

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <https://orca.cardiff.ac.uk/id/eprint/111158/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Spinney, Justin and Lin, Wen-I 2018. Are you being shared? Mobility, data and social relations in Shanghai's Public Bike Sharing 2.0 sector. *Applied Mobilities* 3 (1) , pp. 66-83. 10.1080/23800127.2018.1437656

Publishers page: <http://dx.doi.org/10.1080/23800127.2018.1437656>

Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



Are you being shared? Mobility, data and social relations in Shanghai's Public Bike Sharing 2.0 sector

Justin Spinney^a and Wen-I Lin^b

^aSchool of Geography and planning, Cardiff University, Cardiff, UK; ^bGraduate institute of Urban planning, National taipei University, New taipei City, taiwan, RoC

ABSTRACT

Starting in early 2016, a new wave of dockless ICT-based Public Bike Sharing Systems (PBSS 2.0) has grown rapidly in many Chinese cities and is now spreading globally. Whilst there is a growing literature on sharing and a substantial technical literature on the earlier breed of docked PBSS 1.0, there is no critical academic study of this new bike sharing phenomenon. This paper seeks to contribute to social scientific debates on sharing and mobilities by exploring the nature of sharing engendered by these disruptive forms of bike sharing. Focused on a case study of Shanghai (China) and based upon a series of stakeholder interviews and media analysis, this paper explores the extent to which these systems represent more economically reproductive “transactional” or disruptive and “transformational” modalities of sharing. By exploring the social, spatial and environmental relations produced by these new “hybrid mobiles”, we conclude that PBSS 2.0 represents a retrenchment and extension of existing exploitative capitalist relations. Whilst we temper this conclusion in the knowledge that it is very early in its evolution, we argue that in its current form PBSS 2.0 is unlikely to achieve the societal transformations often cited as a benefit of the hybridisation of virtual and physical mobility.

KEYWORDS

Cycling; mobility; sharing; smart cities; data; sustainability

1. Introduction

Cycling has for some time now been one of the poster boys of new urbanism – environmentally sustainable, space efficient and healthy; who could possibly dislike cycling? Sharing economies likewise have been lauded as more pro-social and pro-environmental ways to organise consumption (Hall and Ince 2017; Richardson 2015). Put the two together in the form of Public Bike Sharing Systems – PBSS 1.0 – (DeMaio 2009; Shaheen, Guzman, and Zhang 2010) and surely you have a system beyond reproach and critique; a system whose planet and citizen-saving credentials are beyond question?

Starting in China, since early 2016 a new wave of PBSS 2.0¹ that utilises smartphones to lock and unlock bikes – freeing them from the need to have physical docks – has risen to prominence. Whilst these systems have had their fair share of bad press they have also been lauded for their contribution to mitigating urban environmental problems. By way of

example, the UN recently awarded Mobike (one of the foremost operators of the new dockless wave of bike sharing) with their “Champions of the Earth” Award (Bikebiz 2017, n.p). As Hall and Ince have commented, particularly for those in the world of business, “...these new sharing economies have been perceived...as exciting new innovations promising to transform our economic and social lives” (Hall and Ince 2017, 1).

In this paper, we do not seek to pour cold water on the idea of PBSS 2.0 as a valuable contribution to urban mobility; rather we seek a critical understanding of what is driving the emergence of these systems and how they are reshaping social relations. Indeed, following Hall and Ince (2017) we argue that there is a need to consider the ways in which post-2008 capitalism is reinventing itself, and how these formulations intersect and overlap with “...other forms of valuing, exchanging, producing and consuming” (2). In particular, this paper explores the extent to which the social, spatial and environmental relations engendered by PBSS 2.0 can be conceived of as “transactional” to the extent they represent a reinvention of capitalist economics or whether they may offer up the conditions for a more sustained “transformational” shift towards a broader conceptualisation of sharing as outlined by McLaren and Agyeman (2015) pro-social “sharing paradigm”. As this suggests, our point of departure in this paper is that systems such as PBSS 2.0 do not only respond to consumer desires or fill gaps in the transport network; they actively imagine and produce urban citizens and practices.

Our data is drawn from two key sources: firstly from a series of in-depth interviews with key stakeholders in Shanghai between April 2016 and August 2017; secondly from media and news reports relating to the growth, investment and impacts of PBSS 2.0 in Shanghai and China more broadly. Based upon analysis of this data, we generate a number of insights: firstly that PBSS 2.0 in its early stages potentially creates uneven relationships between municipalities and operators due to the privatisation of user data. Secondly, that the desire to minimise operating costs leads PBSS 2.0 operators to encourage users to conduct surveillance on each other. Thirdly, that the spatial relations opened up by dockless systems and their rapid growth has led to situations where the commons are not being shared but dominated by bikes. Fourth, that the potential environmental benefits associated with bike sharing are not being realised because of the intense competition and desire to claim territory with bikes, leading to large amounts of waste. Our conclusions are that whilst PBSS 2.0 is still rapidly evolving, the relations produced by PBSS in this initial phase represent a reinvention and extension of capitalist economics. Indeed, the forms of social relations (between users, stakeholders and in relation to public space and the environment) suggest a transactional rental model of operation that falls far short of the “transformational” potential hoped for by the likes of McLaren and Agyeman (2015).

Our analysis contributes to debates in a number of intersecting fields: firstly, we contribute to debates in mobilities that seek to investigate the intersections between physical and virtual mobility (de Souza e Silva 2006; Sheller and Urry 2006;). In particular, we demonstrate that the joining together of the smart phone user and bike-rider brings into being a “hybrid mobile” that enables data to be generated, recorded, combined and commodified. Secondly, by providing an empirical example of the growth of a contemporary sharing phenomena we contribute to the burgeoning literature on sharing (Hall and Ince 2017; McLaren and Agyeman 2015; Richardson 2015). In particular, we highlight the way in which this particular sharing economy is predicated on privatisation of user data and represents a regressive move with regard to open-source data sharing in a municipal context. Finally, alongside

Jennings (2015) we complement accounts that have tended to be technical in nature (DeMaio 2009; Fishman, Washington, and Haworth 2014; Ogilvie and Goodman 2012) by providing an account of PBSS that emphasises its social and political dimensions.

2. Mobility, cycling and sharing

Writing in 2006 Sheller and Urry laid claim to a broad “new mobilities paradigm” and set out a diverse agenda for mobilities researchers. One of the themes they highlighted was the need to study the intersection of virtual and physical mobility. They argued that mobilities research should question how such intersections are “...mobilised, or performed, through ongoing socio-technical practices, of intermittently mobile material worlds” (Sheller and Urry 2006, 211). Indeed, they argue that hybrid mobility should be a key area of study and a number of mobilities scholars have contributed significantly to our knowledge of these intersections.

Writing in 2009 Bratton argued that with the advent of the smart phone our mobility is shifting from mechanical to informational, suggesting that the car is in decline and that the smart phone is the object in ascendancy (92). As Bratton elaborated, the smart phone is not replacing but augmenting and facilitating physical mobility. However, the majority of what the smart phone does is hidden to the user due to the nature of the pervasive computing revolution (Dodge, Kitchin, and Zook 2009) – where computers and software become embedded into our everyday lives in such a way that they are rendered invisible. This embeddedness leads Dodge, Kitchin, and Zook (2009) to ask a number of questions, perhaps the most salient of which is to ask the extent to which pervasive forms of computing challenge agency and democracy and produce/exacerbate inequalities (2009, 1284) because we have so little idea of what these devices are doing “behind the scenes”. Indeed as Williamson (2015) argues, our movement is increasingly animated and directed by black-boxed algorithmic processes (Williamson 2015, 135).

Due to the increasing convergence and “always on-ness” of physical and virtual mobility, De Souza E Silva has argued that we are seeing the emergence of hybrid spaces that flow from “...the combination of physical and digital spaces, along with the social use of location-aware technology” (de Souza 2017, 21). Such hybrid spaces emerge from the conjunction of our ability to be always connected, to be physically mobile whilst in virtual space, and to be virtually mobile in physical space. An interesting side effect of the shift to increasingly hybridised forms of mobility is the ability of such mediums to both produce, record and combine different elements of ourselves in what has been termed “datafication”. As Millington has commented, a variety of software apps (such as fitness tracking, Location Based Social Media and mobile gaming apps) increasingly harness the possibilities available from the intersection of physical and virtual mobilities for individuals to quantify and know themselves (2014, 480). However, alongside the ability of the user to “know” themselves comes the ability of corporations to know, commodify and share the user by gathering and selling data on their habits and preferences (Williamson 2015). As Millington reports, a study of 101 smart phone apps revealed: “intrusive effort by online-tracking companies to gather personal data about people in order to flesh out detailed dossiers on them” (Thurm and Kane 2010 in Millington 2014, 487).

One area of research that has burgeoned under the mobilities banner is that of “velomobilities”. Within this field, numerous overlapping strands of research are evident including

those situated within cycling advocacy (Aldred 2015; Pucher and Buehler 2008); the exploration of cultures of cycling (Aldred and Jungnickel 2014; Freudendal-Pedersen 2009); historical and socio-technical accounts (Cox and Van De Walle 2012; Spinney, Reimer, and Pinch 2017); and a more recent surge in critical work influenced by political-economy (Spinney 2016; Stehlin 2014). This paper contributes to the latter by situating contemporary cycling advocacy and policy within broader processes of capitalist urbanism (Stehlin 2014, 22). Whilst some research has been published in relation to the tracking of leisure cyclists (Gössling 2018; Musakwa and Selala 2016) and sale of data to municipalities, no studies exist into the relations between public bike sharing and the use of rider data.

3. Sharing and economy

Most dictionaries define sharing quite straightforwardly as “dividing something between more than one person”. Academic literature on sharing distinguishes between “sharing economies” describing the voluntary lending/pooling of owned goods in spheres of private consumption, and a broader “sharing paradigm” that also encompasses sharing of activities, and forms of sharing that are collective and productive (McClaren and Agyeman 2015, 7–9). According to Richardson (2015) the sharing economy represents a “win-win” way to overcome pressing social, environmental and economic societal challenges, where we can create stronger bonds with our fellow citizens whilst minimising wasteful overconsumption (Richardson 2015). Whilst not dismissing such a possibility, we engage with the work of McLaren and Agyeman in this paper because of the critical perspective theorising sharing as a potentially more communitarian modality allows when evaluating PBSS 2.0.

McClaren and Agyeman’s argue that the current definition of sharing economy is unhelpful in a couple of ways. Firstly, many formal sharing programmes involve some kind of contract (car sharing, film sharing) and hence to exclude these misses a lot of activity that could be defined as sharing. Secondly, there is concern that in prioritising the economic dimension of sharing rather than its social, cultural or political dimensions, we are more likely to seek solutions in market-based forms (McClaren and Agyeman 2015, 7–9). Indeed as Hall and Ince (2017) state: “...within this multiplicity of economic and organisational forms, the universally positive idea of sharing has, however, acted as a smokescreen for sharing-focused businesses to undertake various strategies of capital accumulation that impact negatively on their clients, workers and broader economic environments’ (5).

Accordingly, McLaren and Agyeman argue that we should seek to promote a broader conceptualisation of the “Sharing paradigm” which includes things (cars, tools, books); activities (like political activity, leisure activity); encompasses that between both private individuals as well as collective; happens in both consumption and production (community gardens open sourcing); temporally simultaneous or sequential (using at once or taking in turns) and sees sharing as something more central to human development rather than a different form of economic exchange. They argue that forms of sharing falling under this banner represent a more transformational idea of sharing characterised by more equitable social, environmental and spatial relations. They go on to argue that such forms of sharing potentially represent the seeds of a post-capitalist society because of the capacity to be more inclusive; to treat resources as common property; and to enhance both individual and collective capabilities (ibid). Certainly, McLaren and Agyeman argue that “sharing the whole city should be the guiding purpose of the future city” (McClaren and Agyeman 2015, 5).

4. Mobility and sharing

Sharing is receiving increasing attention in academic circles (Hall and Ince 2017; McClaren and Agyeman 2015). Whilst ideas around sharing resources are anything but new, the ways in which ICTs are enabling new forms of sharing has seen an explosion in the quantity and types of sharing with large-scale online sharing platforms now available to many more people.

One way in which sharing has manifested is in new forms of shared or smart mobility which Marvin, Luque-Ayala, and McFarlane (2016) define as the, “intersection of intelligent infrastructure, digital economy and e-citizens” (Marvin, Luque-Ayala, and McFarlane 2016, 1). Smart mobility is a primarily urban vision where technology is the primary driver of change. Importantly, technologies in these scenarios are not just objects to be used; these objects actively shape how they are used by feeding back information to the user in near real time.

A number of studies have started to explore the relationship between sharing and mobilities. In a 2012 study, Bardhi and Eckhart investigated Zipcar use in order to understand the difference between use of privately owned and shared cars; and to see if people were breaking their attachments to the car through sharing models (887). Their study gives a number of insights. Firstly, they found that users did not identify with the car, describing it instead as “a hotel room”; the relationship is dominated by use value, though some meaning is generated through the act of accessing (889). Secondly, the use of the cars was dominated by negative reciprocity: users described how they would happily mistreat the vehicle because they didn’t need to fix or clean it. Thirdly, use was dominated by economic and convenience motives with any promoted green identity eschewed (889). Finally, Zipcar was seen as a stepping-stone to car ownership with users stating that they would get their own car as soon as they could (894). Overall, the study suggests that the ultimate goal of users in utilising the shared resource was the maximisation of personal utility with ownership still a more desirable end state than sharing.

Similarly in a review of a ride-sharing programme in Northern England, Parker et al. found very low levels of interest with only 0.5% of the adult population registered to the regional ride sharing scheme, and out of these, less than 20% were active in the scheme with any regularity. Potential users main concerns were cited as lack of convenience in having to timetable their days around other ride sharers, social safety concerns for women and road safety concerns for men (2011, 184–6). Again, this study strongly suggests that maximisation of collective utility is still not being nurtured despite the use of sharing. Indeed, as Hall and Ince (2017) note, whilst sharing is positioned as so, “...inherently beneficial that its innate goodness is rarely questioned, real-life manifestations of sharing, whether it be skills, stuff or stories, are far more complex and contested than we might think” (1).

This brings us round to the questions driving our analysis in this paper. McClaren and Agyeman (2015) argue that in order to overcome the environmental and social problems of existing capitalist economics, we should be looking beyond transactional forms of sharing that promote only more efficient use of resources and assets, and instead trying to create transformational sharing that shifts power relations and creates the grounds for the maximisation for collective utility, as well as an increase in value for participants. Gibson-Graham (2008) for one has highlighted the ways in which sharing can generate alternative economic spaces that sit beyond and/or against existing capitalist models. Hall and Ince however highlight the need to explore the ways in which sharing is transformed through its

intersection and co-option (2017, 2). Following this, our aim in this paper is to explore the forms of relations being produced through PBSS 2.0 with a view to understanding the extent to which this new model of bike sharing is – to use McClaren and Agyeman (2015) terms – transactional or transformational. So to what extent do new platforms such as PBSS 2.0 reflect a more communitarian model of community and economy emphasising local scale, co-ownership, publicness and solidarity (Dredge and Gyimóthy 2015), and to what extent do they reflect a retrenchment or escalation of capitalist power relations and individualised consumption?

The research that underpins this paper began in Shanghai in April 2015 and is ongoing. To date, we have conducted 18 in-depth interviews with representatives from the Shanghai Planning Bureau; Shanghai Transportation Bureau; Shanghai Environmental Management Bureau; District Planning officials; District and Street Office leaders; and Mobike & Ofo designers and government relations employees. The sampling strategy has been primarily opportunistic/snowballing starting with points of contact in the transportation and planning Bureau's and widening out to other relevant stakeholders suggested by interviewees. We have focused on the two largest PBSS operators Mobike and Ofo as those most referred to by municipal interviewees. Whilst we cannot claim to have reached saturation in relation to a city the size of Shanghai, our sample includes representation from the main central stakeholders and a sample of District/Street Offices.

5. Background: PBSS in Shanghai

Whilst much cycle promotion has focused on encouraging cycle use by private users, public bike sharing schemes (PBSS) can be situated as a form of public transport. The emergence of Public Bikes is generally traced back to the "White Bike" system implemented in Amsterdam in 1965 (DeMaio 2004). However, the 2007 launch of the Velib system in Paris is widely regarded as giving the birth to the contemporary global spread of PBSS (Shaheen, Guzman, and Zhang 2010). In the past 10 years, PBSS has exploded in popularity: according to the "Bike Sharing World Map" there were 1328 Schemes worldwide in operation as of July 2017 with a further 405 planned or under construction (DeMaio and Meddin 2017).

Shanghai is a city of approximately 25 million residents covering an area of 6340 km². Density of the city varies greatly with some central districts close to 1000 p/ha down to 20 p/ha. Average city density is around 200 p/ha (Haixiao 2017, 2). Ownership of motorised vehicles is around 0.50 per resident with around 20% of journeys in central Shanghai made by car (Haixiao 2017, 30). Modal share for two wheelers (powered and non-powered) has declined gradually from 17.5% in 2011 to 15.7% in 2015 (HaiXiao, 2017, 30). However, after many years of car promotion, bicycles are once again promoted by the Shanghai government. From 2009 onwards, PBSS 1.0 was instituted in five districts and by 2017 Shanghai boasted 80,000 public bikes putting it amongst the top five in the world in terms of bike numbers if not usage (Figure 1). Indeed, as we report in other papers (authors forthcoming) PBSS 1.0 in Shanghai has suffered from locational & operational issues meaning ridership has been relatively low.

From spring 2015 PBSS 2.0 has been rolled out in Shanghai – financed and managed by private operators. The growth of these schemes in the city has been nothing if not meteoric. By February 2017, there were 260,000 public bikes, rising to 630,000 bikes by April 2017 with 7.5 million registered users and 10 different operators. By August 2017, there were 1.5 million

public bikes in the city – a staggering 16 per resident – with two Chinese firms Mobike & Ofo dominating the market alongside many smaller firms (Figure 2).

Whilst it is difficult to tell if PBSS 2.0 was welcomed by the city government, our interviewees noted that the systems have been allowed to operate partly because they are perceived as a fix for “last mile” transportation problems, but also because they embody a sense of sharing and nostalgia, and enable the government to avoid accusations that they are holding back innovation and business:



Figure 1. pbss 1.0 in shanghai. source: Authors.



Figure 2. extent of pbss 2.0. source: Authors.

Sharing bike is not only representative of green transportation, but also a sense of sharing and nostalgia. Thus, it is a timely opportunity for the business sector. Government also seems have to support it, since you have suppressed the “agitation” left from the regulation of sharing taxis [such as DiDi], and this is a good thing. If you suppress it, this means you have violated the national trend of innovation and sharing... (Mr. Chen, Shanghai Municipal Engineering Design Institute)

After demanding app-based car-sharing firms Uber and DiDi must be regulated to operate, the Chinese Government has been keen to take a more “watch and wait” approach to PBSS 2.0. This is in no small part because it does not want to be seen as stifling innovation and entrepreneurialism. However, with well-publicised scenes of bikes piling up in the streets, by August 2017 the Shanghai municipal government called a halt to any new bikes appearing on the streets and ordered operators to start managing their fleets more effectively.

6. Sharing the user: PBSS 2.0 and data mining

In this section, we discuss the views of PBSS 2.0 operators and the municipality on the sharing of user data. We argue that this is seen as a resource to be commodified and sold rather than a public resource that could for example be used to understand cyclists movements and plan infrastructure accordingly (Gössling 2018). Moreover, we show how PBSS 2.0 operators intend to use the data to reshape the relationship between themselves and the municipality in ways that move further away from flat and cooperative power relations to more uneven relations. Hence, far from enabling users or the municipality to benefit from open-sourcing and collectivising the data for public benefit, data are increasingly privatised and leveraged.

The first thing to note is that it is the development of the sharing platform itself that enables user data to be gathered and combined. PBSS 2.0 users access bikes through a smartphone app (specific to each operator) that tells them where bikes are in relation to their current location. Thus in using the service, the movement of users and their destinations is mapped and recorded by the operators. In addition to this, users must give numerous personal details to use the system. As the Mobike Government Relations manager commented, “the big data is very valuable. We have the name, bank account, ID, workplace, address...; it is a goldmine” (Mobike Government Relations Manager 05/04/17). Central to this construction of value is the intersection of physical and virtual movement because it is precisely this hybridity that enables the movement of the subject to be converted into data. The need of users to move not only generates data in its own right but facilitates the signing over of other personal data. Thus, whilst the outward service being shared is mobility, that same mobility becomes both a means and an end through which to commodify the user.

A second related point of interest is the way in which user data are being shared between companies. As the Mobike Design manager noted,

just yesterday ... Mobike has become a small function of Wechat so maybe this data can communicate with other data. But for the Mobike data there is no profit unless you can bring it together with other data then perhaps you can make money because this data combines together. So in every scenario we try to combine to have more possibilities. (Mobike Design Manager, 05/04/17)

The value of combining and sharing user data gathered through web-based apps is not new. Frith (2013) for example has discussed the ways in which Location Based Social Network apps encourage users to sign up across platforms in order to combine data on users and gain a more holistic understanding of user preferences for advertising purposes. This same drive is evident in the comments above where the ability of data-sets to be linked together

is vital to the profitability of Mobike's operations. Indeed, it is evidently this desire to combine user data that is driving massive investment into PBSS 2.0 operators. By way of example, by July 2017 Mobike was the beneficiary of US\$900 million in investment, mainly from venture capital and internet firms such as Chinese search giant *Baidu*, *Foxconn Technology* and Wechat web developer *Tencent* (Crunchbase 2017, n.p). The other big PBSS operator Ofo has seen similar levels and sources of investment (Crunchbase 2017). Accordingly, we argue that the primary driver of PBSS 2.0 sharing platforms may not be a desire to maximise collective utility or fix urban transport problems, but a desire to combine and monetise user data.

A third and final point we make with regard to the ways in which PBSS 2.0 reshapes relations is that evidenced between the municipality and operators. Interviewees from different Shanghai municipal departments confirmed that they had an interest in using the data from PBSS operators to assist analysis of parking and route requirements of non-motorised vehicles but that they had yet to see anything. Other interviewees confirmed that the big PBSS operators had collaborated with university research institutes to understand how to analyse the data they had, but that this had not made its way to government departments with operational responsibility:

The PBSS enterprises usually find and provide funding to research institutes, and institutes conduct data analysis and report for them [...] This research usually refers more to symbolic functions or business lobbying; it is like Google develops a big data system for information development and management, in order to distinguish itself from other companies: I am Mobike and you are not Mobike; I have big data and rational analysis, and you don't. (Mr. Shi, Director of Shanghai Urban Planning and Design Research Institute)

Mobike has set up a public digital platform with THUPDI (Tsinhua Planning Design Institute) and Ofo has cooperated with the Research Institute of Highway Ministry of Transport. I think the quality of data that the company gives research institutes is poor because these are commercial secrets...and why would they share the real situation with the institute or the public? (Mr. Chen, Shanghai Municipal Engineering Design Institute)

There are two aspects of these statements we foreground: the first is the sense that far from being a public good to be open-sourced, user data are closely guarded. Secondly, the limited data sharing occurring seems to be more about presenting PBSS 2.0 operators as part of the "new China" as home to innovative high-tech data analytic companies rather than companies dealing with "old technology" such as bicycles. Here, data become part of a broader branding exercise. Corroborating this, it was evident from our interviews with operators that rather than share location-based user data with the municipality so that they could know where to target improvements for cycling, PBSS 2.0 operators wanted to use ownership of this data to increase their brand profile and shape the conduct of the government:

...we will figure out which parts of the data are valuable [and utilise it] in resource exchanging. So for example if the Mayor wants to say something good about Mobike or we have a District encouraging Mobike colours then we might give more data to them. But if a government tries to force the data out of us then we are probably going to say no. (Mobike Government Relations Manager 05/04/17)

What we draw attention to here is that the creation of the mobile hybrid and subsequent ownership of user data enable the PBSS 2.0 operator to leverage the government because of both its use value to planning officials and District offices and de facto privatisation. With PBSS 1.0, user data – much like in other cities such as London and Paris – was generally owned by the city government because they subsidised and governed the service even if it was sub-contracted. In PBSS 2.0, this is no longer the case and the data may be used as a

bargaining chip to increase the brand image of the operator. Of key interest here is the way in which mobility is used to shape the conduct of the government in order to produce a preferential business climate. The point we emphasise is that rather than a shared partnership between public and private, there is evidence here that this relationship is becoming *more* unequal with the goal of maximising collective utility becoming subordinated to maximising private utility. By bringing together debates on sharing and de Souza E Silva's work on hybrid spaces, we excavate the data politics enacted through hybrid mobility.

7. Spatial relations: civic realm impacts

For PBSS 1.0 docking stations, space was allocated to shared bikes through discussion with District Leaders, Planning Bureau and private landholders. Whilst our interviews suggested this was not always successful – PBSS 1.0 could not always be placed in central areas due to private land ownership or lack of political will from District Leaders – space was always clearly allocated with some thought given to transportation strategy and the needs of different user groups. One of the attractions of PBSS2.0 is that the creation of the mobile hybrid empowers the user to leave the bike anywhere – they are no longer tied to picking and dropping the bike at a fixed dock as they were with PBSS 1.0. The “unmooring” and increased flexibility offered by the mobile hybrid has engendered a shift in both social and spatial relations. In particular, our earlier interviewees were positive about the potential of PBSS 2.0 to make transportation fairer:

In the past, our transportation was based on the perspective of cars and motor vehicles, which deprived the rights and conveniences of cyclists. Our propositions of the right to equality on the road, public use and fair distribution which is the problem of public transport can all be solved quickly and directly through this model of Mobike or Ofo, without the government. (Mr. Shen, Shanghai Friends of Nature)

Whilst Mr Shen foregrounds the communitarian potential of PBSS 2.0 in terms of equality, publicness and community initiative, the ability of users to park bikes free of government regulation has created well-publicised headaches for city governments with piles of bikes littering the streets, blocking bus stops, pavements and even road junctions (Hernandez 2017, n.p) as our interviewees confirmed:

The key point is on the illegal parking. You must park your bike in the white line. If citizens cannot do it, it's difficult to control the situation. The second question is a great number of sharing bikes are putting into the white-line area where was originally parked by our residents' own bicycles. Furthermore, they always put in a large number of bikes and fill up this white-line area. So there is no space left for residents who have parking needs. (Chief of Wuliqiao Street Office)

As this official suggests, spaces which were once shared more equitably between different users have been over-run by shared bikes (Figure 3). The scale of the problem is in large part a function of the competition between operators. As Hu Wei Wei, founder and CEO of Mobike said in an interview, “...bicycle density is a key factor in beating the competition, as ridership proportionately increases in relation to the number of bicycles” (Wei Wei quoted in Yang 2017, n.p).

Unsurprisingly municipalities have cracked down on this situation. On the 18 August 2017, Shanghai's municipal transportation bureau ordered PBSS 2.0 operators to cease adding any more bikes, and take steps to actively manage and relocate bikes (Horwitz 2017, n.p). Our own observations in Shanghai in September 2017 confirmed that both Mobike and Ofo had employed staff to manage bike placement (Figure 4 and 6) although



Figure 3. bike litter. source: Authors.



Figure 4. Mobike operative tidying bikes outside a Metro station. source: Authors.

we still witnessed many blocked pavements and public spaces (Field notes, 13 September 2017).

The issue we highlight is the paucity of spatial sharing that these stories highlight. Indeed, reports of bikes littering the streets foreground the lack of concern for public resources and other citizens that such behaviour implies (Hernandez 2017, n.p). On a conceptual level, the abandoning of bikes anywhere on the streets is emblematic of the maximisation of private utility (saving time and effort) over collective utility (the ability of other users to easily use the public realm).

However, it also needs to be recognised that this situation is not unique to Shanghai: well-known cycling cities such as Copenhagen and Amsterdam (Koglin 2018; Larsen 2017) have significant problems with bike parking due to the quantities of bikes. The issue for Shanghai has been one of the speed of growth, the number of individual operators, and overall quantity of bikes coupled with a lack of regulation and user discipline.²

8. Social relations: “Bike hunters” and user credit

In this section, we focus on the ways in which PBSS 2.0 connects users. We argue that rather than relate users to each other in collaborative ways, PBSS 2.0 is much more akin to a traditional rental model where the user enters into a contract with a private company. Moreover, when users are encouraged to interact, the relations engendered revolve around surveillance of other users.

In our conversations with PBSS 2.0 operators, one of the problems that they highlighted was the numbers of bikes going missing or being damaged. The scale of this problem has led to the highly publicised collapse of some PBSS 2.0 operators such as WuKong bike which had 90% of its fleet lost, stolen or damaged within 5 months of operation (Everington 2017, n.p). Whilst none of the operators we talked to had problems of this magnitude, the scale of bike loss was still significant though largely unknown:

It's hard to know the [damage rate] since the number of bikes updates constantly. It is difficult to count and I guess people inside the firm do not know that either. In fact, the management of bikes cannot align with the rapid expansion of this industry. (Mr. Xing, Former Manager of Ofo)

Mobike on the other hand were more able to put a figure on their losses with one manager estimating that they had at any one time around 30% of their fleet going missing and becoming what they termed “Zombie Bikes” (Figure 5):

In the peripheral areas we find more and bikes accumulating, we call them “zombie bicycle”s. The traditional way is to have workers remove the bikes back to the centre of the city but it is very costly and slow requiring lots of labour ... So we encourage users to become ‘Bike Hunter’ with the role of finding the zombie bikes and taking them back for us. (Mobike Government Relations Manager 05/04/17)

Evidently, the new PBSS model is predicated on keeping costs traditionally associated with PBSS (such as redistribution of bikes) to a minimum. Thus, Mobike mobilises users to fulfil this role in the form of “bike hunters”. As this Mobike manager elaborated, these teams of Bike Hunters are encouraged to conduct surveillance on other users and report if bikes are where they shouldn't be, such as in or near private residences. More recently, the big operators Mobike and Ofo have also introduced credit-scoring mechanisms for negative use:

In this regard, Mobike is doing a better job, because they have a credit scoring mechanism. If you complain of illegal parking, Mobike can locate it! If anybody parks the bike outside the white-line area, Mobike can subtract their credit score. They have this mechanism to operate while other bicycle companies cannot do this. (Chief of Wuliqiao Street Office)

According to local news reports, some citizens – especially the blind or disabled – have praised hunters for keeping the pavements free from abandoned bikes. However, others say that bike hunters “...are meddling in other people's business and accuse them of being bounty hunters for the companies” (Quan and Gunagy 2017). The situation of citizen surveillance is reminiscent of the “minimal government, maximal governance” described by Datta (2017, n.p) when she highlighted the surveillance and reporting of municipal waste

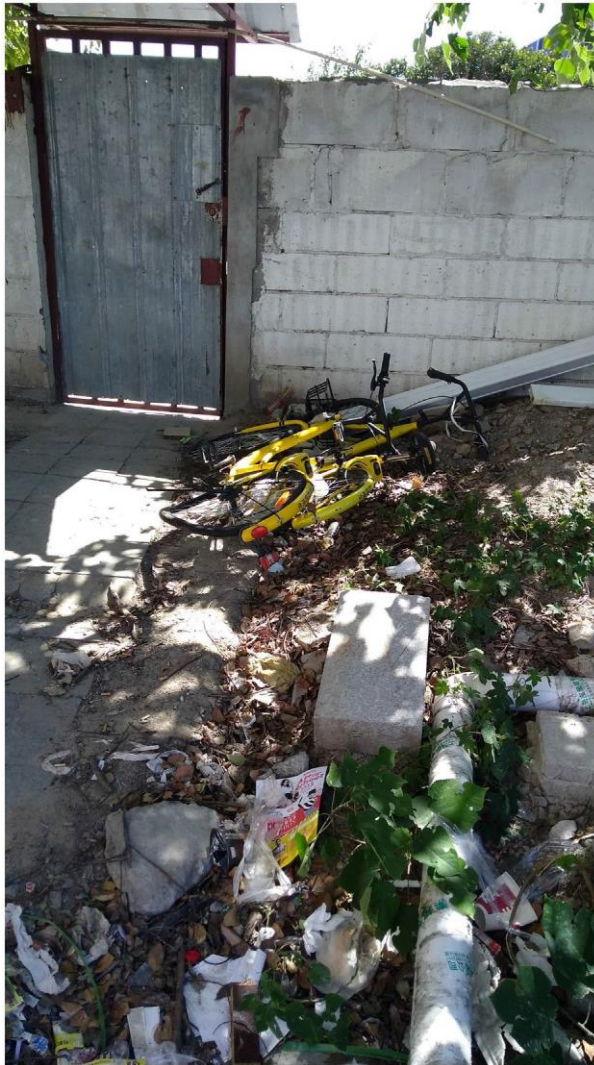


Figure 5. lost and damaged of ofo bikes. source: Authors.

workers by citizens through smart phone apps in Indian cities (Datta 2017, n.p). The central point is that rather than create more equitable social relations, such moves represent a shift to more uneven social relations amongst users.

9. Sustainability and resource use

The last issue we touch upon is that of environmental sustainability. Advocates of sharing argue that it has environmental benefits because multiple users benefit from the use of a single resource. As a result, assets are “sweated” more and there is a significant reduction in the energy and resources required to provide services (McClaren and Agyeman 2015). However, media reporting of PBSS 2.0 calls into question the extent to which bike sharing is achieving potential resource savings.



Figure 6. Mobike preferred parking location. source: Authors.

Recent reports of Chinese bike sharing suggest that because of inter-operator competition and vying for territory, supply of bikes has outstripped demand leading to huge numbers of bikes mounting up in graveyards. Reporting for the Guardian newspaper in November 2017, Haas visually illustrates the scale of the problem with images of football pitch sized piles of tens of thousands of damaged bikes in the city of Xiamen stating that, “the pile clearly contains thousands of bikes from each of the top three companies, Mobike, Ofo and the now-defunct Bluegogo” (Haas 2017, n.p).

There is no sign of a slowdown in bike production either with the *China Channel* concluding that between them, Mobike and Ofo who currently control 95% of the market have the capacity to put more than 30 million bikes on to the streets globally in 2017 (Yang 2017, n.p). Whilst much of this wastage is according to some analysts the inevitable result of a

predictable and "...bloody consolidation in which only one or two players survive" (Chandler 2017, n.p), as Tan notes in her August 2017 article on the topic of bike waste, "...Shared bikes are supposed to promote sharing and save the environment, but then it's caused this instead" (Tan 2017, n.p). Perhaps more to the point, such wastage has not occurred with the PBSS 1.0 model of sharing, begging the question, "is PBSS 2.0 and the way in which it has manifested an environmentally sustainable model of sharing?" Whilst we have no quantitative data to categorically say one way or another, thus far it is fair to say that PBSS2.0 could be utilising resources much more efficiently and the environmental impact of these services requires further study and scrutiny.

10. Reflections on public bike sharing 2.0

In this paper, we have demonstrated that the introduction of PBSS in Shanghai is transforming relations in a number of different registers: The emphasis on gathering, combining and privatising user data has created a resource that is not currently being used to achieve civic goals but rather is being used to enhance brand image of operators and leverage the cooperation of municipal governments. Secondly, initiatives that enrol users in maintaining the integrity of the bicycle fleet encourage users to survey each other rather than encouraging solidarity, representing a distancing and re-direction of social relations for the benefit of the operator. Thirdly, the spatial relations engendered by the rapid and massive growth in PBSS, and the deterritorialisation of operation have left a situation where public space is being shared unevenly. Finally, the environmental relations of PBSS are questionable. Whilst bicycle transport and sharing systems are typically lauded as having a far lower environmental impact, the early stages of PBSS suggest that potential environmental gains are not being achieved due to a competitive strategy driven by sheer numbers and a lack of user ownership in a shared resource reminiscent of that seen in car sharing schemes.

As Ince and Hall (2017) and other commentators on emerging forms of sharing have rightly noted, there are multiple iterations emerging which challenge, conform, intensify and circumvent existing capitalist economic relations to varying extents. Accordingly, we are not trying to judge PBSS 2.0 against a morally ambiguous notion of a "right" version of sharing. Our aim in this paper rather has been to explore where PBSS 2.0 might fit on a continuum of sharing practices, and in so doing evaluate what its contribution might be to shifting, social, economic and environmental relations in ways that might ameliorate some of the existing problems of dominating forms of economic relations. As we stated in the introduction, our point of departure is that systems such as PBSS 2.0 do not only respond to consumer desires or fill gaps in the transport network, they actively imagine and produce urban citizens and practices.

One of the key insights we wish to highlight here is the way in which sharing is producing the citizen as data. By bringing debates on sharing into conversation with de Souza E Silva's work on hybrid spaces, we show how hybrid mobility and the opportunities that arise from bringing physical and virtual together are giving rise to new terrains of capital accumulation that work through sharing. Indeed our analysis suggests that the sharing practices engendered are at best transactional, and certainly not transformational in the pro-social way envisaged by McClaren and Agyeman (2015).

Whilst it is early days for PBSS 2.0 in Shanghai – it is barely 18 months old – our initial conclusions are that far from materialising a transformational version of sharing, PBSS 2.0

represents a retrenchment and extension of capitalist economics. Whilst Canzler and Knie have argued that the shift towards hybridised mobilities has the potential to “increase the capacity and efficiency of transport and energy systems, reinforcing decarbonisation initiatives and eventually also address the citizens needs and interest in a more effective way” (2016, 56), here we highlight the way in which the sharing bike as a “hybrid mobile” is being transformed into a vehicle for harvesting, recording and combining user data with a view to monetising this resource. Whilst users may see the use of the bike as a fair price to pay for their personal data, we argue that it is the relatively pervasive and black-boxed nature of this datafication (Dodge, Kitchin, and Zook 2009; Williamson 2015) and its politicisation that is the key issue.

Notes

1. We make a distinction in this paper between PBSS 1.0 – the older generation of docking and largely municipally governed public bike sharing, and PBSS 2.0 which refer to the newer generation of ICT-based and dock-less bike sharing, financed and operated by private firms.
2. Whilst there is some evidence that similar civic realm issues have been experienced in other cities around the world they have generally not been as intense as the situation found in Shanghai. The authors are currently conducting research into the spread of PBSS in the UK.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

This work was supported by Ministry of Science and Technology [grant number 106-2410-H-305-060-MY2].

References

- Aldred, R. 2015. A matter of utility? Rationalising cycling, cycling rationalities *Mobilities* 5, no. 1: 686–705.
- Aldred, R., and K. Jungnickel. 2014. Why culture matters for transport policy: The case of cycling in the UK. *Journal of Transport Geography* 34: 78–87.
- Bardhi, F., and G. Eckhardt. 2012. Access-based consumption: The case of car sharing. *Journal of Consumer Research* 39.
- Bratton, B.H. 2009. iPhone city. *Architectural design*, 79, no. 4: 92–97.
- Canzler, W., and A. Knie. 2016. Mobility in the age of digital modernity: Why the private car is losing its significance, intermodal transport is winning and why digitalisation is the key. *Applied Mobilities* 1, no. 1: 56–67.
- Chandler. 2017. China's bike sharing bubble goes bust. *Fortune*. <http://fortune.com/2017/11/18/chinas-bike-sharing-bubble-goes-bust/> (accessed December 2017).
- Cox, P., and F. Van De Walle. 2012. Bicycles don't evolve: Velomobiles and the modelling of transport technologies. In *Cycling and society*, eds. D. Horton, P. Rosen, and P. Cox, 113–132. Hampshire: Ashgate.
- Crunchbase. 2017. <https://www.crunchbase.com/organization/mobike> (accessed November 2017).
- Datta, A. 2017. Governing urban futures: Smart cities and postcolonial urbanism in India. Paper delivered at Cardiff University School of Geography and Planning, May 16; Cardiff, UK.
- DeMaio, P. 2004. Will smart bikes succeed as public transportation in the United States? *Journal of Public Transportation* 7, no. 2: 1–15.
- DeMaio, P. 2009. Bike-sharing: History, impacts, models of provision, and future. *Journal of Public Transportation* 12, no. 4: 41–56.

- DeMaio, P., and R. Meddin. 2017. Bike sharing world map. https://www.google.com/maps/d/viewer?mid=1UxYw9YrwT_R3SGsktJU3D-2GpMU&hl=en&ll=-9.048467847879332%2C138.1453722&z=1 (accessed July 2017).
- Dodge, M., R. Kitchin, and M. Zook. 2009. Guest Editorial: How does software make space? Exploring some geographical dimensions of pervasive computing and software studies *Environment & Planning A* 41: 1283–1293.
- Dredge, D., and S. Gyimóthy. 2015. The collaborative economy and tourism: Critical perspectives, questionable claims and silenced voices. *Tourism Recreation Research* 40, no. 3: 286–302.
- Everington, K. 2017. Chinese bike sharing company hits skids after 90% of bicycles lost. *Taiwan News*, June 19. <https://www.taiwannews.com.tw/en/news/3191152> (accessed November 2017).
- Fishman, E., S. Washington, and N. Haworth. 2014. Bike share's impact on car use: Evidence from the United States to Great Britain, and Australia. *Journal of transportation research: part D* 31: 13–20.
- Freudendal-Pedersen, M. 2009. *Mobility in daily life—Between freedom and unfreedom*. Farnham: Ashgate.
- Frith, J. 2013. Turning life into a game: Foursquare, gamification, and personal mobility. *Mobile Media and Communication* 1, no. 2: 248–262.
- Gibson-Graham, J.K. 2008. Diverse economies: performative practices for 'other worlds'. *Progress in Human Geography* 32, no. 5: 613–632.
- Gössling, S. 2018. ICT and transport behavior: A conceptual review. *International Journal of Sustainable Transportation* 12, no. 3: 153–164.
- Haas, B. 2017. Chinese bike share graveyard a monument to industry's 'arrogance', *The Guardian*, <https://www.theguardian.com/uk-news/2017/nov/25/chinas-bike-share-graveyard-a-monument-to-industrys-arrogance> (accessed 10th December 2017).
- Haixiao, P. 2017. Air pollution crisis measure and traffic management in Shanghai and Beijing, International Transport Forum, <https://www.itf-oecd.org/air-pollution-crisis-measures-and-traffic-management-shanghai-and-beijing> (accessed February 2018).
- Hall, S.M., and A. Ince. 2017. Introduction: Sharing economies in Times of Crisis. In *Sharing Economies in Times of Crisis: practices, Politics and Possibilities*, edited by A. Ince, and S.M. Hall, London: Routledge.
- Hernandez, Javier C. 2017. As bike-sharing brings out bad manners, China asks, what's wrong with us?. *New York Times*. <https://www.nytimes.com/2017/09/02/world/asia/china-beijing-dockless-bike-share.html> (accessed December 2017).
- Horwitz, J. 2017. Chinese cities are saying "enough already" to bike-sharing services run rampant. <https://qz.com/1058438/chinese-cities-saying-enough-already-to-chaos-generated-by-bike-sharing-services-like-ofto-and-mobike/> (accessed December 2017).
- Howells, K. 2017. Mobike recognised by UN for environmental impact. *Bikebiz*. <http://www.bikebiz.com/news/read/mobike-recognised-by-un-for-environmental-impact/022354> (accessed December 6, 2017).
- Jennings, G. 2015. Finding our balance: Considering the opportunities for public bicycle systems in Cape Town, South Africa. *Research in Transportation Business & Management* 15: 6–14.
- Koglin, T. 2018. Urban velomobility and the spatial problems of cycling. In *Experiencing networked urban mobilities*, eds. Malene Freudendal-Pedersen, Katrine Hartmann-Petersen and Emmy Laura Perez Fjelland, 112–118. London: Routledge.
- Larsen, J. 2017. Bicycle parking and locking: Ethnography of designs and practices. *Mobilities* 12, no. 1: 53–75.
- Marvin, S., A. Luque-Ayala, and C. McFarlane. 2016. *Smart urbanism: Utopian vision or false dawn*. Oxford: Routledge.
- McClaren, D., and J. Agyeman. 2015. *Sharing cities: A case for truly smart and sustainable cities*. Cambridge, MA: MIT Press.
- Millington, B. 2014. Smartphone apps and the mobile privatization of health and fitness. *Critical Studies in Media Communication* 31, no. 5: 479–493.
- Musakwa, W., and K. Selala. 2016. Mapping cycling patterns and trends using Strava metro data in the city of Johannesburg, South Africa. *Data in Brief* 9: 898–905.

- Ogilvie, F., and A. Goodman. 2012. Inequalities in usage of a public bicycle sharing scheme: Socio-demographic predictors of uptake and usage of the London (UK) cycle hire scheme. *Preventive Medicine* 55, no. 1: 40–45.
- Parker, J., C. Walker, and R. Johnson. 2011. What can we learn from car sharing experiences in the UK? *Proceedings of the Institute of Civil Engineers* 164: 181–188.
- Pucher, J., and R. Buehler. 2008. Making cycling irresistible: Lessons from the Netherlands, Denmark and Germany. *Transport Reviews* 28: 495–528.
- Quan, Y., and Guangyu, F. 2017. Feature: Bike Hunters, XinhuaNet, http://www.xinhuanet.com/english/2017-10/12/c_136674312.htm (accessed 10th December 2017).
- Richardson, L. 2015. Performing the sharing economy. *Geoforum* 67: 121–129.
- Shaheen, S. Guzman, and Zhang H. 2010. Bikesharing in Europe, the Americas and Asia: Past, present, and future 2012. Transportation Research Board Annual Meeting. <https://escholarship.org/uc/item/79v822k5> (accessed August 31, 2014).
- Sheller, M., and J. Urry. 2006. The new mobilities paradigm. *Environment & Planning A* 38: 207–226.
- Spinney, J., S. Reimer, and P. Pinch (eds.). 2017. *Mobilising design*. Oxford: Routledge.
- Spinney, J. 2016. Fixing mobility in the neoliberal city: Cycling policy and practice in London as a mode of political-economic and biopolitical governance. *Annals of the American Association of Geographers* 106, no. 2: 450–458.
- Stehlin, J. 2014. Regulating inclusion: Spatial form, social process, and the normalization of cycling practice in the USA. *Mobilities* 9, no. 1: 21–41.
- de Souza e Silva, A. 2006. From cyber to hybrid: Mobile technologies as interfaces of hybrid spaces. *Space & Culture* 3: 261–277.
- de Souza E Silva. 2017. Pokémon GO as an HRG: Mobility, sociability, and surveillance in hybrid spaces. *Mobile Media and Communications* 5, no. 1: 20–23.
- Tan, Y. 2017. *Graveyard of tens of thousands of bikes looks kind of beautiful*. UK: Mashable. https://mashable.com/2017/08/17/bikesharing-china-dumped/#J7v3l5Rw_kqL (accessed 10th December 2017).
- Williamson, B. 2015. Algorithmic skin: Health-tracking technologies, personal analytics and the biopedagogies of digitized health and physical education. *Sport, Education and Society* 20, no. 1: 133–151.
- Yang, S. 2017. A Closer look in to bike sharing in China and its future, TechInAsia, available at <https://www.techinasia.com/talk/bike-sharing-china-future> (accessed 10th December 2017).