happenstance interactions with others (Spinney, 2011). Clips were selected of moments that help understand how bodily capacities to cycle were transformed by the ways journeys were organised, reorganised and disorganised.

The next section illustrates the insights that emerged from the fieldwork: how the pandemic disrupted a commuter public transport territory felt as safe and efficient; the rhythms and routines that territorialised roads as the taken-for-granted territory of fast vehicles; and the importance of separation and segregation in making the e-bike commute territory.

## 4 | E-BIKE COMMUTE TERRITORIES

### 4.1 | Deterritorialisation ...

Mundane mobility routines change every day. However, the pandemic resulted in a break with the past and the start of new transport possibilities. Through a version of assemblage thinking inflected by its connection to territory, we read the pandemic as a turning point in commuter mobility that was animated by the force of deterritorialization. The effect of which was previous daily commuter routines no longer induced comfort in response to the daily stress of parental and professional lives. The desire for safe and efficient experiences of everyday mobility might be met by other transport technologies, including cycling. As Paul (who is an actuary, married, in his forties, grew up in country New South Wales, rode a pedal road bike for leisure until his thirties and commutes 10 km to the city) illustrated:

Once we went into lockdown, I knew public transport’s gonna be horrible. So, I started looking at buying an e-bike. I kind of thought they are gonna have social distancing on the train, which means the capacity’s gonna be lower. Which might mean that, even though I’ve got a short journey, I could be waiting for several trains to go by before I get on. As well as that, it would just be the chances of getting ill on a train because you are kind of stuck in there with people. When on a crowded train in the middle of winter and there’s people coughing and spitting away,

Paul exemplifies how the disruption of the pandemic operated to deterritorialise the working arrangement of public transport. A heightened sensitivity to the potential presence of the virus in routine commutes confounded any sense of comfort. The rupture in taken-for-granted commuter movement generated a heightened registration of alternative transport modes, including via the e-bike.

Likewise, Liz (who is in her forties, an educator, lives with her husband and two school-aged children and commuter cycled in the Netherlands some 15 years ago) explained how the rupture to taken-for-granted everyday routines provided a reference point to investigate other possible ways of coping not only with the virus but the everyday challenges as a working mother.

I’ve been thinking about I want to get fit ... I always had all these blocks and barriers put up for myself of why I could not do it or it’s too hilly and it’s too hot and it’s too dangerous and it’s too hard with my personal

situation with the dogs and the kids .... And having the lockdown, I guess just because you were, sort of your life was put on pause for a while, it just gave you that opportunity to just rethink how you are doing things and go, “Hey, hang on a second. Okay, where can I improve? How can this be better?” ... I thought, “This is it, I’m going back on the bicycle.” ... I always loved that feeling of freedom and to be able to have that here in Australia as well ... And I just thought why not an electric bike? Because then it will get me up the hills and I will not come to work completely drenched.

Affective capacity features here. In the absence of the sensory discipline of traffic, the power of the battery increased her bodily capacity to cycle by removing pre-pandemic sensations of sweat and exertion, retaining the figure of a professional subject. E-bike mobility protected against how pedal cycling in Sydney is most intensely felt for Liz through the emotional challenges of contact with cars, sweat and sinews of muscles ascending hills. The pandemic provided an opportunity to valorise the sensations of cycling she named as freedom and gave her “permission” to seek assisted technology. The desirability of e-bike technology is folded through a sensuous commuter economy where safety is valorised over danger, efficiency over waste, minimal physical effort over sweaty exertion, connections over disconnection, freedom over restriction.

## 4.2 | ... and reterritorialisation

Deleuze and Guattari (1987) conceive of deterritorialisation and reterritorialisation as reciprocal processes. In our case, as the desire for safety and efficiency of commuter mobility was deterritorialised from public transport by the pandemic, it was then reterritorialised onto the e-bike. In turn, this resulted in the emergence of a new cycling assemblage and mobile territory. Experiments with commuter routines and rhythms offer insights to how the organisation of “home” commuter territories were underpinned by commuter biographies, cycling histories, spatial knowledge and avoiding intense unpleasant sensory stimulations, specifically traffic and darkness.

For example, Keely (who is in her twenties, lives with her partner, grew up in suburban Sydney, rarely cycled as a child, works flexible hours in the bank sector and commutes 9 km to the city) explained:

I would make my fiancé ride in with me, because I was still not really sure enough of where I was going for the first, maybe two weeks ... I needed that extra security because he was more confident than me. I then just worked out a way of how to get home, having to trial and error, just go different ways when possible. I would always try and leave work early, especially when the day started getting shorter, because I did not want to be riding home in the pitch black and I could beat a little bit of the traffic. I found it really hard to know where to go. And I feel a lot of the times, there’s really great pieces of bike routes, but they never connect. I could never work out how to join them or link them.

Keely explains to assemble a “home” e-bike territory that is felt as safe requires initially riding with her fiancé and an ongoing experimentation with routes and timings. Here, Keely underscores how experimenting helps manage the affective intensity of bike routes and how this may differ between riders because of embodied histories.

Like Keely, for Grace (who is in her thirties, married, works flexible hours as an analyst, commutes 9 km to the city and only ever previously cycled as a child in suburban Canberra), spoke of how riding an e-bike initially felt “intimidating” and demanded practising to enhance competencies. Grace tells of the ongoing experimentation with departure times, routes and battery, perceived through affective experience,

I try to get up at 5:30 and be out the door by 6:30. Then I know the sections that I’m on the road, there will not be too much traffic and there will not be too many other bikes on the path. I just do not want to have to deal with bikes coming in behind me and people coming in front of me. I try and go early during the day on my way in. On my way back, I do not have much choice, I do have to get back before sunset. ... I’ll just stick to the bike paths, even if it takes me longer. And if I cannot avoid the road, then I’ll pick the quietest street. And if I’m still uncomfortable, I’ll just go on the pedestrian pathway if there aren’t too many people. If it’s safer for me, safer for cars and there’s no one there then.

Grace yields to the chaotic forces generated by the proximity of drivers by avoiding roads and sometimes to seek safety will break traffic rules by cycling on footpaths. The anticipation of driving bodies travelling at speed territorialises the road at the taken-for-granted territory of cars.

Equally, Paul, who once considered himself a “serious cyclist” and described riding an e-bike as “cheating” but “fun”, e-bike commuting in Sydney peak-hour traffic after dark is beyond his affective capacity to ride, despite the motorised assistance of e-bikes. In Paul’s words:

I just wanted to figure what was the safest way I could get to work using the most of the cycle paths that were available to me and minimising my time in heavy traffic ... I finish at 4:30, so I start at 8:00. It’s still quite bright when I’m riding.

Paul’s ongoing experimentation with routines convey how even for some experienced bike riders, main roads are felt as the territory of motorised vehicles, destabilising their sense of safety and comfort.

### 4.3 | Separation and segregating

The notion of an e-bike assemblage as a form of territory that operates through a process of deterritorialisation and reterritorialisation is bound in generating a moral order and transport hierarchy. The process of territorialisation involves privileging certain transport modes and excluding others. A road, cycleway or footpath becomes a territory for a particular cyclist through the order imposed by shared rhythms. Mobility, when conceived as an ongoing process of territorialisation through rhythms, is about both retaining and eliminating. For example, while Paul avoids riding on main roads as much as possible, if in traffic, he rides at 30–40 km/h to help him negotiate an understanding of himself as a “good cyclist”.

If I’m in traffic I do try and go (laughs) as quickly as I can, 30 to 40 km’s an hour, just so I’m not inconveniencing people as a cyclist. I try and be the good cyclist. You know, not running the red lights and just moving over to the left to give enough room for cars to go by and all that sort of thing. You do not want a row of like 20 cars stuck behind you because you are just like: “I’m a cyclist. I’ve got the same rights on the road. Everyone has to wait for me.” It’s just-, I feel bad. I’m sorry, I’m going as hard as I can.

Paul illustrates how shared speed and performance play a critical role in asserting a right to the road, rather than traffic rules. Repeatedly, participants recalled moments of opting to cycling on footpaths when riding main roads left impressions of vulnerability and becoming a nuisance. Moving to the left, Paul illustrates morally coded sanctions that position the faster paced vehicles as having the right to the road. To become a “good” e-biker, Paul has a responsibility not to slow traffic.

At the same time, participants shared sensations of antagonism that illustrate the affective dimensions of arrhythmia when riding on shared footpaths with pedestrians. For example, Grace, brings into sharp relief the affective intensities conveyed as displeasure when e-bikers are felt to be an encroachment on footpaths already territorialised by the synchronisation of pedestrian rhythms (Figure 1).

For all participants, the appeal of becoming e-bike mobile during the pandemic is explainable by the affective intensities that sustain segregated cycleways as a “home” territory of comfort and safety. When segregated cycleways are read through the notion of territory, acceptable cycling behaviours require a shared sense of pace and flow. Participants illustrate how segregated cycleways become configured by e-bikers as a cycling territory through the shared pacing and bodily gestures that enables faster riders to move together in proximity. The pedalling rhythms that territorialise segregated cycleways as “home” for e-bikes translates into a frustration for anyone, or anything, that diminishes their capacity to cycle. As Grace explained,

On my way back from work, that’s when there’s people on the bike paths, that’s when I have to try and get people off and they always give you a dirty look.

Likewise, guided by routines of sensory responses, Paul constituted slower cycling bodies as “dawdlers”, regarding them as a territorial intrusion (Figure 1). Grace explained how corporeal mastery of the segregated territory required embodying the movements of faster cyclists (Figure 1). Grace shows how e-bike beginners may reveal their learner status within a territory

	<p>Grace: I was at The Domain because I work near there, I go through The Domain on the path and there was someone running, a jogger running, and sometimes they just somehow keep drifting so I had to ring the bell to go 'I'm behind you because it was quite a fast downhill and then this guy just screamed abuse at me, "You should be on the road." I'm like, "Come on."</p>
	<p>Paul: It's always a bit like we're on the cycle path together, but some people dawdle along, and just like, "Oh. They're going just a little bit slower than you'd like to go". Then you just have to lump it.</p>
	<p>Grace: Sometimes when there are other cyclists on the bike path and I could see how they ride, I'm like: "Oh that's how I should ride instead of how I've been doing it." That's been good ... I'm starting to think I might just cycle alongside other cyclists 'cause I'm not as bad now, in terms of my confidence and navigation skills. I'm okay to be part of that pack, and don't feel like I shouldn't be there.</p>

FIGURE 1 Participants' reflections on segregation and separation from video clips

by not performing the expected speed, spacing and bodily gestures. Ensuring e-bike commuter cycling is collectively experienced and individually valued is entangled in processes of territorialisation of the segregated cycleway that requires corporeal mastery of an e-bike and synchronisation of flow that comprise velomobile traffic.

## 5 | CONCLUSIONS

Our engagement with Deleuze and Guattari's concept of territory helped us to explain the uptake of e-bikes during the pandemic. We make three key contributions to geographical scholarship. First, we advance conceptual work by showing how thinking with the notion of territory has the potential to generate richer understandings of behavioural change around transport choice as a process of deterritorialisation and reterritorialisation. Findings from Sydney residents who transitioned to e-bike commuter riding is not only grounded in physical ease, absence of sweat, longer commuter distances and exercise, but also the ability to generate a "home" territory that is sensed as safe and comfortable. Second, we advance understanding of the importance of rhythms to transport geographies by showing how

they support the formation of “home” territories and mobility hierarchies. We illustrated how motorised rhythms that enfranchise roads as the domain of fast vehicles have an intensity that is hostile towards slower vehicles. Our analysis highlights that to belong to traffic as a social identity currently means confirming to the hierarchies of an automobilised society, in which only the most able-bodied and fastest bike riders belong. Finally, our study highlights the affective dimension of rhythms. Our interpretation points to how the affective intensity of sharing rhythms that enable the synchronisation of movement, can serve as an incentive to pedalling. Affective synchronisation of bike rider movement occurred through shared gestures, skills, competencies and speed that territorialised cycleways. In contrast, our interpretation underscores how the affective aspects of arrhythmia generate chaotic forces that operate against a spatial order, acting as a disincentive to pedal. We suggest that Deleuze and Guattari's notion of territory has potential to advance understandings of everyday mobility choices by conceptualising how the sensations of synchronising rhythms matter in (re)making transport hierarchies and in (de)stabilising the spatial order of public space.

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## DATA AVAILABILITY STATEMENT

Research data are not shared to maintain participant confidentiality.

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