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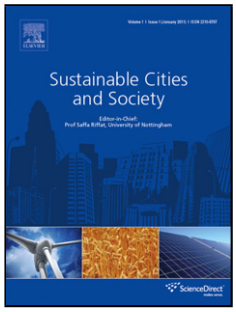

Title: Getting Londoners on two wheels: a comparative approach analysing London's potential pathways to a cycling transition

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Getting Londoners on two wheels: a comparative approach analysing London's potential pathways to a cycling transition

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Abstract: This article compares the current state of cycling in London to the Amsterdam cycling transition of the 1970s, applying the Multi-Level Perspective to identify potential pathways and obstacles to the wider adoption of the cycling niche in London. Our approach is two-pronged, consisting of a historical perspective to analyse the cycling transition in Amsterdam, and a policy analysis in contemporary London, based on semi-structured interviews with respondents involved in London's cycling policy. We identify factors that reinforce cycling's niche status in London, thus making the wider adoption of cycling more challenging than it was in Amsterdam. Based on our comparison, we also highlight policy, infrastructure and cultural changes that will aid in promoting a cycling transition in London.

Key words: sustainability, cities, cycling, sustainable transport, urban transport, low-emission transport, transitions, London, Amsterdam.

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1. Introduction: a cycling solution in two urban contexts

"I want to de-lycrafy cycling. I want to make it normal, something for everyone … helping cycling will not just help cyclists. It will create better places for everyone" (Boris Johnson, former mayor of London, in Woodman, 2013).

In 2010, 14% of global, and 25% of the EU's CO_2 emissions were transport-related, making the transport sector the second largest contributor to European CO_2 emissions (EU, 2015; IPCC, 2014). Road transport is responsible for two thirds of these emissions, and automobiles are one of the largest contributors (Chapman, 2007). This situation has led to calls for research into promoting a transition to sustainable mobility. Scholars working in this area have predominantly focused on public transport (Sengers and Raven, 2015) and low emission vehicles (Hickman et al., 2011) as a way of investigating this transition. Cycling has received much less attention, which is in part due to the commonly held belief that increasing intra-urban distances deter cycling (Chapman, 2007; Geels, 2012; Kemp et al., 2011; Kemp & Rotmans, 2004; Santos et al., 2010). However, 21% of British CO_2 car emissions are caused by trips of less than 6 kilometres, which is equivalent to less than half an hour cycling (DfT, 2009). In London, 63% of NO_x and 21% of CO2 emissions were due to transport, with 47% of the latter being caused by cars and motorcycles (TfL, 2014a; *Figure 1*). Notably, in the city as a whole, the average daily distance travelled per person in 2013/2014 was 9 kilometres, of which only 0.6 kilometres were actively travelled (TfL, 2015a). When considering the transport modal share in Greater London, this dominance of motorised transport is reflected: In 2014, 45% of journey stages were completed with public transport, 32% with private transport (the car), 2% by bicycle, and 21% by walking (TfL, 2015b).

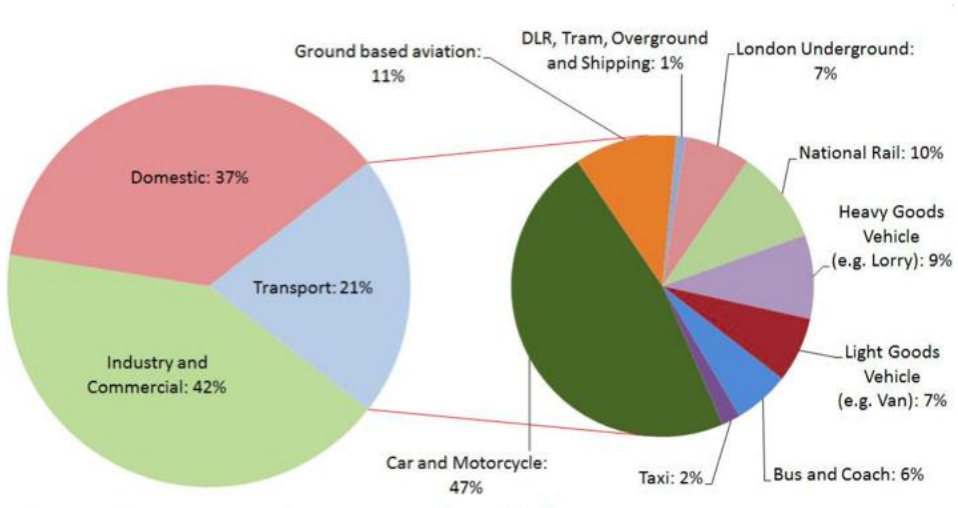

Figure 1: 2010 Greater London CO_2 emissions. Cited by TfL (2014a, p.1)

Cycling has the potential to substitute many local, short journeys currently undertaken with motorised transport in London, which represents 77% of total London transport (TfL, 2015b). An increase in cycling would have a positive impact on London's urban emissions, as well as raising the rates of active travel; two significant environmental and public health benefits (Woodcock et al., 2009). The former mayor of London, Boris Johnson, recognized London's cycling potential and therefore planned significant measures, including two cycling superhighways and a quiet-ways network (TfL, 2013). Simultaneously, the number of cyclists and

journeys by bicycle in London have increased measurably: on average, 610,000 daily cycling journeys were undertaken in 2014, compared to 320,000 in 2001. In 2014, 2% of all journeys in London were on a bicycle (BBC News, 2015; Clemens & McGill, 2013; Gallagher & Parkin, 2014; TfL, 2014).

Cycling transitions, however, often involve the overcoming of systemic institutional and civil society obstacles (Spinney, 2016). In this context, the rising popularity of cycling in London is set against widespread negative perceptions of cycling and cyclists, some of which are related to perceived levels of danger (Aldred, 2013a; Aldred & Crosweller, 2015; Horton, 2006; Tolhurst, 2015; Walker, 2014). Indeed, cycling fatalities are still relatively common in London. Between 1986 and 2010, there were an average of 17.2 cyclists per annum killed on the capital's roads (Cycling Intelligence, 2012). In comparison, in Amsterdam, where cycling rates are much higher (a 36% modal share), the average yearly death toll is of around six cyclists per annum (Orange et al., 2013; Van 't Wout, 2014).

Today, Amsterdam is considered a global cycling city. It was not always thus. In the 1970s, it faced similar issues to those faced by London today: a high numbers of traffic fatalities were reported, as well as an increasing level of environmental awareness leading to a questioning of the notion of the 'automobile city'. These pressures, combined with an oil crisis, effective campaigns, and other factors, reversed former car-centred policies, and helped to form part of what became a cycling transition (Bruhèze & Veraart, 1999; Van der Zee, 2015). This article a.) Analyses the factors that led to a cycling transition in Amsterdam; b) Assesses the current state of cycling in London; and c.) Based on our comparative analysis of Amsterdam, investigates how a cycling transition may be stimulated in London. In so doing, the article's approach is rooted in socio-technical transition theory, and based on the deployment of the Multi-Level Perspective (MLP) for understanding how niche innovations can spread and become widely adopted in society.

2. Theoretical framework

2.1 Socio-technical cycling transitions

Studies of socio-technical transitions are focused on how innovative practices, technologies and 'ways of doing' at a niche level potentially become dominant in regimes that were previously organised around a different practice (Geels, 2012). A wide range of approaches using the concept of transition exists in the literature. For this article we employ an approach rooted in an understanding of transitions as occurring through the interaction between different socio-technical levels, an approach known as the Multi-Level Perspective (MLP). The MLP perceives transitions as interactions between three conceptual levels: niche, regime, and landscape. The *niche* level represents innovative and potentially radical innovations, likely used by a minority of actors. The socio-technical *regime* is the ensemble of various practices and technologies that, together, form a widely accepted and operational social system. The socio-technical *landscape* represents the exogenous environment outside of the regime and niche, such as broader societal trends and attitudes (Kern & Smith, 2008). With regards to cycling, the MLP can be operationalised in the sense that cycling in London is the niche activity. As this article will illustrate, the London cycling niche exists within a London mobility regime that

is largely organised around the car, public transport, and walking, with their associated infrastructures, transport policies, and urban citizens' habitual (cognitive, regulatory and normative) 'ways of doing' formed around their usage. The regime, in turn, exists within a broader landscape of among others safety, public health and capacity pressures (TfL, 2013). Using the MLP, transitions can be understood to be the result of interactions between these three levels.

Both internal and external transitions are possible, depending on regime actors' approach to societal pressures (Geels, 2002; 2005; 2006; 2010; 2012; Kemp et al., 2011). In turn, different transition pathways can prevail, depending on timing and on the nature of interactions between the conceptual levels (Geels & Schot, 2007; Geels, 2011). Timing represents the state of niche innovations when landscape pressure increases: fully developed niche-innovations are more likely to form an alternative to the current regime. The nature of interactions between levels refers to innovations' relationship with the existing regime, either aiming for replacement or enhancement. Four different types of transition pathways can be distinguished:

1. *Transformation:* Moderate landscape pressure is present while niche innovations are not fully developed. Regime actors thereby modify the direction of development and innovation. Outsiders, such as activists, translate landscape pressure to the regime by emphasizing negative externalities.
2. *De-alignment and re-alignment:* Rapid landscape pressure is experienced while no stable niche innovation exists. Multiple niche innovations exist along each other, as none of them is fully developed. One niche innovation might be preferred initially, but becomes re-aligned when another innovation becomes dominant.
3. *Technological substitution:* Significant landscape pressure is experienced and a well-developed niche innovation can immediately substitute the existing regime.
4. *Reconfiguration:* Innovations are adopted from within the regime to solve local problems, triggering adjustments in the regime's basic architecture and reconfiguring a new regime.

When analysing the cycling transition in Amsterdam and studying the potential for a cycling transition in London, it is key to take into account this potential range of pathways. While many studies of transition are longitudinal and deploy a historical perspective to examine transitions that have occurred, our research contributes an approach that takes this historical perspective as a foundation for identifying potential future pathways. In so doing, we deploy a comparative urban framework that recognises the key role of the city as a context within which transitions can be studied. We also root the MLP in the urban context, but do not claim that the niche, regime and landscape levels translate directly into scalar or spatial levels. The city is also a key context for studying sustainability transitions in light of the increasingly urban nature both of society and of societal challenges (Evans, Karvonen & Raven, 2016). In the following section, we apply an MLP approach to introduce the current state of cycling in Amsterdam and London.

2.2 The current context of cycling in Amsterdam and London: a multi-level perspective

In this section, both the Amsterdam and London cases are introduced and contextualised within the MLP, an approach that serves to draw out comparisons and to identify pathways for transition (actual in the case of Amsterdam, potential in the London case).

Amsterdam

In Amsterdam municipality, "The bicycle plays an indispensable part in solving the mobility problem of Amsterdam" (Gemeente Amsterdam, 2012a, p. 5). At the time of writing, economic, environmental, and health benefits continuously facilitate the maintenance and growth of the city's cycling rates (Gemeente Amsterdam, 2012b), factors that together constitute a broader *landscape* within which the Amsterdam transport and mobility regime exists.

Cycling is central to the city's transport and mobility *regime*. The Dutch national government's role is essential for Amsterdam's cycling policy: the Netherlands was the first country to implement national cycling policies. Dutch cycling policy consists of two components: a.) 'Carrot' policies promote cycling by expanding cycling lanes, increasing bicycle parking facilities, providing cycling training, and sharpening traffic laws. An example concerns one of the city's busiest cycling streets in the city centre: The Sarphatistraat was recently transformed into a 'cycle street' ('fietsstraat'), with a maximum speed of 30 kilometres per hour and cars treated as guests (Gemeente Amsterdam, 2016a); b.) 'Stick' policies indirectly encourage cycling by reducing car parking, maintaining taxes on petrol and car purchases, and controlling low-density sprawl (Pucher & Buehler, 2008; Rietveld & Daniel, 2004). An example of a stick policy is the environmental zone (milieu zone) in which very polluting vehicles are denied access to the centre. This zone is continuously extended to other vehicle types (Gemeente Amsterdam, n.d.). Notably, not all urban transport policies hinder the car: an initial plan of the municipality to ban delivery vans from entering the environmental zone resulted in a final plan that only bans these vehicles' parking permits. However, the bicycle's position is undeniably strong, gaining prioritization in all Amsterdam's transport plans (City of Amsterdam, 2009; Gemeente Amsterdam, 2013).
As a result of such policies, the immense popularity of cycling in Amsterdam has led to significant cycle parking problems, especially at train stations (Parool, 2013; *Figure 2*), with cycling having become the most important transport mode for Amsterdam residents (City of Amsterdam, 2009; Gemeente Amsterdam, 2016b). Cycling's prominent role within the regime is strengthened to some extent by cyclists' lobbies, with the Dutch national cyclists' organization, the 'Fietsersbond' (cyclists' federation), representing all Dutch cyclists. The Fietsersbond's main activities focus on providing information, high-level lobbying for improved infrastructure and parking facilities, and initiatives decreasing bicycle theft and road injuries (Fietsersbond, n.d.).

Figure 2: Bicycle parking at Amsterdam Central Station (photo by author)

In Amsterdam, cycling is considered an everyday and normal mode of transport: people transport children, commute to work, and shop by bike; thus, a *niche* is not present (Pucher & Buehler, 2008). Research on residents' transport behaviour found that in 2015, Amsterdam's modal cycling split was 36%, which is higher than the car (24%), public transport (16%), and walking (23%), although varying according to age, education level, and home location. Older residents cycle less than younger residents do – 35% of trips by residents aged 65+ are cycled, compared to 53% by residents aged 30-44. Highly educated residents also cycle more than those with other education levels – 56% compared to 32/33% of trips. In addition, cycling frequency decreases when further from the city centre. Even for low education levels living far from the city centre, however, the cycling level constitutes a considerable 10-30% of all trips (Gemeente Amsterdam, 2016b). Another research, focusing on frequency of cycling, found that 58% of participants – all Amsterdam residents- cycled on a daily basis, and the gender division of cyclists was equal. Concerning motivations, 70% considered cycling a pleasant and 50% a fast mode of transport. 11% of participants found cycling unpleasant, resulting from negative safety perceptions and deterrents including lacking parking facilities and dangerous intersections (Gemeente Amsterdam, 2011). Thus, it can be argued that cycling's status in Amsterdam is now effectively that of being a central and mainstream part of Amsterdam's transport and mobility regime. Some deterrents to cycling, however, are still in place, dependent on residents' location, age, feelings of safety, and education.

Figure 3: Cycling in Amsterdam (Borba, 2014)

London

The broader *landscape* around British transport and mobility exhibits pressures aimed at promoting a broader adoption of cycling. British policy discourse from the 1990s onwards has presented cycling as solving health, traffic congestion, and environmental issues (Aldred, 2012; Golbuff & Aldred. 2011). Similar drivers form pressures for cycling in London: for example, former mayor Johnson emphasised cycling as benefiting neighbourhood safety, economics, transport, and urban health (TfL. 2013b). Cycling fatalities form another pressure for infrastructural improvements, having gained substantial media attention in the 2000s and resulting in demands for improved cycle safety (Tolhurst, 2015).

Notwithstanding pressures at the landscape level, London's transport and mobility *regime* is still rooted in automotive and public transport travel modes. Nonetheless, at the regime level pressures promoting the incorporation of cycling have also arisen. Since the introduction of the Greater London Authority (GLA) in 2000, urban political policy and discourse portrayed cycling in a positive light at the city level, although at a borough level this can be more critical. In 2000, boroughs were empowered to become more involved in transport issues, and former mayors Ken Livingstone (mayor of London 2000-8) and Boris Johnson (mayor of London 2008-2016) encouraged cycling (Batterbury, 2003; Pucher & Buehler, 2008). Also, London's congestion pricing scheme was introduced in 2003, which has significantly contributed to increasing cycling levels, and can therefore be interpreted as a 'stick' policy (Pucher & Buehler, 2008). Other policies have limited car parking spaces and instead created more space for bus lanes or more recently, cycle lanes, as well. Generally, however, implementing 'anti-car' policies seems difficult in London. Therefore, cycling policy mainly focuses on 'carrot' policies such as cycling facilities improvements (Batterbury, 2003; Pucher & Buehler, 2008). This can also be seen in former mayor Boris Johnson's call for a 'cycling revolution' in 2009, and his allocation of a £0.9bn cycling budget in 2013, which was largely spent on initiatives of the 'carrot' type, such as cycling superhighways and the Santander bicycle hire scheme[1] (Gallagher & Parkin, 2014).

London's political-administrative structure also affects its transport and mobility regime, and cycling's associated transformative potential. While the GLA provides oversight and direction for metropolitan London, the urban area comprises 33 boroughs, which are run by different political parties and generate a spatially variegated context of provided cycling facilities. Some of the more progressive boroughs, e.g. Hackney, have a high cycling rate and offer considerable facilities, whereas other boroughs prioritise motor traffic (Aldred, 2012; Moss, 2015; TfL, 2013). Nevertheless, scholars argue that London's car-focused transport and mobility regime is currently destabilizing: qualitative interviews with residents report increasing perceptions of cars as dysfunctional, and environmentally and economically dubious propositions, whereas cycling is perceived efficient and responsible. Yet there is also a spatial split in this perception: in outer London, the car still seems to be considered a lifestyle necessity (Green et al., 2012).

[1] Scheme offering easily rentable bicycles, promoting and normalising cycling by increasing visibility (Goodman et al., 2014)

At this regime level, cycling advocacy groups – i.e. regime 'outsiders'-, including NGOs, bloggers, and radical protesters, attempt to influence the policy debate by campaigning and collaborating with policy-makers. The Space for Cycling Campaign provides an example of a combined effort from Sustrans, CTC, LCC, and others, demanding improved cycling infrastructure (CTC, n.d.; LCC, 2015). Action group Stop Killing Cyclists (SKC), attracts much attention by organising 'die-ins' with thousands of participants congregating in places where cycling fatalities have occurred, also inspired by the Amsterdam transition (Lydall, 2015; Sleigh & De Peyer, 2015). Sometimes these cycling organizations also substitute state functions by assisting local councils in consultations and providing input to transport coordinators, although councils mostly prefer mild citizen participation instead of actual input in road designs (Batterbury, 2003). Also, the asymmetric power distribution between the planning experts of councils on the one hand, and the lay people expertise of activists on the other hand, influences their policy input, forcing activist groups to professionalize and lose their guerrilla characteristic (Spinney, 2010).

At the *niche* level, a specific cyclist identity seems to make cycling a politicised practice instead of a transport choice inclusive and accessible to all residents, with cyclists consisting of mostly middle-aged and working males (Horton, 2003; Spinney, 2009): 20% of Londoners aged 25-44 cycle, compared to the average of 14% in all age categories; 20% of men are regular cyclists compared to 9% of women; and 17% of working compared to 8% of non-working people cycle regularly – Figure 4 illustrates these dominant cyclist characteristics more clearly (TfL, 2015c). Increased fitness is the main cycling motivation, followed by time and money savings. Safety concerns, including perceptions of danger, too much traffic, and fear of collisions, are the main cycling deterrents for Londoners, followed by bad weather, lack of time, health reasons and lacking accessibility and confidence (TfL, 2015c). Although mostly perceptual, these safety concerns are somewhat rooted in fact: In 2013, cyclist fatalities accounted for a high share of British road fatalities (6%) relative to their overall road share (2%; Gallagher & Parkin, 2014). Also, cyclists report to experience scary incidents on a weekly basis (Aldred & Crosweller, 2015).

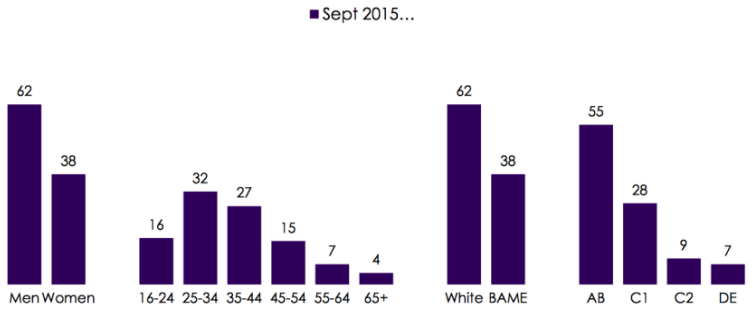

Figure 4: Profile of cyclists in London distinguishing between gender, age, ethnicity and socio-economic group in % (TfL, 2015c, p. 155)

Also culturally, London cyclists seem to form a defined niche (Aldred, 2010). For example, in qualitative interviews with Londoners, Steinbach et al. (2011) reported interviewees defining cyclists as left-wing, environmentally concerned, healthy, and independent. However, cyclists were also perceived as risky and self-identifying through the wearing of materials such as lycra and high-visibility clothing, and race bikes (*Figure 5*).

This perception of the London cyclist carrying a specific identity is shared more widely, as shown by the TfL survey: 71% of participants found cyclists fit and healthy, whereas 47% regarded cyclists as dangerous and 27% even as law abiding. The finding that 43% of participants believe "cycling is not for people like me" also emphasizes the presence of a London cyclist identity (TfL, 2015c, p. 83). Interestingly, an Australian study reports similar findings: cycling was considered environmentally friendly, healthy, and fun, but also dangerous, requiring appropriate gear and clothing. In addition, non-rider interviewees regarded cyclists as risk takers and lawbreakers (Daley & Rissel, 2011). However, cyclists' preferences for wearing sports gear and cycling fast, which are likely to contribute to their exclusive image as fit/healthy, or risk-taking, can be explained too: For cyclists, wearing the 'right' gear is considered essential to be regarded a 'proper' cyclist. Also, a higher cycling speed decreases reported near misses (Aldred & Crossweller, 2015). Nevertheless, this representation might harm cycling's accessibility: such a fast and sporty image might not appeal to everyone (Aldred, 2013a). In response to this perceptual barrier, various attempts are made for a more inclusive cycling identity. For instance, a pop-up cycling organisation for the 2012 Mayoral elections, 'Londoners on Bikes', chose their name as to include all Londoners and present cycling as a commuting choice for everyone (Aldred, 2013b). Also, the monthly Critical Mass ride attracts more radical and rebellious cyclists compared to the typical green and leftist identity (Furness, 2007). Nonetheless, qualitative studies find that cycling itself is still considered unfeminine, bourgeois and idealist, or transport for the poor (Green et al., 2012; Steinbach et al., 2011). Thus, the London cycling niche is institutionally and structurally bounded and strongly culturally defined and policed by a limited range of actors.

Figure 5: London Cyclists (Danny, 2013)

3. Methods

Our research is based on mainly interviews for the London case, and documentary research for the Amsterdam case. We conducted semi-structured interviews in London in July 2015. By using purposive sampling, we selected potential participants, focusing on participants closely involved in either London or UK cycling policy. We invited participants to take part in a research on cycling in London by e-mail, after which we asked positive repliers to set a date for a face-to-face interview. Before starting the interview, we invited participants to sign

a consent sheet and we confirmed if participants let us record the interviews for transcribing purposes. We started each interview with an introduction by the interviewer and some introductory questions for participants on their cycling activities and involvement in cycle activism and/or policy-making. Consequently, interview questions (mostly open-ended) semi-structured the interviews, divided into four categories: *landscape* (e.g. what greater factors do you believe are driving cycling in London?), *regime* (e.g. how do you evaluate current cycling policy in London/how much impact do you believe cycling campaigners have?), *niche* (e.g. do you believe there is a cyclist identity in London?) and *transition/comparison* to Amsterdam (e.g. do you think we are at a transition period for London?). After the interviews, we asked participants for other contacts that would be interested in participating, thereby employing snowball sampling.

We approached 23 potential interview participants, resulting in 13 interviews, one of which was conducted by phone and all others face-to-face. Interviews lasted an average of 45 minutes. All participants self-identified as regular cyclists, and their backgrounds ranged from policy to advocacy, consultancy, academia and retail. We transcribed the interviews and consequently employed content analysis, categorizing transcripts according to the four main themes and associated subthemes: the cycling niche, regime, landscape, and potential to bring about an Amsterdam-like transition. In addition, we used NVivo qualitative data analysis software to analyse term frequencies for each question theme separately, focusing on nouns and adjectives in particular. Furthermore, we engaged in documentary research of mainly published historical material to analyse the Amsterdam case as well as the historical part of the London case. We found these publications by using academic search engines with terms such as “cycling, policy, Amsterdam, history”, and focusing on material of historical experts on cycling. The lack of primary data concerning the historical Amsterdam case should be noted as a limitation of our research, although we have tried to overcome this limitation by using objective academic information sources.

4. The Amsterdam cycling transition

The bicycle was introduced to the Netherlands in 1868 as a sports vehicle for the bourgeoisie, and was initially considered harmful because of its speed. However, the Royal Dutch Touring Club (ANWB), which at the time was the Dutch cyclists’ union[2], presented cycling positively as encouraging virility, balance and self-reliance, reflecting Dutch values. As a result, these efforts of the ANWB helped to establish a cultural connection of the bicycle with Dutch national identity (*Figure 6;* Stoffers & Oosterhuis, 2009). Ridership boomed in the interwar period: 74% of Dutch vehicles in 1923 were bicycles (Ebert, 2004; Tjong Tjin Tai et al., 2015). Also, royals’ usage of bicycles strengthened the bicycle’s reputation as a class-free vehicle (Stoffers, 2012).

[2] It later became a transport and travel body that now fulfils a range of functions from motoring roadside assistance, to insurance, to lobbying.

Figure 6: Nationalistic bicycle advertisement from 1914 (Stoffers, 2012, p. 106)

After the Second World War, car use increased and bicycle use decreased. Dutch policy remained positive towards the bicycle, as seen by post-war attempts to incorporate the bicycle in Amsterdam's urban planning. This approach was stimulated by the ANWB, which worked to emphasise the importance of the bicycle as a mode of transport. This resulted in the relatively late onset of Dutch auto mobility, and in the bicycle not becoming as marginalised as in other countries. Nevertheless, a negative view of cycling slowly emerged in the Netherlands in the post-war era, characterising cyclists as careless and hindering motor traffic. Bicycle use decreased severely in 1950-1975 throughout cities in the Netherlands (*Figure 7;* Bruhèze & Veraart, 1999; Oldenziel & Bruhèze, 2011; Stoffers & Oosterhuis, 2009).

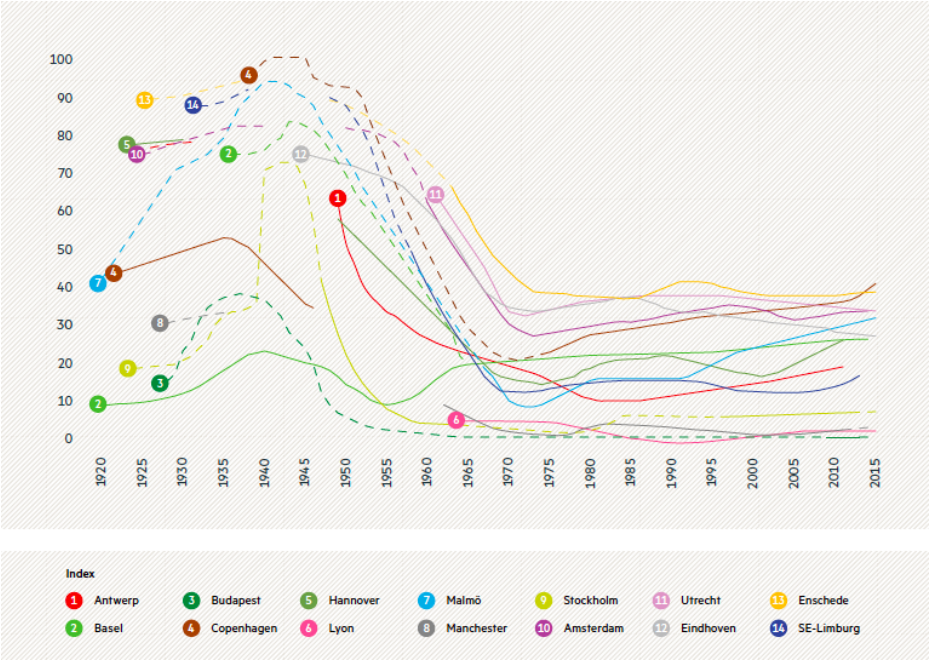

Figure 7: Bicycle use (as a percentage of total trips by public transport, car, and bicycle) in 14 European cities, 1920-2015 (Oldenziel, Emanuel, Bruhèze, & Veraart, 2015)

After the rapid decrease in bicycle usage between 1950 and 1975, a reversal of this trend occurred in the mid-1970s, which we analyse by using the MLP. At the *landscape* level, external and internal pressures supporting cycling mobility had started to appear by the 1970s. For instance, environmental organisations and other social

movements had emerged in Europe and the Netherlands (Bruhèze & Veraart, 1999; Kaldor, 2003; McCormick, 1989). Also, the oil crisis of 1973 underlined the Netherlands' car dependence. As a consequence, Minister-President Den Uyl implemented car-free Sundays. This helped promote the use of non-car transport, including the bicycle (Strabbing, 2000). Simultaneously, media coverage of traffic fatalities helped to galvanize action for improving cycling safety. In 1971, 3,300 casualties (including 400 children) were car traffic-related (van der Zee, 2015). These three societal landscape pressures, both external and internal, put a brake on the bicycle's increasing unpopularity (Rietveld & Daniel, 2004).

Pressures also existed within the Amsterdam transport and mobility *regime* by the mid-1970s, especially coming from cycling activism. Protest movements such as Provo highlighted the significant problems associated with car-centred, congested, and polluted cities. The movement issued 'white plans' for bicycle mobility, intending to distribute free white bicycles around the city of Amsterdam, thereby creating a bicycle-sharing scheme representing sustainable transport and equality. Although these plans were never executed, they emphasized and symbolized the deficiencies existing within Amsterdam's existing transport and mobility regime. The Provo movement also impacted cycling initiatives internationally (Otten, 1984; van Duijn, 2011; Vollebregt, 2013). Another well-known organisation actively exerting pressure was Stop de Kindermoord ('Stop the child murder'). This movement demanded safe streets for children, and pushed for improved cycling facilities and policies disincentivying car use. Stop de Kindermoord organised guerrilla protests, 'reclaiming' the streets from cars by painting illegal bicycle paths, or by staging dinners in the road, blocking traffic. This organisation also enlisted the help of road experts, who designed pilot residential streets favouring the bicycle over the car (BBC News, 2013; BBC World Service, 2013; van der Zee, 2015).
Movements such as Provo and Stop de Kindermoord are examples of regime-level pressures aimed at a regime shift from car-centred to bicycle-friendly cities. In 1975, the Fietsersbond (Dutch Cyclists' Foundation) was established, advocating the crafting of considerate cycling policy by promoting participation with government in the policy process, instead of protesting (Stoffers, 2012). This emphasis had some success in enlisting urban policymakers to these pro-cycling movements' agendas (BBC World Service, 2013). As a material and infrastructural result, Amsterdam built new cycle lanes, which eventually led to the establishment of a national cycle network. By the 1990s, the bicycle was officially included in national transport plans (Oldenziel & Bruhèze, 2011; Stoffers & Oosterhuis, 2009; Van der Zee, 2015).

One of the developments that aided in Amsterdam's cycling transition was the strong narrative formed around cycling during its first entrance as a practical mode of transport for all. This strong socio-cultural connection between the bicycle and Dutch culture, as mentioned above, was re-emphasised in the 1970s, for instance in a range of outlets both visual and text-based (Pelzer & Brommelstoet, 2010; Tjong Tjin Tai et al., 2015). Such an increasing framing of cycling as an accessible transport mode for all Dutch residents, prevented the cycling *niche* from ossifying. Furthermore, no explicit and overt anti-cycling measures were taken in Amsterdam before the 1970s, and cyclists were still regarded as respected road users, with policy emphasising the need to accommodate all transport modes (Bruhèze & Veraart, 1999).

Overall, the cycling transition in Amsterdam resulted from interactions between the regime, landscape and niche levels. In part, it was due to the fact that cycling, although it increasingly became a niche activity in 1950-75 compared to its abundance in the beginning of the 20th century, still retained socio-cultural links and pressure points at the regime level. Broader regime changes occurred as a result of pressures from the 1970s onwards: these enabled the cycling population to become firmly established and to expand into wider societal acceptance at the regime level. These pressures, and changes, can be seen in the national reversal of car-centred policies as mentioned above. This led to a *partial de-alignment* of the regime with auto-mobility, and a *re-alignment* to include cycling more centrally in the transport and mobility regime. By the 1990s the bicycle was firmly embedded as a central transport mode in the transport and mobility regime. A range of actors and networks enabled this shift: activists served the purpose of clarifying the bicycle's potential role to policymakers, presenting the bicycle as a potential solution to broader societal pressures; the bicycle's socio-cultural and discursive construction was largely positive and remained aligned with notions of national identity; and infrastructural and policy changes at the urban scale as a result of these pressures helped to embed bicycle mobility in Amsterdam's urban context. At the time of writing, Amsterdam's transport system favours the bicycle over the car (Oldenziel & Bruhèze, 2011; Pucher & Buehler, 2008; Rietveld & Daniel, 2004).

5. Analysing the potential for a cycling transition in London

In the interwar period, cycling was a popular mode of transport in the UK. Rates of cycling in Britain as a whole increased significantly from approximately 1910 onwards: over 14,7 billion vehicle miles were constituted of cycling in 1949, representing 35% of all British road traffic (DfT, 2015); in home-work commutes, cycling increasingly substituted the role of walking (Pooley & Turnbull, 2000). However, this decreased rapidly after the 1940s: policymakers focused on increasing and facilitating motor traffic, resulting in policies tolerant of motor vehicle use and urban parking (Golbuff & Aldred. 2011). Consequently, walking as a transport mode continued to decrease, whereas utilitarian cycling decreased even more sharply. Interestingly, public transport usage remained quite stable after the introduction of the car. In this time, the bicycle became increasingly associated with the working class and danger. Street reorganisations led to cycling bans on main roads, against which the CTC lobbied (Batterbury, 2003; Bruhèze & Emanuel, 2012; Oldenziel & Bruhèze, 2011). In London, the modal share of cycling has been continuously lower than in other British cities -constituting 5% of commutes to work from 1890-1959- due to the high amount of commuters from outside of the city (Pooley & Turnbull, 2000). However, when considering all types of trips combined and the high percentage of British cycling overall at this time (35%), one can deduct that cycling's modal share in the first half of the 20th century was most probably higher than 5%.

In the 1970s, increased environmental awareness and new social movements also reached the UK and resulted in anti-motorisation campaigning. Consequently, cycling became more included in transport policy, although road dangers and cyclists' potential vulnerability were highlighted. Policymakers widely believed that some anti-cycling policies could not be reversed, and that British people were too scared to share streets with cars. As a result, and unlike in the Netherlands, no national cycling strategy was planned, with local governments

developing their own policy visions in a fragmented and patchwork manner (Golbuff & Aldred, 2011). Therefore, in London, and the UK overall, cycling policy was not much affected by the 1970s protests. Various explanations for this have been put forth, such as the fact that by 1973 UK cycling had decreased to a lowest-ever modal share of 1%, and ceased to be considered an everyday activity (Aldred, 2012; Golbuff & Aldred, 2011). Furthermore, British cyclists' organisations' discursive constructions of the car were more aversive and confrontational than those adopted by their Dutch counterparts (Bruhèze & Emanuel, 2012; Stoffers, 2012). Lastly, it has been argued that anti-cycling policies and measures had, by the 1970s, caused a broader, culturally negative image of cyclists in the UK, also exacerbated by cycling's association with low income, which was irreversible by the protests (Bruhèze & Veraart, 1999). Nonetheless, as mentioned before, cycling's current state in London might be a transitional one. Therefore, below we consider the contemporary landscape, regime and niche developments in London from a perspective of individuals largely involved in London cycling, thereby assessing the current state of cycling. In our interviews, research participants most often mentioned infrastructure, transport and politics as key determinants of cycling in London wider society.

When considering the *landscape* level separately, several pressures can be identified. Within London, the most frequently mentioned drivers by respondents were health, air, the mayor, sustainability, and locality, which will be considered here - except for the mayor, which applies more to the regime level (*table 1*).

Word	Length	Count	Similar Words
health	6	24	health
mayor	5	22	mayor, mayoral
air	3	21	air
sustainability	14	17	sustainability, sustainable
local	5	17	local, locally
transport	9	17	transport, transportation
quality	7	14	quality
argument	8	12	argument, arguments
public	6	12	public
area	4	9	area, areas

Table 1: Ten most frequent terms - Landscape level

Broader societal challenges and issues were often mentioned as drivers of cycling's uptake, with a focus on the public health benefits of cycling: interviewees repeatedly mentioned challenges in Britain's National Health System as motivations for their uptake of bicycle mobility, with cycling seen as a potential solution to the population's increasing levels of obesity as well as health problems associated with poor air quality. Interestingly, the local spatial scale was essential in respondents' perceptions of landscape pressures: although only one respondent mentioned cycling's positive influence on global carbon emissions and climate change mitigation, seven interviewees emphasised local issues, such as air quality, as important drivers for cycling in London. This finding can be explained by the concept of temporal and spatial discounting: the more abstract the problem, because of time or distance, and the less direct the effect of behavioural changes on someone's

life, the less important the issue or behaviour is perceived to be (Kollmuss & Agyeman, 2002; Vlek & Steg, 2007). The following quote exemplifies this effect:

"Rather than those global, geo-political issues…to do with energy and climate change…I think air pollution actually is often a more significant driver locally" (Int6).

At the same time, in another emphasis for local factors, the interviewed policymakers especially considered London's transport system's overcapacity an important driver for cycling improvements. This is exemplified by the following response:

"London is growing at a rate that we are not anticipating, and to accommodate growth in London we cannot keep building more very expensive infrastructure like Crossrail or High Speed 2, or new tube lines…" (*Int8*).

For residents themselves, similar perceptions of infrastructural capacity limitations also provide a reason to cycle:

"*Rather than the attractiveness of cycling pulling people in the centre of London, it is actually more the negative factors, overcrowded tube trains… pushing people to try other things (Int1)".*

Hence, public health, local environmental, and capacity problems were perceived as the most essential broader drivers at the landscape level, all demanding cycling improvements. In contrast, global environmental pressures were not seen as significant drivers of cycling in London. Additionally, policy-makers expressed the need to make an economic argument for cycling besides these health-related, environmental, and planning arguments; *"because that is the vocabulary that Londoners and London businesses need to hear" (Int8)*.

At the *regime* level, respondents highlighted the role of cars, boroughs, campaigns, groups and transport in affecting London's transport and mobility regime (*table 2*).

Word	Length	Count	Similar Words
cars	4	63	car, cars
boroughs	8	56	borough, boroughs
campaign	8	55	campaign, campaigned, campaigners, campaigning, campaigns
group	5	34	group, groups
transport	9	31	transport
change	6	30	change, changed, changes, changing
lcc	3	29	lcc
tfl	3	29	tfl
local	5	29	local, localities, locally
mayor	5	21	mayor, mayoral, mayorality

Table 2: Ten most frequent terms - Regime level

Participants generally agreed London's recent cycling policy was progressing, albeit slowly. Respondents positively highlighted the role of the mayor (Johnson) in pushing forward awareness and policy measures

favouring the uptake of cycling. At a wider political level, respondents described the mayor, the GLA and TfL as characterised by an increasing acceptance of cycling:

"We are quite fortunate in the cycling world to have a mayor of London who happens to really like cycling" (Int7).

This positivity did not apply to other – both lower and higher – political levels. At the national level, lacking pro-cycling measures and stick policies were seen as making TfL's work more difficult, having to develop cycling policies and standards by themselves, without a national example:

"Sustainable transport is seen as small scale, low interest, and low costs. So it never features highly on the Department for Transport's agenda" (Int6).

At the borough level, London's politically variegated and decentralised nature (consisting of 33 boroughs with different political colours), was considered as hindering the development of a more cycling-focused transport and mobility regime, with especially conservative boroughs remaining very car-focused and not realizing cycling's benefits, impacting the associated cycling facilities:

"You really notice it when you cross the border from a progressive borough such as Camden into Westminster… you almost feel as if the hairs of your arms stick up" (Int1).

This factor (the spatially complex and variegated nature of London's political make-up) has implications: TfL manages only 5% of London's roads. On the remaining 95% they need the permission of respective boroughs for implementing measures including cycling-focused initiatives: this makes implementing a cycling network problematic. As a respondent working for TfL noted:

It is the biggest challenge that we face…for most of the projects that we do we need to get an agreement from not just 32 London boroughs, but we need to get agreement within TfL, … to get agreement from the Royal parks, … to get agreement from the Canal and River trust... (Int8).

When considering the position of the car, respondents highlighted how this was becoming somewhat less dominant, which is visible especially in perceptions among the young;*"[y]oung people in London no longer aspire a car" (Int2),* but also in urban policies: "*if you want to build a new residential apartment block… they are now working with maximum parking standards instead of minimal parking standards" (Int2; Int7)".*

However, this shift is, again, spatially variegated and focused mostly on the city centre. Respondents noted how the outer boroughs remain car-dominated. Improvements in these boroughs were considered difficult because of their large sizes and small cycling budgets. In the whole of London, the need for more 'stick' policies, discouraging motor traffic, was recognised. Local councils were considered cautious with these policies because of political reasons, and perceived to be afraid to challenge the car's central position in the regime. Some participants believed that in order to facilitate anticipated growth, 'carrot' policies need to be implemented before stick policies.

Positively, in stimulating change and progress in cycling policy, cycling advocacy was considered highly effective by respondents in raising awareness and agenda setting, with especially LCC and SKC considered influential:

"Campaigners …use that group of cyclists that already exists and direct them to take important actions like attending protests, die-ins, write to members of parliament, sign petitions…" (*Int5*).

However, advocacy groups also received criticism, especially from regime insiders such as policy-makers, businessmen, and transport experts, due the polarising nature of their campaigning, which portrays cycling as an activity that *confronts* the existing state of affairs and pits cyclists *against* drivers and other road users:

"For groups like LCC it is … also being aware that some of their campaigners ... put people who would consider travelling by bike off cycling…Sometimes when they are too campaigny, too kind of vigilanty, it can be off-putting… " (Int8).

Thus, the London transport and mobility regime can be described as changing, albeit slowly. Political pressure and will exists at the mayoral level; this is paralleled by decreasing urban car ownership rates, and by the increasing popularity of the bicycle. However, this will is not as equally presented on the local borough or national level. Also, these changes predominantly apply to London's central areas and not to its outer boroughs. Cycling advocacy groups are deemed to be effective in exerting pressure on the regime, although there was a widespread sense that these groups also serve to define a very specific and non-inclusive cycling niche, which is constructed as being exclusive and confrontational with regards to other road users, including car drivers.

At the level of the London cycling *niche*, cyclists, road, infrastructure, traffic, and group were terms that were frequently mentioned by respondents (*table 3*).

Word	Length	Count	Similar Words
cyclists	8	79	cyclist, cyclists, cyclist'
road	4	43	road, roads
infrastructure	14	39	infrastructure, infrastructures
traffic	7	30	traffic
group	5	29	group, groups
bike	4	27	bike, bikes
children	8	25	children
cars	4	25	car, cars
women	5	20	women
change	6	18	change, changed, changing

Table 3: Ten most frequent terms - Niche level

This highlights the local nature of cycling (infrastructure and traffic) as well as the discursive construction of actors within the niche as a specified 'group'. On this point, most participants described a typical London cyclist as white, middle-class, and male. This is partly explained by the commute-to-work nature of inner-

London cycling. However, respondents differed in their opinions of how the stereotypical London cyclist, and the main purpose of their journeys (the commute to work), influenced the London cycling niche. Some people believed that the image portrayed above made cycling off-putting, as seen in this quote:

"The type of cyclists who join LCC is … a sort of committed 'I am a cyclist' type of person …the people that we are trying to attract, even the term cyclist is something that they do not really want to buy into, they do not want to see themselves as a cyclist…" (Int8).

Interestingly, other respondents disagreed with the cyclist identity as described above, arguing that this original cyclist demographic has already become less specific, or believing that the cyclist demographic does not prevent people with different identities to consider cycling. As these respondents were mostly from the advocacy side, potentially they did not realize their own role and influence on the current cyclist demographic. All participants agreed, however, that the identity-building and visibility of current cyclists was also necessary for cycling to become more mainstream:

"It is very hard … to persuade a politician … to say I want to build a segregated cycle route on this road, when they see a road with no cyclists on it" (Int7).

Besides the need for such a critical 'cycling mass', respondents also actively discussed barriers to more widespread adoption of cycling in the British capital, and broadening the cycling niche. These interrelated barriers were seen as represented by: a.) *A negative and exclusive image of London's cyclists*: Participants perceived cyclists' reputation as negative, with the aforementioned stereotypical cyclist moving very fast and dangerously. In addition, some participants identified perceptions of cycling as a transport mode for less wealthy residents. b.) *A perception of cyclists as being rule-breakers*: This perception can be seen as strengthening barrier (a), with the disobeying traffic behaviour of some cyclists creating a negative reputation. Accordingly, some participants emphasized the need for current cyclists to become more considerate of traffic rules, creating a social norm and thereby potentially decreasing cyclists' negative reputation. c.) *Cycling's perceived lack of safety*: Participants identified this barrier as another factor responsible for the exclusive cycling niche, preventing the niche to grow.

In overcoming these identified barriers for the cycling niche to grow, respondents generally related these mostly perceptual obstacles to a stated necessity for material improvements to the physical cycling environment. In particular, respondents focused on infrastructural improvements, and on the need for cycling networks that were not exclusively or populated overwhelmingly by 'lycra warriors'. Respondents believed that these measures would both decrease cycling's (perceived) danger, enhance cycling's status and adoption in the wider regime, and decrease the incentive for behaviours (such as disobeying traffic rules) harming the appeal of cycling to current non-cyclists. A noticeable reply came from a bicycle shop owner, explaining his preference for segregated cycling infrastructure: *"Because it is fun to ride together… as we are used to in the Netherlands… but that is still impossible here" (Int12).* In this light of physical infrastructural improvements, London's East-West and North-South cycling superhighways (examples of segregated infrastructure) were

generally regarded as potentially change-inducing material projects, and respondents highlighted the role of these projects in helping to stimulate demand for cycling (*Figure 8*).

Thus, the London cycling niche seems to be represented by an exclusive demographic, although this was perceived to be changing by some participants. Various barriers were identified to a broadening cycling niche, mostly relating to a negative and unsafe reputation of cycling and cyclists. To overcome these barriers, participants mostly focused on infrastructural improvements.

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Figure 8: East-West cycling superhighway design (TfL, n.d.)

The final theme of the interviews considered *the Amsterdam transition*, and the *potential for a similar cycling transition in London*. In this part of the interviews, participants most frequently mentioned terms related to infrastructural developments (e.g. 'infrastructure', 'transport' and 'road'), and barriers (e.g. 'cars' and 'funding'). Interestingly, words such as 'already' and 'change' illustrate the positive view of many interviewees that a transition is already happening in London, and change is on its way.

Word	Length	Count	Similar Words
cars	4	31	car, cars
change	6	30	change, changed, changing
road	4	30	road, roads
infrastructure	14	29	infrastructure
times	5	22	time, times
local	5	20	local
transport	9	16	transport
already	7	14	already
barrier	7	14	barrier, barriers
funding	7	14	funding

Table 4: Ten most frequent terms - Transition theme

In comparative terms, respondents were asked to reflect on the differences and similarities between London and Amsterdam. Some of the differences were material: it was noted that London's large size means that commuting distances are also greater than in Amsterdam. Other differences were political: Amsterdam's more

centralised political structure was compared to London's variegated structure of 33 boroughs and a Greater London Authority. At the level of attitudes, key differences in approach and in the socio-cultural construction of the place of cycling in Dutch and British contexts were highlighted, as seen in the following excerpts:

"Cycling is not a political subject in the Netherlands, which is very different from here where it is more a political debate…it is a non-issue in the Netherlands, a natural way of how we built our cities…" (Int3).

"*What does a road look like in England? Pavement and a road ... from a Dutch point of view we know it is pavement, cycle lane, road. It is just a different mind-set (Int7).*

These attitudinal differences seem to be both illustrated and caused by the fact that cycling is included in the Dutch transport mix, whereas in the UK and London it is treated separately, affecting the allocated funding, hindering the implementation of effective infrastructure, and making transport engineers often overlook or disregard cycling as a transport option.

Notwithstanding the key differences and barriers highlighted above, one of the main findings of our research was that all participants expressed the belief that London was on the brink of change with regards to the broader societal acceptance and material provision of cycling, also pointing to the recently large increase in cycling, already totalling to over half a million daily cycling trips. One of our respondents, a bicycle shop owner, revealed that they had even included the occurrence of an Amsterdam-like cycling transition in their business plan for the shop. Participants noted how a set of pressures were coalescing and enabling interactions between the niche and regime levels, which were also regarded parallels to the Amsterdam transition of the 1970s. These parallels included increasingly effective cycling advocacy, broadening interest in cycling, more political will, increasing funding for cycling activities and infrastructure, and increasing levels of wider environmental awareness. Most respondents, however, were aware of the likelihood of a cycling transition taking several years to emerge:

"Some colleagues from the Netherlands… show pictures of what Amsterdam actually looked like in the 1960s and 70s, it is exactly like London looks now… So we are beginning to see that sort of thing happening in London, but I think we are quite a way back, sort of thirty years behind you" (Int8).

Finally, participants were asked to name three barriers to a cycling transition in London (*table 5*). Political will, funding, and negative safety perceptions were mentioned most frequently. As explained by a transport professional, many of these barriers are interrelated: *"We need infrastructure … to encourage people who are less excited to cycle. Infrastructure needs finance, finance needs political support" (Int7:2).* Infrastructure overcomes perceptual barriers, and political will is needed to receive the associated funding – not only from the mayor, but also on a national and local level. To build this infrastructure, stick policies can create more cycling space, whereas transport engineering and policy expertise are also needed. Interestingly, participants mostly believed that a cycling transition would come from combining forces of supportive insiders and outsiders, together convincing those that are not yet.

Barriers	Frequency
Inconsistent political will (both general and local)	6
Inconsistent funding	5
Negative safety perceptions	3
Insufficient expertise of transport engineers/policy-makers	2
Lack of infrastructure	2
London's (narrow) roads	2
Resistance to stick policies	2
Negative image of cycling	2
Slow progress	1
Lack of campaigners	1
Conservative national government	1
Showing the (economic) benefits of cycling to businesses	1
Inaccurate travel models & law	1
Car lobbyists	1

Table 5: Cycling barriers named by participants

6. Discussion and conclusion

Cycling in London is growing considerably, resulting from the many pressures and actors involved. London's central authorities including the former mayor (Johnson) and TfL have recognised cycling as one solution to the limited capacity of London's transport system, public health concerns, and local environmental issues. Various cycling advocacy groups effectively stimulate this recognition by organising protests and providing lay expertise. At the national and borough level, however, these efforts have not completely succeeded: the national government does not take sufficient leadership in cycling measures, and both conservative and outer London boroughs remain car-dominated. Actors in the current cycling niche fulfil their role as visible users of cycling infrastructure, providing incentives for policy-makers. Nevertheless, the cycling niche is also consisted of a dominant demographic, which is not perceived as accessible, and potentially reinforces cycling's marginal status. However, mayoral infrastructural plans, such as the cycling superhighways, are potentially revolutionary and could increase cycling's accessibility. Concerning potential for a transition, all participants emphasised their belief that London is, at the time of writing, starting to experience a cycling transition, although they recognised that the associated size depends on broader pressures, advocacy efforts, political will, and the accessibility of the cycling niche. A summary of this comparison is provided in *table 6*.

6.1 Main findings from our comparative approach

By adopting a historical perspective and comparative focus, our analysis has revealed some notable differences between the Amsterdam and London contexts with regards to a potential cycling transition in London. The largest differences are encountered at each of the three societal levels.

At the *landscape level*, environmental awareness is increasing in London. Although it is hard to judge, the importance of the environmental issue seems less than in 1970s Amsterdam, with other more localized topics seemingly receiving more attention. This more limited role of environmentalism could stem from the fact that environmentalism first entered the public sphere in 1970, whereas at current times it is an issue known to sometimes 'tire' people because of its global and challenging nature (also named 'green fatigue'; Independent, 2007). More important pressures include concerns over cycling safety, public health, and the local environment. The 1973 oil crisis, an event which forced the Dutch government to implement radical measures, is absent in the UK context, although climate change threats may form a similar larger pressure in the future.

At the *regime level*, the greatest difference concerns the politicised status of cycling in London, while in Amsterdam cycling is a central part of the regime, and is not politically debatable: cycling is part of the transport mix. Also, although increasingly effective, advocacy mainly focuses on themes that do not connect all Londoners, including health, environment, or cyclist safety, whereas advocacy in Amsterdam focused mainly on one connecting theme: child traffic fatalities. Furthermore, London's political decentralisation requires the permission of many authorities to implement policies and infrastructural improvements, hindering effective policymaking; Amsterdam's more centralised nature simplifies this. In addition, the car's position is considered to probably be more central in London at present than it was in 1970s Amsterdam, when auto-mobility had only been an increasing trend for thirty years and car ownership was relatively low in the Netherlands. This makes stick, but also carrot policies difficult to implement, especially in outer London and conservative boroughs.

At the *niche level*, there are significant and specific differences. Whereas cycling in Amsterdam was positively associated with Dutch nationality, cycling in London carries many negative and specific connotations. These form a London cycling niche with a dominant but exclusive demographic. This, in turn, influences cycling's reputation and accessibility.

However, there are also important and useful parallels to be drawn between 1970s Amsterdam and contemporary London, existing mostly at the *landscape* and *regime* levels. As in Amsterdam, environmental awareness is increasing in London, although mostly with a local focus. Together with the salient media exposure of cycling fatalities in London, this focus is part of a strong societal pressure at the regime level. Another parallel is the growth of political will: policymakers increasingly recognise cycling's potential role in London's transport mix. In addition, the influence of activism in the 1970s in Amsterdam was very large and the organisations' motivations accessible to residents. At the moment in London, activism also seems to have an increasing power on policy-makers and the mayor, with all our respondents agreeing on its effectiveness. Some of these groups also actively replicate the approaches that were central to advocacy and lobbying activities during the Amsterdam transition, such as die-ins.

The various points raised above are essential to consider, as they represent differences and parallels between a cycling city (Amsterdam) and a potential cycling city (London). Accordingly, this comparison illustrates what factors pushed a cycling transition in Amsterdam, and to some extent also why this transition has not occurred (yet) in London. Considering these differences and parallels separately for specific socio-technical levels allows actors involved in cycling policy in London to point out what issues most probably will require changes to stimulate a cycling transition and what issues do not; e.g. our analysis suggests that landscape pressures need to be emphasized more smartly to policy-makers; cycling should be part of the transport mix; and cycling should be presented as a convenient transport mode for all Londoners, while increasing political will needs to be perpetuated as well as cycling activism's efforts.

Stages of the MLP	**Amsterdam in the 1970s**	**London at present**
Landscape	• Introduction of environmentalism gains attention for green city development • Oil crisis forces the government to limit motor fuels • High occurrence of road fatalities involving children	• Local drivers such as road capacity and air pollution issues • Global issues are not considered most important drivers for cycling policy and seen as tiring • Increased attention for road fatalities involving cyclists
Regime	• Centralized governing structure of the municipality with one political focus • Competitors' position such as the car was still developing and not as strong • Very strong and influential activism, population-shared motivations for cycling safety • Highly accessible policy-makers with strong political will, egalitarian culture • Promotion of car-free transport alternatives on the national level (partly in response to the oil crisis) • Lack of anti-cycling measures	• Political decentralization requires high amount of coordination between political affiliations • Strong position of competitors including public transport and the car • Increasingly powerful activism, although this could become more inclusive for all Londoners • High dedication to cycling policy from the mayor and TfL • Lack of national governmental leadership in promoting cycling policy
Niche	• Early formed associations of cycling with Dutch culture • Considerable amount of remaining cyclists at point of transition • Remaining cyclists did not represent a specific cyclist identity	• Strong cyclist identity: male, working, young • Negative image of cyclists: dangerous, rule-breakers, poor • Strong perceptions of lack of safety associated with cycling • Growing activity with increasing inclusivity

Table 6: Comparison of the London and Amsterdam contexts

6.2 Policy implications

As illustrated by our research, the niche level seems to be the greatest and potentially most influential difference between the two cases, which is why we recommend policy-makers to use the cycling niche as a starting point for policy interventions. Firstly, to facilitate a growth in cycling, the cycling niche should consider attempting to become more inclusive and accessible to all London residents. To achieve this, our analysis suggests that the bicycle's exclusive reputation as opposing car culture needs to be substituted for one of convenience, flexibility, and most importantly inclusivity, while simultaneously providing sufficient cycling infrastructure, representing two carrot policy measures. In order to operationalise this recommendation, however, it is important to recognize that providing cycling infrastructure and space for cycling necessitates compromises in terms of the space allotted to other forms of mobility and transport. It is clear that moving from holding cycling up as an ideal, to putting into action policies aimed at increasing cycling, will require political will and the willingness to enter into potentially fractious negotiations around the issue of taking space away from, say, motorized vehicular traffic so as to increase and segregate the space given over to cyclists. Urban politics is often about the politics of space, and we argue that in order to promote a cycling niche in London, the issue of the uses of (public) spaces of mobility in the city needs to be directly tackled.

Secondly, policymakers should consider acknowledging and promoting cycling as a common transport mode for all Londoners by including cycling in the general transport mix and marketing its affordability, practicality and speed instead of focusing overwhelmingly and moralisingly on its health and environmental benefits. Here, providing adequate infrastructure and effective cycling networks, instead of the current retrofitting of cycling facilities, will greatly assist overcoming safety barriers, strengthen marketing efforts (by making cycling a more visible 'common' transport mode), and decrease reputational barriers. In doing so, our analysis suggests that transport professionals with sufficient expertise need to be employed to make effective cycling investments, creating user-friendly and inviting cycling networks. Improved education for future cyclists also presents a method to increase (perceived) cycling safety, for instance by making cycle training an obligatory part of the curriculum at primary schools but also by making cycle training a more visible option for inexperienced students and residents who consider cycling. This responds to current calls from a wide range of societal groups for a focus on cycle training. In 2013, for example, an open letter to *The Telegraph* newspaper was authored by the Automobile Association (AA), the UK Road Haulage Association, British Cycling, and the UK Health Forum, calling for cycle training to be placed on the school curriculum with the same importance as swimming (Paton, 2013). In a 2014 government report (House of Commons Transport Committee 2014), it was acknowledged that although the Greater London Authority provided cycle training funding to cover all London schoolchildren, only around 50% of schoolchildren could actually access this training. Because the training is not compulsory, rates of uptake are not as high as they could otherwise be.

Thirdly, for the most beneficial result, our analysis indicates that London's stick policies simultaneously need to be increased to discourage motor vehicles, improve cycling safety, and make space for new cyclists. Examples include increasing the congestion charge and extending the area covered by the charge, or making parts of

central London, for instance Soho and the West End, entirely car-free. Also, parking charges and road tax could be increased while simultaneously decreasing parking possibilities at public places, also in outer London. The issue of 'stick' policies carries with it the risk of culturally pitting the bicycle against the car. This is in part unavoidable, as these measures are aimed at enabling the emergence of a cycling niche and providing a protected space for it. However, they require their being placed in a broader, transitional context which (re)considers the London transport and mobility mix so that the focus of these policies is not simply on cycling or on reducing car use, but on trying to shape different ways of travelling and moving around the city.

Fourth, in acknowledgement of the potentially progressive nature of global urban policy mobilities, setting up policy learning networks or exchanges between cities at a desired transitional stage (such as Amsterdam) and cities interested in transition (such as London) is key. Once all these steps are combined in an integrated and disciplinary approach to cycling in London, a transition might take place – one that probably best fits the description of the 'transformation' transition pathway, considering the large role of activists, developing role of cycling, and moderate present landscape pressures. This transformation, however, may take many years.

6.3 Concluding remarks

This article has attempted to analyse the potential of London to become a future cycling city by comparing the transitions associated with a contemporary cycling city (Amsterdam) and a potential cycling city (London). With its active travel and low emission components, cycling forms a (partial) solution to the ills associated with contemporary urban atmospheres including air pollution, greenhouse gas emissions, and capacity challenges, as exemplified by the case of London. We have taken a 'learning' approach to the Amsterdam case, sketching what a similar cycling transition would entail in London. Notably, we do not argue that this learning-based scenario is the only potential path to increase cycling in London.

As illustrated by this article, a cycling transition follows from a combination of factors at the landscape, regime, and niche levels: in analysing and stimulating future cycling transitions, the MLP therefore provides an effective approach. The Amsterdam case study has demonstrated the importance of creating an accessible and inclusive group of cyclists, representing cycling as a utility transport mode for all residents. At the moment in London, this is not yet the case: our analysis suggests that the cycling niche needs to open up to a wider demographic. Here, effective policy-making at the regime level, together with successful advocacy, can create such an accessible cycling-friendly urban environment in London: safety can be increased by providing quality cycling infrastructure, and negative perceptions can be decreased by making cycling part of the transport mix and marketing cycling as a transport mode for all. To achieve this, a balanced use of stick and carrot policies is required, as already employed in Amsterdam. In London, both of these policy types are increasingly used, although this could be increased, especially in more conservative and outer-boroughs. Landscape pressures, which in Amsterdam's case consisted largely of environmental, security, and public health factors, also play a significant role in demanding alternative transport modes: they can serve for policy-makers and advocacy to legitimize their choice for cycling. At the moment in London, these pressures mostly consist of local

environmental, health, and capacity pressures, which one should consider to effectively emphasize when convincing policy-makers and/or transport engineers of the potential future role of cycling.

The argument of this article is, indeed, that in a city like London, a cycling transition is a choice, to be achieved by the three societal levels participating together. In the coming decades the role of the aforementioned landscape pressures will increase considerably: in 2050, 70% of the rapidly growing global population is predicted to live in urban densities; this will increase capacity difficulties of transport systems as well as air pollution, if an increased motorization transport path is chosen. Global environmental issues including climate change mitigation and adaptation are also expected to form increasingly significant drivers for urban policies. Such policy drivers force regime actors to contemplate potential alternative transport paths, including cycling, which are currently often overlooked or disregarded. In London, regime actors have the choice to make cycling more accessible and viable compared to other local transport modes. In doing so, an effective approach combines segregated infrastructural projects and networks with measures limiting more polluting and less healthy means of transport, while simultaneously communicating cycling as an inclusive transport mode. Here, advocacy's role would be mainly to push regime actors in a transformative direction, but also to emphasize cycling's inclusiveness and decrease the dominance of the current cyclist identity. For the cycling niche in particular, it is essential to represent cycling as a practical transport mode, instead of a manner of identification.

If all societal levels participate accordingly, a cycling transition can be achieved in London, in the form of a transformation, re-alignment, technological substitution, or even reconfiguration, depending on experienced in increase in landscape pressures, political will and actions of policy-makers, and accessibility of the cycling niche. Importantly, the London case is only one example of a potential cycling city. Therefore, after public authorities have realized cycling's potential for future cities and aim to increase their cities' cycling rates, our analysis suggests using a cycling policy approach that focuses on the interrelatedness of the different associated societal levels and actively chooses for cycling. As a result, many cycling transitions may follow the Amsterdam case of the 1970s.

"Amsterdam was not always like this, it did not happen by accident, it happened through political will, campaigning, all coming together at the same time" (Int8).

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