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Ripples through the city: Understanding the processes set in motion through embedding a public bike sharing scheme in a city☆

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ABSTRACT

This paper seeks to elucidate the nature of the processes or 'ripple effects' associated with embedding a public bike sharing scheme (PBSS) into the physical, social and institutional fabric of a city. It draws on a case study of the *dublinbikes* scheme and was guided by the Multi-Level Perspective (MLP) conceptual framework. The study employed a mixed method data collection approach encompassing interviews with key informants and users (and non-users) of the PBSS and analyses of statutory plans, policy documents, engineering guidance and other material. Through an examination of a number of domains — rules and regulations, user experiences of navigating the city, the emergence of new actors and re-alignments of existing relationships, infrastructures and traffic management measures — it is revealed that the introduction of the PBSS set in motion an array of unpredicted processes and cascade effects (or feedback loops in complex systems terms) which are now playing out. The knowledge generated from this study of the planning and early operational phases of the new socio-technical system enhances our understandings of processes of change associated with PBSSs and, more broadly, of some potential transition pathways towards lower carbon futures. The paper also raises new questions for future research.

1. Introduction

1.1. Background and study aims

Public bike or bike-sharing schemes (PBSSs) have now become a common component of urban transport systems. Their history can be traced back to low-tech origins with the creation of the *Witte Fietsen* (White Bike) initiative by countercultural Amsterdam based group *Provo* in the mid-1960s (Voeten, 1990). The free bikes scheme then evolved over the following decades through increasingly sophisticated generations of schemes (DeMaio, 2009; Shaheen, Guzman, & Zhang, 2012). Meddin and DeMaio (2014) estimate that globally there are now 721 "3rd generation" bike sharing schemes in operation (i.e. those enabled with ICT technologies and in which bicycles can be taken from and returned to different locations) with 814,000 bicycles in total in use. To put the former figure in context, we know from Senior (2009, p. 289) that "there are over 350 light rail schemes globally" so public bike schemes appear to be developing into an almost standard part of the transport offer in many European, American and Asian cities.

As a subject of academic enquiry, there has been a mushrooming of publications in recent years from a number of disciplinary perspectives. Some scholars have examined the diversity of schemes organisational forms and (public/private/non-profit) business models underpinning the schemes (Beroud & Anaya, 2012). Other works have focused on the changes in individual behaviour accompanying schemes and the degree to which PBSS trips may (or may not) be substituting for those previously taken on motorised transport. In their synthesis of the literature on public bikes, Fishman, Washington, and Haworth (2013) have argued that there are generally low transfer rates from car to public bike journeys: the vast majority of trip substitutions come from public transport and walking. There has been very little focus however on how exactly schemes become embedded into their physical, social and technological contexts and what knock-on effects or unintended consequences ensue following the introduction of schemes. A notable exception here is the research on the modelled public health (dis-)benefits of introducing PBSSs with Woodcock et al. (2014, p. 1) concluding that "London's bicycle sharing system has positive health impacts overall, but these benefits are clearer for men than for women and for older users than for younger users". This paper responds to the gap in our knowledge in this area and the research questions driving the paper are: firstly, what are the processes associated with embedding a public bike share scheme in a city and, secondly, what (if any) 'ripple effects' have emerged in response to these embedding processes. The metaphor of the ripple is employed so as to suggest that there are (subtle) disruptions to the pre-existing regime and these 'come ashore' in quite distinct terrains, expressing themselves in different ways. The paper also uses the notion of 'cascade effects' or a chain of ensuing effects. Cascade

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effects might also be thought of as positive (or self-reinforcing) or negative (or self-regulating) feedback loops, concepts used by scholars of complex systems such as Unruh (2000) in his exploration of the notion of *carbon lock-in* (i.e. being locked into fossil fuel-based energy systems).

This paper draws on recently completed research in which a case study was conducted on the *dublinbikes* PBSS in Dublin, Ireland launched in 2009. The methodology for the case study was guided by the Multi-Level Perspective (MLP) theory, a conceptual framework which has been used extensively by scholars such as Geels examining transitions at the level of societal functions in realms such as transportation, communication, energy, housing and health-care (Geels, 2005, p. 445). The main debates that this paper seeks to contribute to relate to the nature of (potential) transitions or large scale shifts from one type of system to another and this could, of course, also include 'transition failures' as attempts to move towards electric car regimes have been recently described by Newman, Wells, Nieuwenhuis, Donovan, and Davies (2014).

The remainder of this introductory Section 1 provides a brief insight into travel patterns in general and bicycle movements in particular in Dublin city, the case study location. It also extends the history of Dublin's experiences with the public bike concept back to the mid-1990s before discussing the operations of the new '3rd generation' public bike system. In Section 2, the guiding theoretical framework of the Multi-level Perspective (MLP) and methodology employed are explained in more detail. Section 3 summarises and discusses the findings from the study, covering the domains of: rules and regulations; aspects of users' experiences of the scheme; actors and new coalitions; and, finally, infrastructures and traffic management. Section 4 presents and discusses the overarching conclusions from the study. It considers in particular the concept of momentum as applied to the ongoing shifts and ripples which, it is argued, have been generated through the introduction of a new socio-technical system in a European capital city.

1.2. Cycling and public bikes in Dublin

To turn to the case study city itself, over one quarter (27.75%) of the population of the Irish state live in Dublin (City and County combined): that is, 1,273,069 of a total of 4,588,252 persons with 527,612 living in Dublin City (Central Statistics Office, undated). Of the 1.6 million persons commuting to work, 1.1 million (69%) drive or are a passenger in a car, while just 39,803 (2.4%) cycle (Central Statistics Office, undated). In Dublin (City and County combined) 529,812 persons commute to work, of which 26,670 (i.e. 5.03%) do so by bicycle. For Dublin City only, 219,700 commute to work with 16,960 (i.e. 7.72%) travelling by bicycle (Central Statistics Office, 2012, p. 7). In Dublin City centre, the most recent canal cordon counts[1] show that "[o]ver the 10-year period 2003 to 2013, the volume of inbound pedal cyclists crossing the canal cordon during the morning peak increased by 92.3%" (Dublin City Council, 2014, p. 1) as shown in Fig. 1.

The history of PBSSs in Dublin can be traced back to 1996 and a stunt organised by Green Party (GP) City Councillors aimed at publicly criticising the transport policies of the Council. Ciaran Cuffe, the then GP Transport spokesman, argued that the "£3.2 million invested in a new car park… 'could have provided 16 pocket parks, 64 playgrounds or 32,000 free bikes'" (McDonald, 1996). As part of the stunt, ten or so white bikes – inspired by the Dutch *Provo* and an early free bike scheme in La Rochelle, France (Cuffe, 2014 — personal communication) — were released onto the streets of Dublin to present an alternative approach to transport planning (Fig. 2). The bicycles disappeared quickly as did the

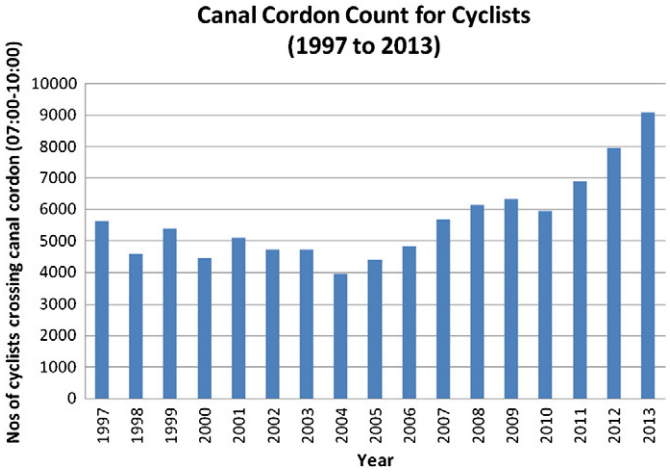

Fig. 1. Data from Dublin's Canal Cordon Count for Cyclists, 1997–2013.

idea of introducing public bikes in Dublin. While Jason Frehill (Key Informant #2 — see Table 1 below) indicated that in the early 2000s the City Council examined the idea of introducing a public bike scheme into the city before deciding against it on cost grounds, it was not until the mid 2000s that the idea re-emerged and a final decision was taken to introduce a scheme. This was prompted by a mixture of political campaigning (according to Kelly (2005a)) and a desire for the City Council to draw in advertising revenue (according to Frehill (KI#2)). This all occurred just a few years after the launch of the *Vélib'* free bikes in Paris, a scheme which now has "20,600 bicycles and 1451 bicycle stations available every 300 metres" (Shaheen et al., 2012, p. 193).

In September 2009, Dublin City Council finally launched its '*dublinbikes*' scheme, comprising 450 bikes available for use from 40 docking stations located within the central canal cordon of the city (Fig. 3). The scheme has recently expanded to 1500 bikes at 100+ stations (Ginty, 2014a) (Fig. 4) with further proposals to raise this to 5000 bikes over the coming years (Dublin City Council, 2011b). As of October 2014, there were over 50,000 long-term subscribers to the scheme (Ginty, 2014b). 95% of journeys take less than 30 min and are therefore free to subscribers (Dublin Bikes, 2014).

As well as generating intense interest from journalists[2] since it was announced that the *dublinbikes* were coming to Dublin, the system has also been the subject of quite intense scholarly interest. Early work by Mooney, Corcoran, and Winstanley (2010) used a GIS perspective to examine the usage and flow patterns of *dublinbikes* and their work showed that during weekdays three of the five busiest stations lie within 400 m of either tram or mainline/sub-urban train stations, but this changes at weekends where the five busiest are located within 400 m of key shopping areas. Other scholars such as Murphy (2010)[3] and O'Neill and Caulfield (2012) have examined the relationship between *dublinbikes* and public transport use with the latter scholars finding that proximate public transport stops and stations positively influence activity at *dublinbikes* stations. Most recently, Murphy and Usher (2013) demonstrated that the vast majority of users of the scheme are male (78%), relatively young (approximately 80% of users are between 25 and 48 years of age) and come overwhelmingly from middle- and upper-middle-income backgrounds. Intriguingly, their work also showed "that individuals who use the scheme and are drivers feel that their awareness of cyclists on the road has been increased when they

[1] Since 1980, Dublin City Council has been conducting annual traffic counts in November each year for all modes of traffic at 33 locations around the cordon formed by the Royal and Grand Canals. Since 1997 the counts have been conducted from 7.00 to 10.00 am (Dublin City Council, 2014, p. 1). Note also that the *dublinbikes* scheme was introduced in September 2009 just before the (November) 2009 traffic count.

[2] A search of the Irish Times database using the term "dublinbikes" for the period 01 January 2006 to 02 August 2014 and using the Proquest platform (ProQuest LLC, 2014) yielded 99 results — i.e. stories either about or making reference to the *dublinbikes* scheme.

[3] Hilary Murphy to distinguish her from Enda Murphy. This latter scholar co-authored the work with Usher (see above).