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Uber, airports, and labour at the infrastructural interfaces of platform urbanism

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Abstract

Recent interest by human geographers and urban scholars in the spatialities of platform companies such as Uber and Airbnb has generated a wealth of contributions on *platform urbanism* – a concept that captures the urbanization of algorithmic business models and sharing economies.

This article explores the interface between platform-mediated labour on Uber, the largest ride-sharing company globally, and the geography of the international airport. To comply with or overcome physical and regulatory barriers that airport precincts are subject to, as well as to manage e-hailing-related conflicts, Uber relies on a series of material adaptations which make its algorithmic platform function. These material adaptations range from sign boards, to attendants wearing high-visibility vests, to car lots specifically designed to embed AI-managed labour into the city.

With two ethnographic vignettes set in Mumbai's and Cape Town's airports, this essay charts some of the ways in which urban infrastructures and algorithmic platforms transform each other. At their interfaces, labour is algorithmically managed and made invisible, but alternative transactions and different visibilities are also enacted. This paper thus makes a case for charting the singularities of platform urbanism and its labour.

Keywords

Acknowledgements

Introduction

The thinking that sparked this essay began as I landed in Cape Town, South Africa, for a period of research in the Spring of 2019. Having arrived on a crowded late-week evening, I booked an Uber and followed the prompts of the app, which invited me to reach the designated pick-up area — on the ground level of a multi-storey car park outside. As I walked toward the building, in the windy air of the Cape, I could not help but notice how the airport had been physically transformed to embed e-hailing. Since 2015 I have had the habit of recording research notes about most of my Uber transactions, therefore the changes at Cape Town International Airport immediately struck me as new. Several yellow signs would guide passengers to what was described as the 'e-hailing pick up area'. There, a few small crowds of customers were waiting for their Uber and Bolt drivers, distributed across different pick-up platforms, each signalled by a number. Another large, yellow, back-lit board visibly hung above the vehicles.

The wayfinding signs at Cape Town International can be described as an infrastructural interface that eases e-hailing airport transactions. Smoothness is indeed one of the qualities of world-class airports (Elliott & Radford, 2015), as well as one of the features upon which the economies of "platform urbanism" are predicated (Leszczynski, 2019a; 2019b; Barns, 2020a). This essay explores precisely the interface between the modernist urban infrastructure of the international airport, and platform-mediated labour on Uber, the largest ridesharing company globally. In doing so, my contribution follows in the footsteps of a growing body of literature that seeks to chart the spatialities of platform companies, starting from the urban sites where algorithmic business models are tested and embedded in both existing and new infrastructure.

The concept of "platform urbanism" captures a series of interconnected phenomena associated with the urbanization of technology capital driven by companies that rely on platform business models, but also with the diffusion of data-driven services upon which new forms of urban governance and citizen engagement rely (Barns, 2020b; Borghys et al, 2020). While platform urbanism research spans across diverse areas of studies that range from urban policy to geographies of labour, in this paper my focus is on the urban spaces through which so-called 'platform companies' engineer their urban economies and regimes of labour. In this line of research, platform urbanism does not only acknowledge the

increasing political power that such companies wield on cities (see Ferreri & Sanyal, 2018; McNeill, 2016; Sadowski, 2020; 2020; Söderström & Mermet, 2020) but also the fact that urban environments function as testbeds for platform business models (Shaw, 2018; Barns, 2020a) and are therefore inextricable from their very functioning. For Sadowski platform urbanism inaugurates new forms of rentier capitalism that have long been in the making (2020c) and sheds light on "how digital platforms are intertwined, even symbiotic (or parasitic), with urban space and society – and the critical and uneven implications of that relationship" (2020a, p.5).

This paper draws two strands of literature on platform labour and platform urbanism together: on the one hand, it contributes to research that has sought to uncover how the labour of platform urbanism is managed and made invisible (or visible) depending on the needs of the platform (Rosenblat, 2018; Altenried, 2019; Ravenelle, 2019; Richardson, 2019). On the other hand, I draw on research addressing the physical interfaces and locations through which platform operations are embedded in the city (Bissell, 2020; Huws, 2020; Odendaal, 2020). In doing so, I follow two important cues. First, as Graham has put it (2020), that platform urbanism inevitably features "spatial bottlenecks": this is where algorithmic businesses need to negotiate their existence in the urban space and are therefore prone to glitches, hacks, and breakdowns. Second, I embrace a call made by economic anthropologist Jane Guyer (2016), to chart how contemporary digital platforms rely on the existing grids and structures of the modernist era, continuously transforming each other. Guyer's work has historicized and placed platform capitalism within a longer thread of conflicts at the interface between different, at times irreconcilable economic systems and infrastructures (2016).

The main argument of this essay is that the labour of platform urbanism, whose "algorithmic management" is now well documented (see, beyond the cited above, Griesbach et al, 2019; Oppegaard, 2019; Whittaker et al, 2019; Wood et al, 2019), also relies on small adaptations of modernist urban infrastructure such as airports. These infrastructural interfaces, I suggest, are integral to the algorithmic management of platform-mediated work, and to its regimes of flexibility and invisibility. On the other hand, the infrastructural interfaces through which algorithms are made smooth and invisible are also the places where they may break down, coexist with alternative economic transactions, and become visible in different ways. In this sense, these infrastructural interfaces reveal that if platform urbanism is indeed the urbanization of platform businesses, this is never a complete project (Leszczynski, 2019). Not only alternative platforms are always in the making (Scholtz, 2016; Lynch, 2020), but at the interface of profit-making companies such as Uber and the city there is a radical indeterminacy of economic forms, labour regimes and future possibilities.

When I noticed the wayfinding signs in Cape Town, it was not the first time that I had observed the microinfrastructural arrangements used by Uber (and airport authorities) to make ride-sharing

economies function seamlessly. In fact, those yellow signs in the car park induced me to go back to ethnographic notes that I had taken two years earlier, while at Mumbai International airport. There too Uber had installed a signage system and devised a pick-up apparatus to manage the e-hailing crowds of a large airport. A few days after my arrival in Cape Town, I also contacted a driver whom I knew from my earlier research with Uber drivers in city (Pollio, 2019). It is thus that I found out about a parking lot in an industrial area not far from the airport's precinct, a small plot of land where Uber drivers wait for their airport calls, through an algorithmically managed waiting system.

These two spaces —the multi-storey car park at Mumbai International and the parking lot outside Cape Town International— are the ethnographic settings of this paper. They are also, I will argue, part of the infrastructure through which the labour of Uber's platform economies is smoothly embedded in the city. Starting from these sites takes this paper in a different direction from research that seeks to understand platform urban economies and labour from the vantage point of the platform itself, as Langley and Leyshon have posited (2017). In fact, my contribution begins with an emblematic modernist infrastructure, the airport, where signs, benches, car parks and other microinfrastructural arrangements function as interface between Uber, its labourers and urban space. There are, of course, several other examples of seemingly minor devices and spaces that make platform companies work by nesting onto existing, complex, urban systems. Consider the self-check-in lockboxes for Airbnb customers described by Ravenelle (2019). Residential buildings are not radically transformed by these small devices, which end up being hidden behind backyard fences or mailboxes. Yet lockboxes enable multi-property hosts to manage several check-ins without relying on additional human labour, in the same way as more sophisticated forms of automation contribute to the financialization of housing rental markets (Fields, 2019; Fields & Rogers, 2019). Similarly, dark kitchens for on-demand delivery services may have little impact on the urban fabric, but are reshaping the food-labour geographies of many cities (Richardson, 2019), and, possibly, the ways in which platform labour becomes invisible (see Gray & Suri, 2019; Griesbach et al, 2019).

As I will further explain in the conclusion of this essay, the reason for exploring these infrastructural interfaces is twofold: first, it makes a case against Uber (and other companies) which – in monetizing the labour of platform urbanism – often describe themselves as third-party providers of systems that only exist in the digital realm. Uber specifically made this argument in a number of court cases (e.g. Gollnick vs Uber Technologies, 2017; Adonnis Biafore vs Uber Technologies, 2018) maintaining that the drivers' work is external to the platform that Uber provides (and that therefore drivers are not entitled to employees' standard benefits). In fact, my essay shows that this claim is partial at best, as Uber supplies interfacing systems that extend, as in this case, into the physical space of the airport and that constantly operate to invisibilize and algorithmically manage gig labour.

Second, a more fine-grained understanding of platform urbanism emerges from these infrastructural interfaces – one that considers both how platform companies use urban space as a profit terrain and the cracks, glitches, and ruptures that happen because of these interfaces. It is through these spatial bottlenecks, Graham (2020) suggests, that the possibility of fairer forms of gig work may stem, as well as, I argue, a critique of platform urbanism that is attentive to what in this journal Bissell has described as "the actually existing configurations of platform and cities" (2020, p.103).

Before moving to a more in-depth discussion of platform labour and its interface with the international airport, I begin with a reflection on the methodology underpinning this essay: ethnographic writing as a strategy to chart platform urbanism.

Platform urbanism and an ethnography of infrastructural interfaces

The idea of platform urbanism describes the ubiquity of digital platforms in both urban governance and in the urban economies generated by platform companies, their business models, their financial operations and their multiple assets (Langley & Leyshon, 2017; Barns, 2019; Sadowski, 2020). Among different strands of research on digital platforms, here I am interested in the nexus between what Srnicek has called "platform capitalism" (2017), and the different regimes of labour that stem from its urban forms. In this respect, whether platform urbanism and platform capitalism describe the exact same phenomena has been object of debate.

For Rodgers and Moore (2018), for example, the notion of "platform urbanism", as a theoretical move away from platform capitalism, is useful because it suggests that "there are emergent, irreducible, co-generative dynamics between platforms and the urban" (2018). Conversely, and while in agreement with Stehlin's argument that both the platform and the urban are "built environments", "whose mutual entwining creates landscapes of locational advantage that bridge the physical and the digital" (2018), Barns – one of the first urban scholars to use the term – has insisted that platform urbanism cannot be exclusively reduced to the logic of capital extraction that the concept of platform capitalism suggests (2018). In a related critique of what she describes as "totalizing analytics" (2019b, p. 14), Leszczynski has further noted that

> advancing platform urbanism as the spatialization of platform capitalism […] anchors the
> categories offered by political economic orthodoxy for making sense of *capitalism* as default
> epistemological entry points for empirically engaging with and theorizing platform *urbanism*
> (2019, p.7, original italics)

In her work, Leszczynski thus uses the figure of the glitch – the technical imperfection and its correction – to renarrate the platform and the inevitably dystopian futures that emerge from viewing

the city simply as a theatre of extractive operations. For Odendaal, platform urbanism is indeed a contextual, "continuous process of emergence and remaking" (2020, p.216), in which platform/city interfaces disclose how diverse, fragile and place-dependent are the configurations of what companies like Uber represent instead as flat, frictionless and globalized business operations. In a similar vein, Bissell has recently suggested that the actual sites of platform urbanism are vantage points to observe different aspects of its operations, for instance its affective dimensions (2020) as well as the blind spots and failures of platform companies. Although such glitches (and fixes) should not be fetishized, because they might be symptomatic of the inherent forms of inequality scripted into the very design of technical systems (Benjamin, 2019), these ruptures in the smoothness of platform economies point to what I call 'infrastructural interfaces' as sites where the unfolding of the labour of platform urbanism can be observed.

At once, infrastructural interfaces reveal how platform companies such as Uber operationalize these contact zones to their benefit, and how the possibilities of circumventing and repoliticizing the algorithmic management of work stem from these same, often glitchy, interfaces. How to engage the interfaces of platform urbanism is therefore an important epistemological question, especially if we embrace Graham's call (2020) for exploring the conjunctural sites that render platforms vulnerable, or dysfunctional. In a recent agenda-setting paper, Fields and her colleagues (2020) have listed a series of possible "platform methods" that encompass different empirical engagements with platform urbanism[1]. To these strategies, I suggest adding – and I experiment with – an additional possibility that has a rich tradition in urban studies: an ethnography of infrastructure (Star, 1999).

In this essay, infrastructures are both the algorithmic software and the airport space. Specifically, to explore the interface between them, I use three of what Star described as "tricks of the trade" in her original 1999 article — that is, three of the possible starting points to read infrastructure. These are: the identification of the master narrative (in this case, the management of the drivers' flexibility), the surfacing of the invisible work performed by infrastructure on other forms of work (in this case, the work of the airport onto the algorithm to make drivers invisible or visible depending on the need of the platform) and the recognition of the paradoxes of infrastructure (in this case, dysfunctions and anomalies that emerge at the intersection of the airport infrastructure and the ride-sharing algorithm). Accordingly, such ethnographic practice entails an "infrastructural inversion" (Bowker, 1994), by which the background of work comes in the foreground.

Critiques have been levelled at the practicality of Star's approach, which, as Larkin has argued, is based on a simplistic understanding of the visibility of infrastructural work (2013). However, Star's radical simplicity in approaching infrastructure has a value in its capacity to shift between work and

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1 Another reflection on methodology is in Odendaal, 2020.

infrastructure — which is the area where this paper hopes to make a contribution. It would be a mistake to argue, for example, that the algorithmic management of platform labour and its infrastructural underpinning are not, at least in part, invisible. And the question of visibility is so central to platform-enabled labour that Star's tricks of the trade may contribute to a better understanding of its existing urban interfaces. An ethnography of infrastructure is, in other words, a useful simplification, one that maintains the political economic category of labour and however moves away from the totalizing accounts of platform capitalism criticized by Leszczynski (2020). As Guyer writes,

> a platform is hugely complex as it is now constructed. But it is also ambiguous and entangled. So we may not be trying to describe all of it. But we should be taking key phenomena, key foci, and following the components and connections as far as they take us [...] (Guyer, 2016, p. 126).

In my case, as I narrate in the last two sections of the article, these connections took me to my own archive of ethnographic entries and to a small plot of industrial land outside Cape Town International airport.

This brings me to another methodological note. Although in what follows I narrate two brief, unrelated encounters with the interfaces of Uber's platform and the airport space, my analysis of these short vignettes draws upon a much longer research engagement with ride-hailing, condensed in the form of a travel diary – a genre of note-taking that has long been practiced in mobility-related research (see Büscher & Urry, 2009). In a repository of journal entries, annotated screenshots, and clippings, I have collected observations on more than four years of Uber transactions and encounters (Image 1). Through this practice, which began as a lateral project of my PhD research in the entrepreneurial scene of the Western Cape of South Africa, I gradually educated myself to what Tim Ingold describes as the "attention" of the fieldwork (2014) – the capacity to attend to what surrounds us. I immediately noticed the yellow signs in Cape Town's car park precisely for this reason.

While Ingold, however, questions the very possibility of the so-called "ethnographic encounter", arguing that documentary intentions should not be conflated with the unfolding of the observational engagement (2014), my diary was always meant to be ethnographic, even if it occasionally felt as an act of scavenging, as Seaver puts it (2017, p.6). This is because some of the research undertakings that we are passionate about only exist prospectively, for practical reasons that I am not listing here but would certainly include being a precarious researcher working on several different, often unrelated projects – that is, working in the privileged, academic version of the gig economy. It goes without saying that – in conducting research with Uber drivers over several years – I found myself falling in and out of official, approved ethics procedures. From the beginning, however, I developed my own systematic protocol, which involved always declaring my research interests and desire to write about

their stories to the drivers I engaged – as well as recording notes of the trails and traces that even the most secretive platforms inevitably leave behind. I discuss the limits of this strategy in more detail elsewhere (McNeill & Pollio, 2018). For example, I cannot extricate myself from the transactional logic that was often pegged to my note-taking activities, if anything because I was a user as well as a researcher. I however always saw an opportunity, through my diary of transactions, conversations and screenshots, to catch a glimpse of the platform mechanisms designed to create informational black boxes between drivers, users like myself, city officials and so forth.

In selecting the material for this essay, I therefore draw together some of my diary entries centred on the airport interfaces of platform urbanism, and for this reason Star's tricks of the trade (1999) are useful to navigate the analytical writing of what follows. It is precisely in the possibility of drawing different aspects of airport e-hailing together that I find my Uber diary to be the strategic starting point for the kind of "thin" ethnography described by Jackson (2013). Such a thin ethnography acknowledges the inescapable incompleteness (and "autoethnographicness") of any ethnographic writing, but, importantly, is also a strategy for cutting thin slices of different scales, locations and varying degrees of personal involvement – in the way a travel diary often does. Brought to the domain of digital platforms, Benjamin has suggested (2019), "thinness" mirrors the kind of screen-mediated interactions that are often the starting point of our engagement with technology. In my case, thinness also aligns with the insight that fine, subtle infrastructural interfaces reveal the radical indeterminacy of the work of platform urbanism.
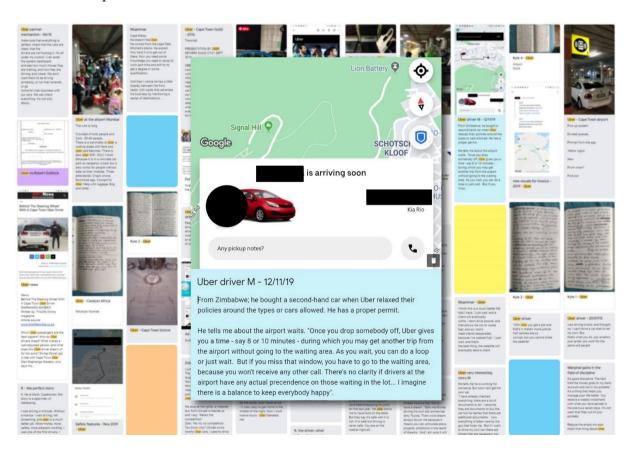
Image 1. A screenshot capturing one entry in my Uber diary. It contains more than 180 entries, ranging from journal entries, annotated screen grabs, observational notes, videos, photos, and other multimedia clippings from various sources. Most entries are tagged with keywords (e.g. transaction, airport, etc.).

Airport spaces and the qualities of platform labour

Airports have traditionally been sites of geographic research, most visibly because global air travel is an important proxy to gauge transnational relations between cities (see Derudder & Wilcox, 2005; Zook & Brunn, 2006; Pirie, 2006). Airports, however, are not just places of passenger transit. They are also large urban machines which, as McNeill has argued, entail complicated rapports with their cities and their countries (2011; 2014). Airports are also vantage points for observing the spatial and economic politics of mobility (see Crang, 2002; Adey et al, 2007) or the (bio)politics of security and border practices, as represented by a large body of work at the intersection of anthropology, geography and critical security studies (see Salter, 2008; Adey, 2008; 2009; Amoore & Hall, 2009; Martin, 2010; Schouten, 2014). Airports are also sites of logistic labour (see Kanngieser, 2013; Vukov & Sheller, 2013; Kumar, 2017), urban planning conflicts (McNeill, 2014; Hilbrandt, 2017), and competing calculative practices (McNeill, 2010).

The interest of this paper is not in the airport per se, but in its ancillary spaces which, I argue, are transformed by and themselves transform e-hailing in order to facilitate platform-capitalistic "operations" (Mezzadra & Neilson, 2015) that monetize the labour of platform urbanism. Specifically, the next two sections focus on two ethnographic vignettes that are set in a multi-storey car park and a parking lot, both located within the infrastructure of the airport. Some of these secondary airport spaces — from the airport hotel (McNeill, 2009) to informal logistic villages (Chakravarty, 2016; Kumar, 2017) — have already found a place in airport-related research. Here, I combine these insights with current research on the forms of labour of platform urbanism– often themselves described as "platform labour". The latter is broad notion that has been used to characterize a range of activities carried by both human and non-human actors to enact platform economies (see Whittaker et al. 2018; Wood & Lehdonvirta, 2019, Spangler, 2020). These activities range from gig work to emotional work, to the very making of algorithmic software that manages the latter.

In this broad literature – too vast to fully acknowledge here – two concerns seem particularly relevant: the question of flexibility and the question of (in)visibility. Oppengaard, for example, has shown how managing flexibility is at the heart of Uber's algorithm (2019). Flexibility is also the promise through which the supply side of the service is sourced (Pollio, 2019). Algorithms designed to allow flexibility, in fact, are full of nudges and features that constrain, orient, and track platform work

(Kanngieser, 2013; Griesbach et al, 2019; Wood et al, 2019). Arguably, the labour of platform urbanism emerges at the intersection of the flexibility, the precarity and the software-mediated control of the workers (Malin & Chandler, 2017; Munn, 2017; Rosenblat, 2018; Altenried, 2019; Ravenelle, 2019; Spangler, 2020) Even state-driven platformization, as Lin and De Kloet have shown (2019), engenders forms of calculated, flexible precarity.

Visibility is another defining quality of platform labour. On the one hand, algorithms are invisible and inaccessible to the workers that they manage (Whittaker et al, 2018). Platform urbanism appears to be based on deep information asymmetries between the managers and the managed (Rosenblat & Stark, 2016; Annany & Crawford, 2018). On the other hand, it is labour itself that becomes visible, or invisible, depending on the needs of the platform. Dark kitchens are the most prominent example of labour that is — rather literally — made invisible to make food delivery platforms work. Even when these companies release their data sheets, as Uber recently did with its *Movement* website, the workers' labour involved in producing data is obfuscated (Attoh et al, 2019). Artistic labour too, Bonini and Gandini have argued (2019), is subject to new algorithmic regimes of visibility, in which the threat of invisibility constitutes one of the platform's mechanisms. Conversely, the ubiquity of rating systems makes the emotional labour of Uber drivers, Airbnb hosts, and other freelance workers an extremely visible feature of platform urbanism. Unsurprisingly, gig economy workers have also based their political fights for labour rights on making themselves and their "ghost work" (2019) *more* visible (see Rossi, 2019; Newlands et al 2018; Graham, 2020).

It is these two aspects of platform labour on Uber — its algorithmic management of flexibility and its (in)visibilities — that the next two ethnographic sections explore, in the ways in which they are both enabled and defied at the urban interface with the modernist infrastructure of the airport space.

Chhatrapati Shivaji Maharaj International Airport, Mumbai, December 2017.

Between 2017 and 2018, recently diagnosed with chronic arthritis, I took a sick leave from my PhD and ended up spending some time in India, where I finished writing my doctoral dissertation and took a break from the intense teaching of postgraduate life. Upon my arrival at Mumbai's international airport, and failing to get cash from an ATM in the airport, I called an Uber[2]. The app notified me that I needed to leave the arrivals hall, and reach a designated area of the multi-storey car park facing the

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[2] On the ethical aspects of my own use of Uber, I refer to what I wrote elsewhere about the peril of overgeneralizing ridesharing platform ethics according to, for example, the categories of Western precariat (Pollio, 2019). Pre-existing or alternative forms of mobility might be similarly imbricated in the forms of predation that are attributed to ridesharing platforms. Depending on the gender, the socioeconomic status and the context in which one happens to be, Uber might be the safest, the most feasible or even the only mobility option available.

airport. As I walked past the fractal columns designed by global architecture firm SOM, I started to notice Uber signs. At the beginning, makeshift paper arrow-signs taped on the walls. As I got closer to the area indicated by the app, the signs appeared to be proper Uber banners, with the company's logotype and the unmistakable black&white corporate colours.

Having conducted research on Uber during my earlier fieldwork in Cape Town (see McNeill & Pollio, 2018) I took notice of the signs and of the algorithmic interaction that had guided me from the cool dry air of the airport into the Mumbai-hot humid air of the car park. There, an Uber counter was attended by three young men wearing high-visibility Uber vests and handling at least thirty local and international voyagers. The small crowd was crammed on a small pedestrian platform that was clearly not designed to host a temporary stall and large numbers of people with overloaded trolleys. Within the waiting area, Uber-branded benches would cater for older people needing to sit down during the wait, and dusty fans would blow air on the Uber attendants.

As my wait for a car eventually lasted for almost 45 minutes, I observed that the three men were involved in a range of different operations. They were helping passengers download the app, recognize their drivers amidst a fleet of very similar cars with very similar licenses, and load their luggage into the boots. Most importantly, they functioned as an infrastructural patch for people without an active internet connection. Looking at my phone I noticed that, probably because of the multiple levels of concrete above us, the connectivity was very low, barely sufficient to update me about the position of my driver, who was stuck in Mumbai's evening traffic. For less fortunate customers and for passengers without mobile data, a router within the stall provided a stable internet WiFi connection. The attendants would take somebody's phone, connect it to the Uber-provided WiFi, and e-hail a driver on their behalf and according to their requests. They seamlessly switched between many of the languages spoken on the subcontinent. Once in my Uber driver's car, slaloming between vehicles and trolleys, I realized that another Uber attendant was manning the exit to the ramp. Also a young man, he checked the driver's phone to verify that we were on an actual Uber trip. I immediately asked about the quick transaction, which my driver explained to me as a verification step that avoided dysfunctions in the use of the service. Accordingly, given the crowded and messy space that the airport authority had provided for e-hailing customers, many of them used to get frustrated for the long wait, would cancel their trip, and eventually jump on a random Uber car — possibly the car of a driver whose trip had been cancelled by another customer. Other drivers would purposefully ask the customer to cancel the trip and give them a discounted fare. To avoid these cash-based transactions, which were invisible to Uber's profit mechanism, a person would now verify that drivers leaving the car park with people in their back seats were actually on an algorithmically tracked trip. This was also a safety precaution, the driver added, probably referring to the then recent news of the violence perpetrated by an Uber partner on a female customer.

Out of the car park, on a barely lit stretch of asphalt connecting to the airport's main spaghetti junction, we encountered another checkpoint. This time, the driver paid some money to the older person who was standing at the boomgate and who had asked him for my destination. This was another very quick transaction in which my driver showed the Uber app to the gatekeeper and repeated the address that I had typed in the app as part of the e-hailing process. How my destination was relevant information I do not know. Possibly, the driver was asked to pay an additional fee dependent on his future trip income. These types of "lumpen" fees are not uncommon in Indian airports (Kumar, 2017). As Bedi (2016b) has suggested, writing about taxis in Mumbai, infrastructural modernization projects – of which the international airport car park fly over is an evident example – impose their novel logics of order to what seems unruly but these new infrastructural rationalities land where existing urban economies have their own logics and do not cease with the arrival of new systems. My driver had carefully prepared a little sum of rupees and laid them in the pocket near the manual gear. The gatekeeper had asked for more. I had no way of verifying what the base of that calculation was: when asked, this time, my driver was quiet. He shrugged but did not answer.

This sketch sheds light on how a transport infrastructure's ancillary spaces are operationalized to embed platform economies such as Uber's, with physical elements (gates, benches, signs, banners, WiFi routers, attendants, desks and fans) that make e-hailing work in a crowded, jammed, world-class city airport such as Mumbai's. Without these devices, customers would still find their drivers, would still find ways of e-hailing in lack of internet connection, possibly through the airport's free WiFi, but the process would not be as smooth, and informal transactions would escape Uber's profits — which are based on a cut of each trip fare. In other words, this vignette attests to the spatial transformations that companies like Uber, which have been described as "global urbanists" (McNeill & Pollio, 2018), enact or require to make their economies work, in order to monetize and maximize platform labour. In the space on an airport, platform labour exists in continuity with other forms of what Sen and her colleagues have described as "transit labour" (2012). The latter is a concept that captures both the intrinsically logistical nature of airport-related work but also the ephemeral nature of this work, continuously upended by technopolitical transformations, from new software updates to new regulatory regimes and security standards. Transit labour and platform-enabled labour are obviously not the same but exist on a continuum punctuated by conflicts and alliances that the airport infrastructure enacts.

Mumbai's new airport terminal, with its large cantilevered roof inspired by traditional Indian peacock-shaped pavilions, is also a telling example of how infrastructure such as airports have ambiguous, conflicting relations with their cities (McNeill, 2011). Looked from above, the airport's asymmetrical shape reveals the fight against displacement and slum removal that eventually dictated the decision to not complete one of the wings of the building (Ren, 2017). The formal and informal economies built in and around its car park, beginning with the Uber's counter that I have described,

hint to the battle over who and what is valued in the making of platform urbanism: the customers, the drivers, their networks, Uber's profits, the airport's placement in international rankings, and so forth. A traveller would certainly recognize this sort of crowded counters in many other large cities of the global South, where airports have become symbol of progress, the gateway for international tourists, the site of struggles over land, work and the right to live through and of mobility (Kumar, 2017), and where taxi mobilities represent the pace towards an ideal type of world-class urban modernity (Bedi, 2016a). These counters are also one of the infrastructural ends of the e-hailing business model underpinning companies such as Uber, Ola, Lyft, Grab and Bolt, for which India is one of the fastest growing markets.

At the same time, airport ancillary spaces are operationalized by informal or semiformal economies that are nested onto the platform-mediated business of ridesharing. Some of these transactions, I have argued elsewhere (2019), are predatory; some others are forms of protection and actual forms of sharing (see Richardson, 2015; Waite & Lewis, 2017). Silver has suggested that "popular economies" are not, in fact, extraneous to the functioning of platform urbanism (2019). Neither are they external to taxy cultures in a city like Mumbai (see Bedi, 2016). Many of these economies happen in defiance of the strict regulations of software-enabled transactions, even when, as in this case, additional levels of airport security and verification on behalf of Uber are layered onto the space of a multi-storey car park. Companies like Uber do try to harness and curb the possibility that drivers gain through ridesharing from without the app, but they have not been, thus far, fully successful. For Graham (2020), this is because platform-capitalistic economies are simultaneously embedded and disembedded from their geographies. They are therefore prone to hacks and circumventions – "hidden transcripts" (Anwar & Graham, 2020). A similar argument has been made by Stehlin and colleagues (2020), who use a series of sharing mobilities to underscore their inherent fragility. My argument here is also that, to use a metaphor borrowed from Ferguson (2007), platform economies exist as "islands" among what remains a much more complex set of transactional logics of exchange that the modernist airport underpins. The driver's payment at the exit of the car park shows how the economies that exist on the outside of platform urbanism beget their own forms of labour, their own forms of security and flexibility, and their own ways of relating to the airport's urban infrastructure.

After jotting notes down during my first evening in Mumbai, I had very few other ride-sharing transactions, and mostly with Ola, an Indian competitor which, according to many drivers, took a smaller cut of their fares. In fact, I had not thought about my notes from that night until, after landing in Cape Town, I went back to my archive of diary entries and screenshots on 4 years of Uber transactions.

Cape Town International Airport, Cape Town, October 2019

Almost two years after my encounter with the Chhatrapati Shivaji Maharaj Uber's counter, and almost four years after my research with Uber drivers in Cape Town (Pollio, 2019), I eventually travelled back to the South African legislative capital for another period of field research. As I mentioned at the beginning of the paper, the yellow signs at the airport prompted me to go back to older field notes and, some days later, I contacted Kyle, a Zimbabwean Uber driver whom I had interviewed in 2015. A quick Whatsapp conversation was followed by the agreement that we would meet, and he would explain to me how airport pick-ups had changed since I had last been in the Cape.

When we met, Kyle began by saying that airport e-hailing had become more complex, and that I should see a parking lot that Uber had arranged a few kilometres outside the airport, in an industrial area called Boquinar. He was willing to take me there, and he did so, dropping me a couple of hundred meters from what, on Google Maps, appeared to be an empty piece of land, surrounded by warehouses. Many of the surrounding buildings in the industrial precinct were somehow related to the airport logistics and supplementary services. As Kyle waited in the car, I was the only pedestrian on a road that, at least at that time of the day, was very busy with small trucks, vans and vehicles.

Eventually, I reached the Uber waiting lot. Contrary to its appearance on the satellite photos, the plot was not empty. A low but acuminated metal fence surrounded several sheltered car parks, all shaded by metal tents, and a two-storey prefabricated building, which was marked by an unmistakable Uber sign on its main door. Several cars were parked in the lot, which reached the very end of the industrial precinct, on the border with the highway. On the other side of it, separated by several lanes, I could see a pocket of informal settlements called Barcelona. The corrugated-iron roofs of the shacks gleamed in the distance. In the 90s, the airport became surrounded by a few of these settlements, which originated from backyarders living in what apartheid planning had designated as the first black townships of Cape Town (Nyanga and Gugulethu). The location of these black-only settlements in the airport proximity is a spatial reminder of the environmental racism of apartheid planning (see McDonald, 2002).

Three drivers were standing at the gates chatting with a security guard. I would have liked to engage them, but I also felt that my presence was out of place. In a sense, I was aware of the implications of the type of 'fieldwork' that I was conducting. As Mattern has suggested (2016), bravely venturing to the remote corners of the digital world is both a sign of the privilege of the explorer and an echo of colonialist explorations. Perhaps, not seeing and leaving parts of the world unseen, she has written, is the practice of conscientious ethnographers. Whilst not relieved by the privilege that had brought me there, I walked back to my informant, who, sipping his coffee, explained to me how the parking lot functioned within the geography of airport e-hailing.

For almost two years, he elaborated, the lot had been the only way of getting a call from a customer at the airport. Uber had established that drivers willing to pick up clients from the airport arrivals area had to queue outside the airport precinct, and wait for their turn from the parking lot in the nearby industrial area which I had just walked through. At the beginning, drivers would be waiting on a surface of unpaved dirt, causing cars to be constantly dusty. Following protests from both drivers and customers, Uber had paved the entire lot with asphalt and upgraded it with shelters, toilets, food-vending machines and an office building that functioned as the drivers' help centre. This upgrading was recent enough not to appear on the satellite photos.

Only a limited number of cars would be allowed in the lot at the same time, and yet, Kyle noted, wait times could be as long as three hours. Drivers entering the lot would be given a waiting time based on their position in the queue. Eventually, they would receive a call. Or a pre-match, which would assign the first driver in the queue an empty call, based on an algorithmic calculation of relative traffic at the airport. The pre-match meant that the driver ought to start driving towards the airport, as it was highly probable that in the following minutes a client would be assigned. Rejecting a pre-match would result in being placed at the back of the queue. It goes without saying that, for a driver waiting for hours in a parking lot and then given a very small window of possible work, the promise of flexibility clashed with the reality of platform labour at the airport.

According to Kyle, there were more than one reason for Uber's decision to create an obligatory passage point in accessing the airport's outbound clients. These were his own speculations because, as with other changes that had happened on the platform, causing disruptions for drivers (for example, the introduction of cash, which had made drivers feel less safe), Uber had been rather secretive about its unilateral decisions. Most importantly, Kyle thought that the parking lot was a consequence of the high value of airport trips in relation to the skewed income geography of the city. Located some 20 km outside the city bowl, or similarly long distances from wealthy suburbs and tourist hotspots, the airport is surrounded by several kilometres of very poor townships, where very few Uber customers reside. Therefore, airport trips usually take riders on long, valuable journeys. They are a fundamental resource of income to make up for a bad week, especially during the low Winter season. In the cold months, Kyle explained, there used to be hundreds of drivers roaming around the airport, desperately waiting for that long trip. In a sad irony, the environmental racism of apartheid planning, which had located black townships close to the airport, was now a valuable geography of ride-sharing trips.

The parking lot had rationalized the driver crowds, but also helped with another issue, Kyle believed. Year 2018 had marked four years of Uber operations in Cape Town and the peak of a conflict with the city, which had impounded hundreds of vehicles not in possession of the right kind of driving permit. In the years before, the council had decided to regulate e-hailing by releasing a limited number of concessions. The procedure had left thousands of drivers in a condition of unlawfulness, and amidst a

battle with metered taxi and minibus drivers. Making drivers 'invisible' by relocating them in the parking lot had been a way of protecting them from these fights, and allowing them to keep working in semi legal conditions, out of sight. I had no way of verifying Kyle's suppositions, but if true — and it is true that the city issued less permits than drivers already on the road and that the latter had been victim of violent attacks from taxi and minibus drivers[3] — his observations show that the invisibility of platform labour is a much more complicated matter than what most research currently allows for.

The end of our conversation was about how the waiting lot had changed work for him. He was, by his own admission, a fortunate driver. Not only did he own his car, unlike many drivers who had to share their already meagre income with often predatory car owners (see Carmody & Fortuin, 2019; Pollio, 2019), he also possessed a proper permit. Before Uber, he used to be a professional private driver and still had several foreign clients who trusted him and paid him in cash. He did not depend on the airport calls. He would only get the inbound ones, picking riders from the streets of the city, and hope for a re-match with a new customer at the airport, something that Uber still allowed. He had tried the car park a few times, and the wait had been less alienating than he had thought. He had talked to other drivers. Only those who had waited long enough to be close to a call would wait inside their cars, in order not to miss the opportunity of a customer. Some would sleep in their cars. Others would stay outside and chat.

Kyle believed that something new had emerged from the waiting lot. He thought that being forced to wait in the same small piece of land had generated more opportunities for connection among the drivers. A year earlier, a group of drivers had taken the streets and blocked access to the airport, as a form of protest. Some members of the "Guild"[4], an informal association of drivers guiding collective action against Uber and the city, had used the airport car park to sign people up on their Facebook page and their Whatsapp group, an online space of debate and collective organization. Kyle, in his own words a very individualistic driver, had stayed away from the Guild, in fear of the deactivation threat that had been weaponized by Uber against some of the original Guild founders. However, he had noticed how the parking lot, whilst making Uber drivers less visible to the city and to the taxis, had made them more visible to each other. Was Uber aware of this? He nodded and added that there was not much they could do about it, now.

Kyle's observations show that the whilst the purported freedom of platform workers to operate flexibly in time and space had needed to be curbed through a specific infrastructural bottleneck, whereby both the e-hailing algorithm and the airport space had been mutually transformed, the very same infrastructural interface had generated a new regime of both visibility (among drivers) and

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[3] https://www.groundup.org.za/article/uber-drivers-battle-get-licences/ [accessed 30/10/2019]
https://www.groundup.org.za/article/uber-drivers-say-theyre-being-harassed-taxis/ [accessed 17/10/2019]
[4] https://www.theatlantic.com/business/archive/2018/09/uber-south-africa/567979/ [3/11/19]

invisibility (with respect to the rest of the city). If, as Mains has noted (2019), infrastructures also work for what it is imagined that they do, regardless of what they actually do, Kyle's speculations about the new political possibilities engendered by the car park should be taken seriously. For him, the waiting lot would create the condition for a fight that many other platform workers have already engaged in (see Rosenblat, 2018; Rossi, 2019; Wood & Lehdonvirta, 2019). A fight that would not start from the platform, but from the interface with old-fashioned modernist infrastructure that the former needs to function smoothly in contemporary cities.

Conclusion

This essay has explored the relationship between platform-mediated labour and the airport space. Through the lenses of an "ethnography of infrastructure" (Star, 1999), three observations can be drawn.

First, the necessity to manage the flexibility of Uber drivers appears as one of the key mechanisms by which the airport and the algorithm transform each other at their infrastructural interface. Flexibility is both a temporal and spatial quality of platform labour (Altenried, 2019; Richardson, 2019). Both the pick-up system at Mumbai's airport and the car park in Cape Town were clearly established to render airport pick-ups more efficient and, in turn, these adaptations made the drivers' work less flexible. The fact that platform workers are more precarious that actually flexible is not a new claim (and that flexibility is a mechanism for lowering wages - see Crawford et al 2019). It could also be argued that traditional taxi operators also use airport space to operationalize their pickups. What I highlight here is that the management of Uber drivers' flexible labour also relies on urban spaces and infrastructures that are outside the platform. And that also from outside the platform, for example through existing informal economies that are afforded by the airport's ancillary infrastructures, ulterior mechanisms of control become layered onto the drivers' labour. Such an observation empirically dispels some of Uber's own claims, as made in recent court cases (including in South Africa), that – in the words of Uber's chief legal officer – "[the] drivers' work *is* outside the usual course of Uber's business, which is serving as a technology platform for several different types of digital marketplaces" (West, 2019, original italics).

Second, different visibilities emerge at the interface of Uber's platform and the airport infrastructure. In Cape Town, for example, the car park has made the drivers less visible to other urban actors, namely the traffic police and metered taxi drivers. Being invisible to the road police is so important that the drivers' app has a feature to signal roadblocks in real time to other drivers. In Mumbai, the pick-up system was designed to avoid transactions that would have been otherwise invisible to the monetizing mechanism of the application. By playing with different forms of (in)visibilities, Uber

interacts with urban regulatory systems and existing economies that would not otherwise be captured. In doing so, the airport space and the algorithm are materially transformed by each other.

Third, both cases present breakdowns and paradoxes which make platform labour visible in different ways or escape it entirely. In Mumbai, the security checkpoints were on one hand a response to the cash-based informal transactions that the driver would engage in. On the other hand, they had enabled additional, probably not entirely legal transactions, such as the fee payment at the exit of the car park. In Cape Town, according to Kyle, the car park had unexpectedly made drivers more cognizant of their own category, and allowed collective actors such as the Guild to gather members and support. It had, in other words, generated new visibilities that could be strategic for novel political engagements.

Understanding these unwanted or unexpected infrastructural possibilities, and the ways in which they are seen and acted upon in time, is fundamental to grasp platform urbanism from without seemingly linear trajectories of capitalist expansion and extraction (Leszczynski, 2019b; Barns, 2020a), As Guyer has argued,

> what matters about a platform is its durability and thereby its dependability across whatever temporal rhythms are required by the existing apps and the novel apportunities [app-mediated opportunities] that different parties perceive and try to act on. The temporalities of the components, connections, and capacities of platforms then become a crucial aspect of understanding how apps are projected and realized […]: not only in what they open up [...] but also in what they close down, divert, undermine, and so on, for other app searchers and platform attendants (Guyer, 2016, p.119).

More specifically, Graham has further noted that:

> Platforms may not have any physical presence in the cities in which they operate, but their workers are nonetheless finding ways of using bottlenecks in space-time – for example, through algorithmic hacks as well as the old-fashioned collective power of pickets and strikes – to remind themselves that they too should have a say in how their jobs and their cities are run (Graham 2020, p.).

An attention to such spaces/moments reveals the specificities of platform urbanism, and the radical indeterminacy of its infrastructural interfaces. This essay thus speaks to the possibility of ethnographic writing as a "platform method" (Fields et al, 2020) that narrates these urban economies from the outside of the black boxes in which algorithms are kept by the companies that own them. I am in no way suggesting that ethnographic accounts are universal, nor that mine is. Rather, I suggest that ethnography is both a thick and "thin" method (see Jackson, 2014) for exploring platform urbanism. It is thick because it involves what Geertz (1973, p. 21) described as "microscopic" writing,

a molecular attention to singularities. It is thin because it is necessarily partial, superficial, detail-oriented and limited to the experiences that possibly, as was my case, took place in between other research activities and gig jobs. Thinness means that an essay such as this one is not necessarily providing an alternative conceptualization to the political economy of platform capitalism which dominates many geographic analyses of its urbanized forms. Rather, it is through these ethnographic slices, thin as they may be, that the relation between apparently powerful platforms like Uber, and seemingly powerless platform attendants is revealed and challenged at its infrastructural interfaces.

This was my driver Kyle's insight: he had noticed that despite everything, Uber's platform still relied on the temporal and spatial logics of infrastructures that could become sites and objects of unionized struggles or other forms of collective action. My own notes in Mumbai show that these interfaces are, already, the sites where different economic engagements and alternative visibilities are enacted.

Making the work of platform urbanism visible is obviously not sufficient, sometimes not even desirable, as Stokes has written (2019). However, the act of defetishing the platform is a crucial one, because it implies realizing that the new global urbanists, such as Uber, are not almighty, and that forms of resistance and commoning spark at the urban interfaces of new platforms and older infrastructures.

References

Adey, P. (2008). Airports, mobility and the calculative architecture of affective control. *Geoforum, 39*(1), 438-451.

Adey, P. (2009). Facing airport security: affect, biopolitics, and the preemptive securitisation of the mobile body. *Environment and Planning D: Society and Space*, *27*(2), 274-295.

Adey, P., Budd, L., & Hubbard, P. (2007). Flying lessons: exploring the social and cultural geographies of global air travel. *Progress in Human Geography*, *31*(6), 773-791.

Altenried, M. (2019). On the last mile: logistical urbanism and the transformation of labour. *Work Organisation, Labour & Globalisation, 13*(1), 114-129.

Amoore, L., & Hall, A. (2009). Taking people apart: Digitised dissection and the body at the border. *Environment and Planning D: Society and Space*, *27*(3), 444-464.

Ananny, M., & Crawford, K. (2018). Seeing without knowing: Limitations of the transparency ideal and its application to algorithmic accountability. *New Media & Society, 20*(3), 973–989.

Anwar, M. A., & Graham, M. (2020). Hidden transcripts of the gig economy: labour agency and the new art of resistance among African gig workers. *Environment and Planning A: Economy and Space, 52(7)*, 1269–1291.

Attoh, K., Wells, K., & Cullen, D. (2019). "We're building their data": Labor, alienation, and idiocy in the smart city. *Environment and Planning D: Society and Space*. DOI: https://doi.org/10.1177/0263775819856626.

Barns, (2018). Platform Urbanism Rejoinder: Why Now? What Now? *Mediapolis, 4*(3). Retrieved from https://www.mediapolisjournal.com/2018/11/platform-urbanism-why-now-what-now/ [31/3/20].

Barns, S. (2019). Negotiating the platform pivot: From participatory digital ecosystems to infrastructures of everyday life. *Geography Compass*. DOI: https://doi.org/10.1111/gec3.12464

Barns, S. (2020a). *Platform Urbanism: Negotiating Platform Ecosystems in Connected Cities*. London: Palgrave MacMillan.

Barns, S. (2020b) Re-engineering the City: Platform Ecosystems and the Capture of Urban Big Data. *Front. Sustain. Cities, 2*(32). Doi: 10.3389/frsc.2020.00032

Bedi, T. (2016a). Mimicry, friction and trans-urban imaginaries: Mumbai taxis/Singapore-style. *Environment and Planning A: Economy and space, 48*(6), 1012-1029.

Bedi, T. (2016b). Taxi drivers, infrastructures, and urban change in globalizing Mumbai. *City & Society, 28*(3), 387-410.

Benjamin, R. (2019). *Race after technology: Abolitionist tools for the new jim code*. Cambridge: Polity.

Bonini, T., & Gandini, A. (2019). "First Week Is Editorial, Second Week Is Algorithmic": Platform Gatekeepers and the Platformization of Music Curation. *Social Media + Society*. DOI: https://doi.org/10.1177/2056305119880006

Borghys, K., van der Graaf, S., Walravens, N. & Van Compernolle, M. (2020). Multi-Stakeholder Innovation in Smart City Discourse: Quadruple Helix Thinking in the Age of "Platforms". *Front. Sustain. Cities, 2*(5). Doi: 10.3389/frsc.2020.00005

Bowker, G. (1994). Information mythology and infrastructure. In Bud-Frierman (ed.) *Information acumen: The understanding and use of knowledge in modern business*, 231-247. London: Routledge.

Büscher, M. and Urry, J. (2009). Mobile Methods and the Empirical. *European Journal of Social Theory, 12*(1), 99-116

Carmody, P., & Fortuin, A. (2019). "Ride-sharing", virtual capital and impacts on labor in Cape Town, South Africa. *African Geographical Review*. DOI: https://doi.org/10.1080/19376812.2019.1607149

Chakravarty, S. (2016). Between Informalities: Mahipalpur Village as an Entrepreneurial Space. In Chakravarty, S., & Negi, R. (Eds.) *Space, Planning and Everyday Contestations in Delhi* (113-136). New Delhi: Springer.

Crang, M. (2002). Between places: producing hubs, flows, and networks. *Environment and Planning A,* 34, 569–74

Crawford, K., Dobbe, R., Dryer, T., Fried, G., Green, B., Kaziunas, E., …. & Whittaker, M. (2019). *AI Now 2019 Report*. New York: AI Now Institute, 2019, https://ainowinstitute.org/AI_Now_2019_Report.html .

Derudder, B. & Witlox, F. (2005) An appraisal of the use of airline data in assessing the world city network: a research note on data. *Urban Studies, 42*(13), 2371–2388.

Elliott, A., & Radford, D. (2015). Terminal experimentation: the transformation of experiences, events and escapes at global airports. *Environment and Planning D: Society and Space*, *33*(6), 1063- 1079.

Ferguson, J. (2007). Formalities of poverty: Thinking about social assistance in neoliberal South Africa. *African Studies Review*, *50*(2), 71-86.

Ferreri, M. & Sanyal, R. (2018) Platform economies and urban planning: Airbnb and regulated deregulation in London. *Urban Studies, 55*(15): 3353–3358.

Fields, D. (2019). Automated landlord: Digital technologies and post-crisis financial accumulation. *Environment and Planning A: Economy and Space*. DOI: https://doi.org/10.1177/0308518X19846514

Fields, D. & Rogers, D. (2019) Towards a Critical Housing Studies Research Agenda on Platform Real Estate. *Housing, Theory and Society*. DOI: https://doi.org/10.1080/14036096.2019.1670724

Fields, D., Bissell, D., & Macrorie, R. (2020). Platform methods: studying platform urbanism outside the black box. *Urban Geography*. DOI: 10.1080/02723638.2020.1730642

Geertz, C. (1973). *The interpretation of cultures*. New York: Basic Books.

Graham, M. (2020). Regulate, replicate, and resist – The conjunctural geographies of platform urbanism. *Urban Geography*. DOI:10.1080/02723638.2020.1717028

Graham, M., & Anwar, M. (2019). The global gig economy: Towards a planetary labour market?. *First Monday* [S.l.], Apr. 2019. ISSN 13960466. Available at: <https://firstmonday.org/ojs/index.php/fm/article/view/9913/7748>.

Graham, M., Hjorth, I., & Lehdonvirta, V. (2017). Digital labour and development: impacts of global digital labour platforms and the gig economy on worker livelihoods. *Transfer: European Review of Labour and Research*, *23*(2), 135-162.

Graham, M. & Shaw, J. (2017). *Towards a fairer Gig Economy.* Meatspace Press.

Gray, M. L., & Suri, S. (2019). *Ghost Work: How to Stop Silicon Valley from Building a New Global Underclass*. Eamon Dolan Books.

Griesbach, K., Reich, A., Elliott-Negri, L., & Milkman, R. (2019). Algorithmic Control in Platform Food Delivery Work. *Socius*, *5*. DOI: https://doi.org/10.1177/2378023119870041.

Guyer, J. I. (2016). *Legacies, logics, logistics: Essays in the anthropology of the platform economy*. Chicago: University of Chicago Press.

Hilbrandt, H. (2017). Insurgent participation: consensus and contestation in planning the redevelopment of Berlin-Tempelhof airport. *Urban Geography, 38*(4), 537-556.

Huws, U. (2020). The algorithm and the city: platform labour and the urban environment. *Work Organisation, Labour & Globalisation, 14*(1), 7-14.

Jackson Jr, J. L. (2013). *Thin description*. Cambridge: Harvard University Press.

Kanngieser, A. (2013). Tracking and tracing: Geographies of logistical governance and labouring bodies. *Environment and Planning D: Society and Space*, *31*(4), 594-610.

Kumar, M. (2017). *Infrastructure, Labor, and Government A Study of Delhi Airport*. Western Sydney University Theses.

Langley, P., & Leyshon, A. (2017). Platform capitalism: the intermediation and capitalisation of digital economic circulation. *Finance and Society, 3*(1), 11-31.

Larkin, B. (2013). The politics and poetics of infrastructure. *Annual review of anthropology, 42*, 327-343.

Leszczynski, A. (2019a). Platform affects of geolocation. *Geoforum*. DOI: https://doi.org/10.1016/j.geoforum.2019.05.011

Leszczynski, A. (2019b). Glitchy vignettes of platform urbanism. *Environment and Planning D: Society and Space.* DOI: https://doi.org/10.1177/0263775819878721

Lin, J. & de Kloet, J. (2019). Platformization of the Unlikely Creative Class: Kuaishou and Chinese Digital Cultural Production. *Social Media + Society*. DOI: https://doi.org/10.1177%2F2056305119883430

Lynch, C. (2020). Contesting digital futures: Urban politics, alternative economies, and the movement for technological sovereignty in Barcelona. *Antipode,* 52(3), 660–680.

Mains, D. (2019). *Under Construction: Technologies of Development in Urban Ethiopia*. Durham: Duke University Press.

Malin, B.J., & Chandler, C. (2017). Free to work anxiously: Splintering precarity among drivers for Uber and Lyft. *Communication Culture & Critique, 10*(2): 382–400.

Mattern, M. (2016). Cloud and Field. *Places Journal, August 2016*. DOI: https://doi.org/10.22269/160802

McDonald, D. A. (ed.) (2002). *Environmental justice in South Africa*. Cape Town: University of Cape Town Press.

McNeill, D. (2009). The airport hotel as business space. *Geografiska Annaler: Series B, Human Geography*, *91*(3), 219-228.

McNeill, D. (2010). Behind the `Heathrow hassle': a political cultural economy of the privatized airport'. *Environment and Planning A, 42*, 2859-2873.

McNeill, D. (2011). Airports, Territoriality, and Urban Governance. In McCann, E., & Ward, K. (eds.) *Mobile Urbanism: Cities and Policymaking in the Global Age*, 147–66. Minneapolis: University of Minnesota Press.

McNeill, D. (2014). Airports and territorial restructuring: The case of Hong Kong. *Urban studies*, *51*(14), 2996-3010.

McNeill, D. (2016). Governing a city of unicorns: technology capital and the urban politics of San Francisco. *Urban geography, 37*(4), 494-513.

McNeill, D. & Pollio, A. (2018) Tracking the global urbanists. In J. Harrison and M. Hoyler (eds.), *Doing global urban research*, 81-95. London: Routledge.

Mezzadra, S., & Neilson, B. (2015). Operations of capital. *South Atlantic Quarterly*, *114*(1), 1-9.

Munn, L. (2017). I am a Driver-Partner. *Work Organisation, Labour and Globalisation*, *11*(2), 7-20.

Odendaal, N. (2020). Platform urbanism and hybrid places in African cities. In Aurigi, A. & Odendaal, N. (eds.) *Shaping Smart for Better Cities*, 203-219. Cambridge (MA): Academic Press.

Oppegaard, S. M. N. (2019). Regulating flexibility: Uber Black in Oslo and the platform as a technological work arrangement. Paper presented at the *ILERA European Congress 2019 Perspectives of Employment Relations in Europe*, Düsseldorf, 5–7 September.

Ravenelle, A. J. (2019). *Hustle and Gig: Struggling and Surviving in the Sharing Economy*. Berkeley: University of California Press.

Rosenblat, A. (2018). *Uberland: how algorithms are rewriting the rules of work*. Oakland: University of California Press.

Newlands, G., Lutz, C., & Fieseler, C. (2018). Collective action and provider classification in the sharing economy. *New Technology, Work and Employment, 33*(3), 250-267.

Pirie, G. (2006). 'Africanisation' of South Africa's international air links, 1994–2003. *Journal of Transport Geography*, *14*(1), 3-14.

Pollio, A. (2019). Forefronts of the sharing economy: Uber in Cape Town. *International Journal of Urban and Regional Research, 43*(4), 760-775.

Ren, X. (2017) Fragile Entrepreneurialism: The Mumbai Airport Slum Redevelopment Project. In: Smitha K. (ed) *Entrepreneurial Urbanism in India,* 157-173. Singapore: Springer.

Richardson, L. (2015). Performing the sharing economy. *Geoforum, 67*, 121-129.

Richardson, L. (2019). Platforms, Markets, and Contingent Calculation: The Flexible Arrangement of the Delivered Meal. *Antipode*. DOI: https://doi.org/10.1111/anti.12546.

Rodgers, S., & Moore, S. (2018). Platform Urbanism: Mediapolis Roundtable Introduction. *Mediapolis 4*(3)*. Retrieved from http://www.mediapolisjournal.com/roundtables/platform-urbanism/ [31/3/20]

Rosenblat, A. (2018). *Uberland: how algorithms are rewriting the rules of work*. Oakland: University of California Press.

Rosenblat, A., & Stark, L. (2016). Algorithmic labor and information asymmetries: A case study of Uber's drivers. *International Journal Of Communication, 10*(27), 3758–3784

Rossi, U. (2019). The common-seekers: Capturing and reclaiming value in the platform metropolis. *Environment and Planning C: Politics and Space*. DOI: https://doi.org/10.1177/2399654419830975.

Sadowski, J. (2020a). Who owns the future city? Phases of technological urbanism and shifts in sovereignty. *Urban Studies*, DOI: 0042098020913427.

Sadowski, J. (2020b) Cyberspace and cityscapes: on the emergence of platform urbanism. *Urban Geography*. DOI: https://doi.org/10.1080/02723638.2020.1721055.

Sadowski, J. (2020c). The internet of landlords: Digital platforms and new mechanisms of rentier capitalism. *Antipode, 52*(2), 562-580.

Salter, M. B. (Ed.). (2008). *Politics at the Airport*. Minneapolis: University of Minnesota Press.

Schouten, P. (2014). Security as controversy: Reassembling security at Amsterdam Airport. *Security Dialogue, 45*(1), 23-42.

Seaver, N. (2017). Algorithms as culture: Some tactics for the ethnography of algorithmic systems. *Big Data & Society, 4*(2). DOI: 2053951717738104.

Sen, S., Vyas, M., Remesh, B. P., & Dasgupta, B. (2012). Situating Transit Labour. *CRG research paper series Policies and Practices*, *43*.

Scholz, T., (2017). *Uberworked and Underpaid: How Workers are Disrupting the Digital Economy*. Cambridge: Polity.

Silver, J. (2019). The Labour of Platform Urbanism: A Popular Economy in the Making. In (collective ed). *Labouring Urban Infrastructures*, 55-57. Manchester Urban Institute.

Srnicek, N. (2017). *Platform capitalism*. London: Polity Press.

Söderström, O., & Mermet, A. C. (2020). When Airbnb sits in the control room: platform urbanism as actually existing smart urbanism in Reykjavík. *Frontiers in Sustainable Cities, 2*(15), 1-7.

Spangler, I. (2020). Hidden value in the platform's platform: Airbnb, displacement, and the un-homing spatialities of emotional labour. *Transactions of the Institute of British Geographers, 45*(3), 575-588.

Star, S. L. (1999). The ethnography of infrastructure. *American behavioral scientist, 43*(3), 377-391.

Stehlin, J. (2018) Urban platforms, rent, and the digital built environment. *Mediapolis 4(3).* Retrieved from https://www.mediapolisjournal.com/2018/10/urban-platforms-rent-and-the-digital-built-environment/

Stehlin, J., Hodson, M., & McMeekin, A. (2020). Platform mobilities and the production of urban space: Toward a typology of platformization trajectories. *Environment and Planning A: Economy and Space*. DOI: 0308518X19896801.

Stokes, K. (2019). Infrastructural Labour as Enacting the Right to the City? In (collective ed). *Labouring Urban Infrastructures*, 64-65. Manchester Urban Institute.

Vukov, T., & Sheller, M. (2013). Border work: Surveillant assemblages, virtual fences, and tactical counter-media. *Social Semiotics*, *23*(2), 225-241.

Waite, L., & Lewis, H. (2017). Precarious irregular migrants and their sharing economies: A spectrum of transactional laboring experiences. *Annals of the American Association of Geographers, 107*(4): 964–978

West, T. (2019, Sep. 11). Update on AB5. Blog post. Uber Newsroom.

Whittaker, M., Crawford, K., Dobbe, R., Fried, G., Kaziunas, E., Mathur, V., ... & Schwartz, O. (2018). *AI now report 2018*. AI Now Institute at New York University.

Wood, A. J., Graham, M., Lehdonvirta, V., & Hjorth, I. (2019). Good Gig, Bad Gig: Autonomy and Algorithmic Control in the Global Gig Economy. *Work, Employment and Society, 33*(1), 56–75.

Wood, A., & Lehdonvirta, V. (2019). Platform Labour and Structured Antagonism: Understanding the Origins of Protest in the Gig Economy (March 5, 2019). DOI: http://dx.doi.org/10.2139/ssrn.3357804

Zook, M. A., & Brunn, S. D. (2006). From podes to antipodes: positionalities and global airline geographies. *Annals of the Association of American Geographers*, *96*(3), 471-490.