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Spatial politics of mobility transitions:
Bicycle urbanism & Spatial Justice

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Being a dissertation submitted to the Faculty of the Built Environment as part of the requirements for the award of the MPlan City Planning at University College London: I declare that this dissertation is entirely my own work and that ideas, data and images, as well as direct quotations, drawn from elsewhere are identified and referenced.

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Abstract:

This dissertation investigates social implications of built environment interventions (BEI) related to bicycle urbanism from a Spatial Justice (Soja, 2010) perspective. By combining urban spatial theory and mobilities research, the novel theoretical framework Mobility Space helps to analyse spatial, experiential and discursive aspects of urban mobility priorities concomitantly and is thus an adequate analytical tool to uncover how recently proliferating cycling strategies impact society through an alteration of urban space. A qualitative and multi-method research design combines descriptive mapping, virtual site observation and semi-structured interviews to apply Mobility Space to the controversial Mini-Holland programme in Waltham Forest, London. Examining in detail the Walthamstow Village scheme, the research finds three patterns by which BEI related to bicycle urbanism re-organize movement, re-allocate space and re-design public realm to prioritize active travel and dwelling while discouraging car use. Those spatial alterations shift the political organization of space which in turn affects the Right to the City (Lefebvre et al., 1996) – an expression of Spatial Justice – as it enables a greater diversity of people to use urban space (right to appropriation) and makes them conscious how the space they inhabit is discursively produced and the outcome of contentious decision-making processes (right to participation). This research is relevant for urban professionals as environmental as well as pandemic-related urban mobility challenges necessitate a transformation of urban space to accommodate cycling, but negative outcomes for social equity, as resulting from car-urbanism, need to be avoided.

1. Introduction

As the consequences of climate change are ever more apparent, the shift towards sustainable practices in urban development becomes a necessity. Since emissions and energy needs of transportation make up a large amount of cities' carbon footprint, sustainable urbanism calls for corresponding forms of mobility. In many cities, a paradigm shift in transport planning ("peak car") is bringing an end to an era in which the automobile was the supreme mode of mobility (Newman/Kenworthy, 2011). Within the range of sustainable alternatives to the car (public transport, walking, cycling), the latter has gained particular momentum in the last decade as it constitutes an emission-free and economically effective solution to urban mobility challenges, while yielding public health benefits (Meschik, 2012; Becker et al., 2012; Gössling/Choi, 2015). This is reflected in the amount of cycling strategies adopted in various cities across continents (Pucher et al., 2010; Pucher/Buehler, 2012; Fishman, 2016). Best practice examples from the Netherlands and Denmark have received much popular (Colville-Anderson, 2018; Bruntlett/Bruntlett, 2018) and academic attention (Pucher/Buehler, 2008; Gössling, 2013; Sick Nielsen et al., 2013a; Harms et al., 2014; Koglin, 2015) due to long-established cycling cultures and comprehensive infrastructure resulting in high mode shares. Most of relevant cycling literature is concerned with question of public health and cycling rates, but rarely asks questions about socio-political implications of cycling interventions (Stehlin, 2019; Koglin/Peter, 2020). Moreover, whereas many case studies are from cycling cities in Scandinavia or Western Europe, research on the car-dominated United Kingdom is scarce (Horton et al., 2007; Aldred et al., 2017; Latham/Wood, 2015).

In the contemporary city, various measures implemented by municipalities to increase cycling mode shares cannot be viewed in isolation but must be investigated against the backdrop of other mobility modes competing for urban space and impacting urban life. Newman et al. state that different urban fabrics, each enabling a specific mode and displaying distinct built environment characteristics, co-exist within modern cities (2016). Since urban fabrics are "products of transport-related lifestyles and functions that have needed certain physical elements and environments to enable them", a shift in transport priorities can result in a drastic change of land-use pattern (ibid.: 431). Public transport and automobile fabrics, for instance, were built atop the walking fabric of historic city centres as transport priorities changed, leading to overlapping functions and to competition over urban space (Thomson/Newman, 2020: 1507). The emergence of modernism in urban planning was closely linked to the advent of the automobile (Hall, 1989) and more often than not cities' built environments were developed in accordance with the needs of motorised traffic, profoundly transforming urban space and marginalizing other modes and uses within it

(Koglin/Rye, 2014). Individual motorized transport impacted societal practice through the built environment as public spaces became parking, streets became roads, and sub-urban housing was prioritized over dense, mixed land uses prevalent in historic cities, leading to loss of places for social interaction, polluted walking environments, danger for cyclists, and transport inequality for those who could not afford the lifestyle associated with automobile use (Shoup, 2005; Lee, 2015; Norton, 2008). Automobile dominance transgresses the realm of private mobility to enmesh space, culture and production ("automobility"), illustrating how space and society are mutually constitutive (Urry, 2004; Lefebvre, 1991). The effects of such mobility priorities on social equity can be grasped by the concept Spatial Justice which exposes how resources are distributed in urban space and who is able to access them (Soja, 2010).

Recent interest in cycling as potent form of urban mobility and corresponding approaches to accommodate its needs in urban space – "bicycle urbanism" (Berney, 2018) can be interpreted as a shift in mobility priorities that provokes yet another transformation of the built environment, this time tailored to cyclists and with entailing impacts on urban life and Spatial Justice (Golub et al., 2016). But what, exactly, are these impacts? While cycling interventions are often hailed to increase social equity by advancing mobility of low-income communities (ibid.) and diversifying ridership (Aldred/Dales, 2017), there is considerable evidence of negative effects on Spatial Justice as cycling infrastructure can become a catalyst for gentrification and displacement (Lubitow/Miller, 2013; Herrington/Dann, 2016; Flanagan et al., 2016). Further, resistance to cycling interventions reveals conflicting perspectives on who is perceived to benefit and how the public is engaged in decisions over the built environment it inhabits (Wild et al., 2018).

The Greater London Authority adopted an ambitious cycling strategy that includes an extensive network of infrastructure and measures to discourage car use (TfL, 2018). A paradigm shift in transport priorities becomes even more evident in the Mini-Holland programme that targets car-dominated outer London boroughs with specific built environment interventions (BEI) to increase cycling rates (TfL, 2013). Waltham Forest Mini-Holland's objective to "benefit the whole community, not just the ones who cycle" implies an intention to create positive impacts for the broader society (TfL, 2020b). However, apart from the regular probes into health benefits and active travel rates (Aldred et al., 2019; Danjak et al., 2019), thus far no research has comprehensively investigated what the Waltham Forest Mini-Holland interventions mean for Spatial Justice. Most recently, the urgency to achieve sustainable urban mobility due to environmental concerns was intensified by the travel implications of the COVID-19 pandemic. Since physical distancing regulations substantially limit the capacity of public transport, cities such as Paris, Milan and Bogota quickly reorganized streets and restricted vehicular traffic in city centres to make active travel a

viable alternative (Bliss et al., 2020). London's Streetspace programme for example is the response to an expected ten-fold increase in cycling rates post-pandemic (TfL, 2020a). Given those circumstances, urban policymakers must quickly find adequate ways to integrate cycling into the existing car-dominated urban fabric.

Research question

In order not to repeat past mistakes caused by previous abrupt shifts in mobility priorities, it is vital to understand the social consequences of implementing bicycle urbanism related built environment interventions. The research question of this dissertation is therefore:

> *How and to what extent do built environment interventions related to bicycle urbanism affect Spatial Justice?*

In line with an understanding of space and society as mutually constitutive, the research question cannot be addressed by considering only one perspective. The theoretical framework of Mobility Space captures the complexity of bicycle urbanism with its repercussions for space and society by looking at material interventions as well as social practices and discourses. Whereas this will be thoroughly explained in the subsequent literature review, Mobility Spaces helps to sub-divide the research into the following objectives:

1. *What are the built environment interventions that indicate a transition towards bicycle urbanism?*

2. *How have these interventions enabled or restrained a diversity of uses in urban space?*

3. *How were these interventions interpreted by various members of the community?*

After a literature review that outlines relevant theories and empirical examples, the methodological approach will be explained, and the applied methods described. Chapter 4 provides an overview of the case study, Walthamstow Village, followed by a detailed report of the findings. Subsequently, the results are discussed in relation to academic debates and comparable studies before the research question is answered in a concluding chapter that also highlights the relevance of this dissertation to urban planning in general.

2. Literature review

The literature review will first theoretically frame the research by outlining how three intersecting aspects of urban life – space, society, mobility – are politically related. Based on these premises, the theoretical framework, Mobility Space (including conceived, perceived, lived dimensions), will be derived in order to examine how BEI emblematic of bicycle urbanism (conceived) can impact social practices (perceived) and political meanings (lived). The subsequent part will make the link between the latter two dimensions and Spatial Justice. In order to illustrate this empirically, a last part will outline BEI related to bicycle urbanism and possible implications for Spatial Justice.

a. Mobility shapes society through space

When analysing cycling as a socio-spatial practice of movement, one must theoretically understand how mobility interacts with society through space.

The "mobilities" paradigm refocuses any analysis of social phenomena onto the movement of people, goods, ideas, and other aspects of urban life (Urry, 2000; Sheller/Urry, 2006). The mobility perspective offers to "[include] power relations, social relations and cultural aspects of transport" in an analysis of urban mobility (Koglin/Rye, 2014: 215). Adherents of this approach have emphasized the increasing impact of mobility systems on society's organization by affecting people's everyday lives: a person's urban life is dependent on being mobile or immobile in such systems. Mobility is always "infused with power relations, and […] of great significance for how people use mobile spaces" (Koglin, 2018; Koglin, 2013: 62). Cresswell elaborates this political notion of mobility by formulating the politics of mobility: "mobility involves a fragile entanglement of physical movement, representations and practices" (2010: 18). These three elements can merge meaningful at a given point in time as "constellations of mobility" but they are also amenable to morph into something different as time progresses (ibid.). Physical movement from A to B is "raw material for the production of mobility. People move. Things move. Ideas move" (Cresswell, 2010: 19). Since this movement can be measured rationally, traditional transport planning prioritized the metrics of movement and excluded notions of sociality and culture (Koglin, 2013: 65; Cresswell, 2010: 19). Yet, movement is political in that destinations or modes are not equally accessible. When movement is linked with "meaning shared by people who perform [it]", representations of movement emerge (Koglin, 2013: 65). It evokes a sense of freedom in the person on a joyride but can be regarded as necessity for commuters on their way to work. Looking at how narratives are discursively constructed and framed by different groups gives an insight into the political facet of

those representations. Mobility as practice pertains to "both the everyday sense of particular practices such as walking or cycling but also [to] the more theoretical sense of the social as it is embodied and habitualised" (Cresswell, 2010: 20). Central is the experience of movement and what it can reveal about power relations in society if one asks how comfortable and safe it is for someone to move or in which way this experience varies for different social groups (ibid.). Mobilities encompass a "physical reality, they are encoded culturally and socially, and they are experienced through practice", which makes the concept useful if one wants to understand the interactions between mobility and society in urban space (Cresswell, 2010: 20).

One example of a mobility system is automobility, which refers to "non-human powered forms of mobility" (Koglin/Rye, 2014: 219). Related research sheds light on the experience of driving or wider societal impacts of car use (Urry, 2004). Vélomobility, in contrast, refers to "mobility on a bicycle" and acknowledges how this mobility is distinct from that of motorists "in terms of space (both while cycling and parking), and also in terms of safety and in terms of environmental problems and energy use/pollution" (Koglin, 2013: 63). Cycling is tightly connected with urban social relations: not only does it allow people to move around cities with less impact on others than automobility, cyclists are also able to make more use of public space and interact more directly with others than people driving cars (Koglin/Rye, 2014; van Oldenburg, 2015; te Brömmelstroet et al., 2017).

As a theoretical concept, vélomobility is helpful to examine "the performance of bicycling [in urban space and] problems that arise from the urban transport systems" (Koglin/Rye, 2014: 219). Within the context of car-dominated cities, cycling as political and social practice is interpreted as "normative critique of the use of urban space today" challenging automobile hegemony and "contesting the use of urban space" (Koglin, 2013: 63). This is reflected in the range of issues that vélomobility research covers: from the sensory experience of cycling (Spinney, 2007; 2010; Fox et al., 2014), bicycle activism (Furness, 2007; 2010), to identities of cyclists (Aldred, 2010; 2013b) and cycling as tourism (Pesses, 2010). While social issues and identity aspects are addressed in those studies, power relations in bicycle-planning is a young academic field (Koglin/Cox, 2020; Gössling, 2013; Stehlin, 2020).

Since bicycle planning literature mainly consists of best practice cases from cycling countries and lacks a theoretical grounding, Koglin and Rye attempt to theorize the political repercussions of cycling and its expression in urban space by adapting Cresswell's politics of mobility framework to vélomobility (Koglin/Rye, 2014). The physical movement from A to B requires sound cycling

infrastructure "without obstacles and the creation of free and safe flow of cyclists" which is achieved by a comprehensive network of cycling lanes and the prioritization of cyclists at intersections (Koglin/Rye, 2014: 220). This notion of priority points to an existing hierarchy amongst mobility modes sharing urban space: modernist transport planning has prioritized vehicular traffic while marginalizing cycling by allocating less road space or making the movement less comfortable. What these underlying power relations mean for vélomobility can be revealed if Cresswell's politics of mobility are expanded by a sub-category of spatial politics - "power relations in urban traffic space" (Koglin/Rye, 2014: 221).

The practical experience of cycling offers insights into the political implications of vélomobility. How individuals experience cycling on their way to their work, school and homes can reveal power relations between social groups and transport modes. Females and elderly especially perceive cycling unseparated from vehicular traffic as dangerous, which prevents many of them from cycling altogether (Aldred/Dales, 2017). In this vein, Koglin states that achieving modal shift will be difficult, if driving remains a more pleasant experience than cycling in some areas (2013).

The representation of cycling relates to the shared meanings attached to it by social groups. Cycling groups or cycling advocacy organizations see it as an opportunity to engage socially excluded persons in a collective activity that surpasses "class, gender, ethnic or other boundaries" (Koglin/Rye, 2014: 220). Since vélomobility and its dimensions of politics uncover power relations in urban space, the concept is a useful starting point when analysing how BEI related to bicycle urbanism impact Spatial Justice.

b. Mobility Space: A Conceptual Framework

This dissertation examines the Spatial Justice impacts of material alterations to urban space. It employs a conceptual framework relating space and society via cycling mobility.

The politics of mobility concept and its adaption to cycling as politics of vélomobility allow one to address "both historical forms of mobility and forms of immobility", meaning that an analysis of movement politics cannot ignore the power-laden process of the production of space (Cresswell, 2010: 17). Lefebvre considers space to be a social product that can be captured in three moments: representations of space, representational spaces and spatial practice (1991).

The first moment is "conceptualized space, the space of scientists, planners, urbanists, technocratic sub-dividers and social engineers" who conceive the physical characteristics of cities in the form of analysis, plans, designs and codes (Lefebvre, 1991: 38). Representational space (lived) "overlays physical space, making symbolic use of its objects" by infusing space with meaning (ibid.: 39). Spatial practice pertains to everyday experiences, the perceived space which "embraces production and the particular locations and spatial set characteristics of each social formation" (1991: 33). Daily routines and rhythms of society's members produce this momentum of space.

These three momentums of space correlate with the politics of mobility and ultimately help to describe spatial and societal expressions of vélomobility. The movement from A to B finds its equivalent in conceived space, a plan for example that considers metric distances or specifies technical details of cycling infrastructure (London Cycling Design Standards, Cycling Action Plan, etc.) (TfL, 2014, 2018). The "power relations in urban traffic space" are inscribed in conceived space by hierarchies that advance or restrain access, safety or convenience of movement for one mobility mode to the detriment of other user groups as for instance through the allocation of space. Spatial practice corresponds with the everyday experience of cycling, walking, driving, dwelling in urban space. Regarding cycling, such experience can be of social, sensory or spatial nature (Liu et al., 2018). Sociality amongst other cyclists (McIlvenny, 2014) was explored as well as interactions where infrastructure is shared with pedestrians (Simpson, 2017) and vehicles (Latham/Wood, 2015). The sensory dimension relates to perceived risk of safety (Parkin et al., 2007; Manton et al., 2016). Spatial experience of cycling commutes in Utrecht sheds light on cyclists' orientation tactics (van Duppen/Spierings, 2013). The representation of cycling infuses movement with meaning as lived space is conceived space filled with symbols and images of society. The meanings attached to cycling resonate with identities (Aldred, 2010), stigmatize cycling (Aldred, 2013a) or view it as activism (Furness, 2010). Vision Zero – the eradication of traffic causalities is another symbolic meaning associated with cycling (Whitelegg, 2020). The experience of cycling can further contribute to the creation of specific meanings attached to the built environment (Spinney, 2007) that even transgresses national boundaries (Aldred/Jungnickel, 2014).

This dissertation's conceptual framework is informed both by urban spatial theory (social production of space) as well as mobilities research (politics of mobility, vélomobility) to make sense of bicycle urbanism's Spatial Justice impacts. What I call Mobility Space describes an equally spatial and social expression of a mobility priority. The physical built environment of Mobility Space is infused with corresponding social practices and political meanings, each of the three characteristic

mediates the other two and has a measurable impact on socio-spatial relations if altered in some way (figure 1).

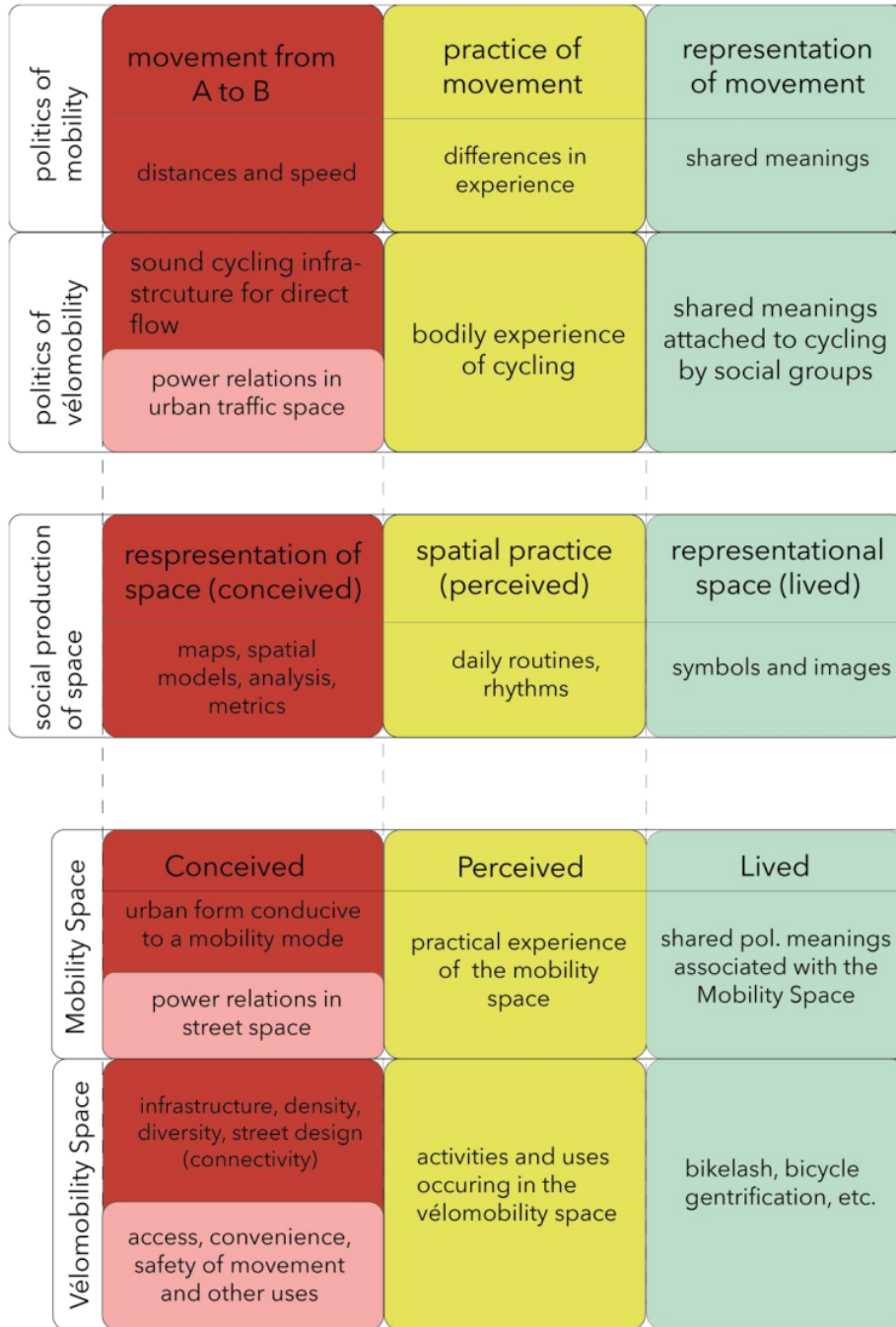|			
politics of mobility	movement from A to B distances and speed	practice of movement differences in experience	representation of movement shared meanings
politics of vélomobility	sound cycling infra-strcuture for direct flow power relations in urban traffic space	bodily experience of cycling	shared meanings attached to cycling by social groups
social production of space	respresentation of space (conceived) maps, spatial models, analysis, metrics	spatial practice (perceived) daily routines, rhythms	representational space (lived) symbols and images
Mobility Space	Conceived urban form conducive to a mobility mode power relations in street space	Perceived practical experience of the mobility space	Lived shared pol. meanings associated with the Mobility Space
Vélomobility Space	infrastructure, density, diversity, street design (connectivity) access, convenience, safety of movement and other uses	activities and uses occuring in the vélomobility space	bikelash, bicycle gentrification, etc.

Figure 1: Theoretical foundations of Mobility Space (Author)

c. Spatial Justice and Mobility Space

The concept Spatial Justice is useful for investigating the impact of bicycle urbanism, as it enriches the notion of social justice with a spatial dimension. Originating in the "spatial turn" that saw a renewed interest in the spatiality of social, economic, cultural and political processes, Spatial Justice can be traced back to the writings of Lefebvre (Lefebvre et al., 1996) and was further developed by the academic contributions of Harvey (2003) and Soja (2010). In affirming Lefebvre's social production of space, Soja posits "the spatial shapes the social as much as the social shapes the spatial" in what he calls socio-spatial dialectic (2009: 2). Spatial Justice is defined as "intentional and focused emphasis on the spatial or geographical aspects of justice and injustice. As a starting point, this involves the fair and equitable distribution of socially valued resources in space and the opportunities to use them" (Soja, 2009: 2.). Spatial injustice in Soja's understanding can occur in form of locational discrimination, the political organization of space, and the unequal distribution of the value created by capitalist urbanization, all of which are shaped by factors of class, race, gender and other markers of marginalization (ibid.; Iveson, 2011: 253). Further, Soja suggests that spatial (in)justice must be understood by looking at outcomes (distributional patterns) and decision-making processes that create those outcomes (2009: 3).

The concept "Right to the City" contributes to a "spatial understanding of politics, and in particular an understanding of politics that places urban space at the very centre of its vision" (Purcell, 2014: 148). In urban spaces, the Right to the City is a claim to "urban life, renewed centrality, to places of encounter and exchange, to life rhythms and time uses, enabling full and complete usage of these moments and places" (Lefebvre et al., 1996: 179). The Right to the City can be demanded by all "who contribute to the body of urban lived experience and lived space" and thus is not restricted by boundaries of national citizenship, ethnicities, gender, or social classes (Purcell, 2002: 102). In accordance with the aspects of redistribution of resources and decision-making processes inherent to Spatial Justice, the Right to the City is defined both as right to the appropriation, which includes access to, use as well as occupancy of urban space and as right to participation in the production of urban space that meets the needs of its inhabitants to make full use of it (Purcell, 2002: 103). Moreover, the right to the city emphasizes the use value of urban space over the exchange value in decisions that produce urban life (Lefebvre et al., 1996: 179).

Since the research question addresses BEI's implications for Spatial Justice, the effect of these on the political organization of urban space, by altering the conceived dimension of Mobility Space is the starting point of this dissertation's research design (figure 2).
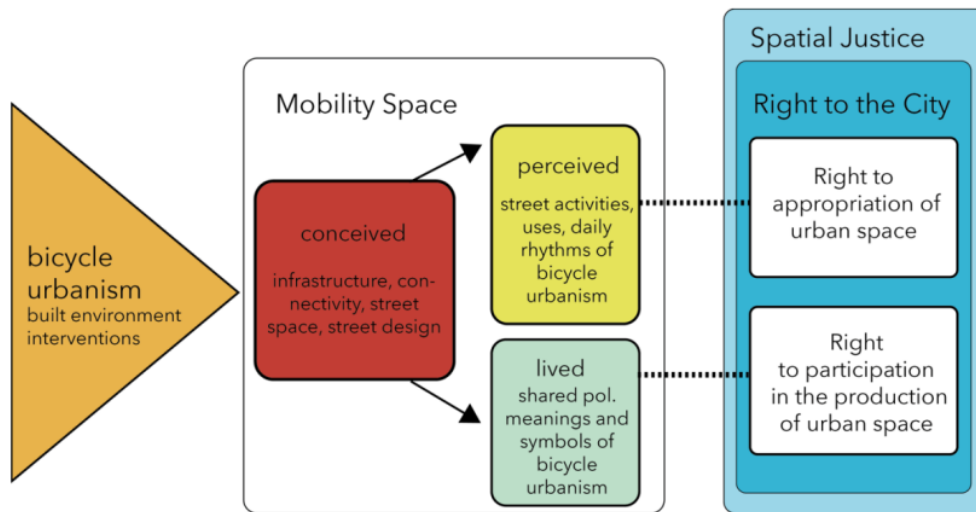
Figure 2: Research design (Author)

The organization of urban space can reflect injustices imposed by specific regimes or cultures (Nolte, 2016). Car-centred urbanism, as the spatial expression of automobility, for instance, marginalizes active travel in street space (Koglin/Rye, 2014; Longhurst, 2015) and usurps public space as an essential locality for social interaction (Gehl, 2010) to accommodate the need for road and parking space (Shoup, 2005; Henderson, 2009). Those limitations on urbanites' daily activities (perceived dimension) represent a curtailment of the right to the appropriation of urban space if they cannot safely access neighbourhoods by walking, comfortably use streets for cycling or occupy space for dwelling and play, especially if those do not hold the socio-economic privileges to participate in the automobility lifestyle (Urry, 2004). However, interventions to urban spaces "not only reflect the regimes that produce them, but also reproduce the power inequalities inherent (or unexamined by those" (Cox, 2020: 20). If existing discrimination based on race, class, gender or physical ability is not considered in the design of interventions, the re-organizing urban space may only serve one clientele at the expense of other social groups (Golub et al., 2016; Lugo, 2018). If cycling interventions are blind to gender bias in perceptions of safety, those might benefit male ridership but have done little to advance women's right to use urban spaces for cycling (Aldred et al., 2016; Lam, 2018). Soja's understanding of Spatial Justice urges one to consider also how the political organization of space is discursively produced (2009). How users of urban space understand interventions symbolically and how those interpretations influence the implementation of such are questions relating to the right to participation in the production of urban space. Cycling infrastructure, is often viewed as beacon of gentrification which might elicit resistance from marginalized communities (Lubitow et al., 2016; Hoffman, 2016; Stehlin, 2015). However, the

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bicycle justice movement sees cycling, if catered for in an inclusive way, as democratic form of mobility that enables low-income or otherwise marginalized communities to greater material equity (Golub et al., 2016).

Perceived and lived Mobility Space can be understood from a Spatial Justice perspective through the right to appropriation of space and the right to participation in the production of urban space. For illustrative purposes, a range of BEI related to bicycle urbanism (conceived) are described while their impact on the perceived dimension of Mobility Space is demonstrated with case studies. Wider political meanings (lived dimension) attached to those BEI, relating to governance and socio-economic processes, are additionally discussed.

d. Vélomobility Space

How does the built environment relate to cycling?

Worldwide municipalities are adopting ambitious cycling strategies and investing in infrastructure to increase cycling mode shares in their cities (Pucher/Bühler, 2012). Adam et. al hierarchized such policies according to their effectiveness on cycle use (2018). After pull-interventions, referring to infrastructure or facilities that make cycling more attractive and push-policies that discourage car use, exogenous factors relating to the socio-spatial context, such as spatial characteristics (diversity of uses, population density) or provision and costs of alternatives to cycling, are most significant for the success of cycling strategies (ibid.). However, as Aldred notes, to distinguish between so-called carrot and stick interventions in the promotion of cycling is often inaccurate, because built environment interventions which provide improved conditions for active travel are often intertwined with the discouragement of car-use as for instance parking space being transformed into pocket parks or cycle lanes (2019a). She defines built environment interventions as "changes such as provision of cycle infrastructure, pedestrianisation of shopping streets, or the creation of local parks which create or improve active travel routes" (ibid.: 309).

The relation between built environment and travel is often discussed with reference to the Five Ds impacting upon it: density, diversity, design, destination accessibility and distance to public transport (Ewing/Cervero, 2010). Design refers to street network characteristics within a given neighbourhood: "[these] can vary from dense urban grids of highly interconnected, straight streets to sparse suburban networks of curving streets forming loops and lollipops" (ibid.: 267). In a study on the impact of built environment variables on active travel, Cervero et al. found that especially street density and in the case of cycling, route connectivity are factors encouraging active travel

(2009). Those aspects are relevant because they are proxies for distance: denser urban areas have more destinations within cyclable proximity and a variety of services in mixed use neighbourhoods is correlated with "shorter destination distances and consequently a higher probability of cycling" (Harms/Te Brömmelstroet, 2014: 233; Titze et al., 2008; Krizek, 2012; Sick Nielsen et al., 2013b; Heinen et al., 2010). The salience of street network connectivity goes beyond correlation with distance as "better connected streets allow for both shorter paths and more route choice between origin and destination, reducing trip lengths and possibly also providing routes with less vehicle traffic" (Salon et al., 2019: 101). Additionally, the attractiveness of the urban environment is said to have a minor influence on cycling rates (Harms et. al, 2014). Salon et al. states that there are important differences in the way built environment characteristics affect bicycling frequency across demographic groups (2019). Higher density, for example, can also deter children from cycling due to safety concerns related to higher traffic intensities in those areas (Larsen et al., 2009; Moran et al., 2016) These aspects do not only call for an investigation of urban form conducive to cycling, but also urges one to ask "who [this "bicycle-supported development"] is meant to serve" (Muhs/Clifton, 2016; Salon et al., 2019: 99).

Street design for cycling: filtered permeability

According to Marshall connectivity "[refers] to the degree to which different links or routes connect up in a network" (2004: 88-89). Dill remarks that connectivity is "the primary purpose of any transportation network" as it links the locations between which people want to travel (Dill, 2004: 1). The proxy for the impact of connectivity on cycling is distance, because there is a practical and natural limit to how far a person is able or willing to cycle (ibid.). In accordance with the urban fabrics theory, however, the street network serves various modes (driving, walking, cycling, etc.) as circulation space but different priority is given to each mode at specific locations and within wider areas. One approach that encompasses a variety of BEI impacting on street network connectivity with different outcomes across modes is called filtered permeability. First coined by Melia in the UK context:

> "filtered permeability means separating the sustainable modes from private motor traffic in order to give them an advantage in terms of speed, distance and convenience. There are many ways in which this can be done: separate cycle and walkways, bus lanes, bus gates, brides or tunnels solely for sustainable modes" (TCPA/CLG, 2008).

By providing dense street networks for active travel and limiting access of cars to certain areas, this street design technique is thought to stimulate mode shift while making a neighbourhood more people-friendly and facilitate active street life (Foletta, 2011; Melia, 2012). While filtered

permeability has been used in the Netherlands and Germany for decades (Melia, 2012), it has been adopted in planning policy internationally, in the UK as well as in London more recently (NTA, 2011; DfT, 2007; TfL, 2014).

Grey literature describes the variety of BEI associated with filtered permeability such as cycle-contraflows on one-way streets, low-traffic cells, exemptions from road closures (modal filters) or new connections only available for active travel (Sustrans, 2015; CityInfinity, 2018). Area-wide improvements result in a reduction of cycling journey times due to shorter routes (Sustrans, 2015) as well as a reduction of vehicular traffic on residential streets with a variety of effects on perceived safety of cyclists (Parkin et al., 2007) and community cohesion (Appleyard, 1969; Hart/Parkhurst, 2011). Further, BEI associated with filtered permeability affect local businesses as more walking and cycling is associated with higher and more frequent spending in local retail (Rajé/Saffrey, 2016; Lawlor, 2013; McCormick, 2012; Aldred/Sharkey, 2018). Increased permeability for active travel creates opportunities for social interaction in the public realm, which in turn fosters social cohesion and provides a sense of community (Hall et al., 2017; Carmona et al., 2018). The effect of filtered permeability on crime, however, is controversial: While increased active travel and therefore more "eyes on the street" (Jacobs, 1961) could influence perceived safety through passive supervision (NTA, 2011: 10), a high degree of context dependency prevents academia to confirm this assumption (Melia, 2016).

The town of Houton, the Netherlands is often cited as an early example of bicycle urbanism in which the above-mentioned built environment characteristics (density, mix-use, street network connectivity) as well as filtered permeability were already considered at the time of its initial development (Foletta, 2011: 50). The basic structure consists of two peripheral ring roads with high streets and adjacent residential neighbourhoods at the centre (figure 3). Vehicles can only move between neighbourhoods along the peripheral roads while cyclists can easily cross the city via a cycling network fully separated from vehicular traffic. The speed and distance advantages make cycling "the most direct mode of transportation" (Foletta: 2011:48). Although residential streets are shared with vehicular traffic, driving is calmed through intentionally bent streets and design features that prioritize walking (e.g. surface demarcations) (Hilbers, 2008: 5). These BEI result in improved traffic safety and high active travel modal share (55%) (Foletta, 2011: 48). Segregated cycling infrastructure is especially associated with an improved sense of safety (Parkin et al., 2007; Pooley et al., 2013) which would in turn enable more women (Aldred/Dales, 2017) and children (Aldred, 2015) to cycle.
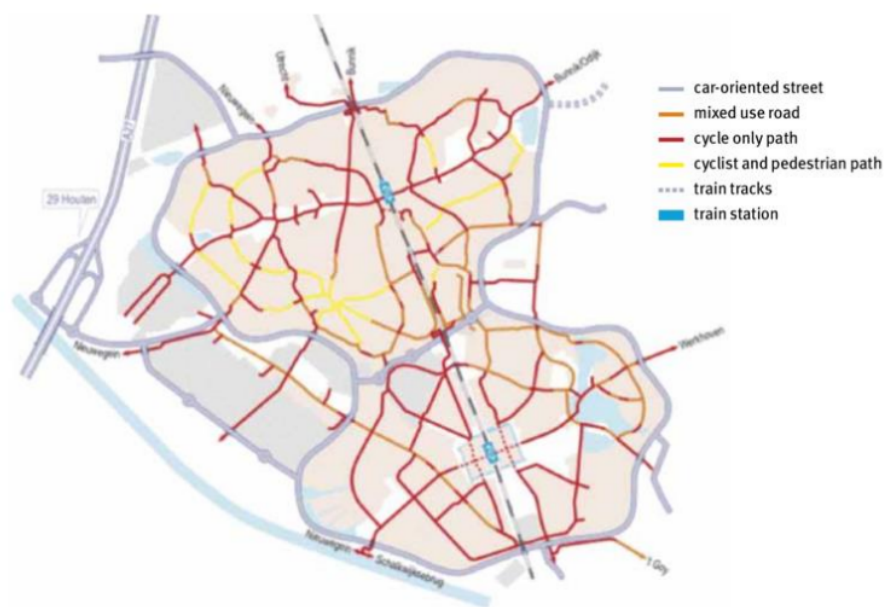
Figure 3: Street network design of Houton (Foletta, 2011)

Street design for cycling: space allocation

Often the re-prioritization of active travel is facilitated by BEI that alter the allocation of street space to the detriment of motorized traffic. Given the current urbanization patterns that necessitate densification, public space is becoming increasingly contested (Bodnar, 2015). Pressure on available urban space leads to contentions over the allocation of street space for mobility infrastructure (Oldenziel/de la Bruhèze, 2011; Henderson, 2017). According to Gössling et al., space allocated to roads, sidewalks, rail tracks or bicycle lanes has varied historically as a reflection of changing planning paradigms and design ideals (2016: 660; Carstensen et al., 2015). In order to represent the dominance of cars over cyclists or pedestrians in streets, the space allocated to each mode in intersections has been visualized (figure 4).
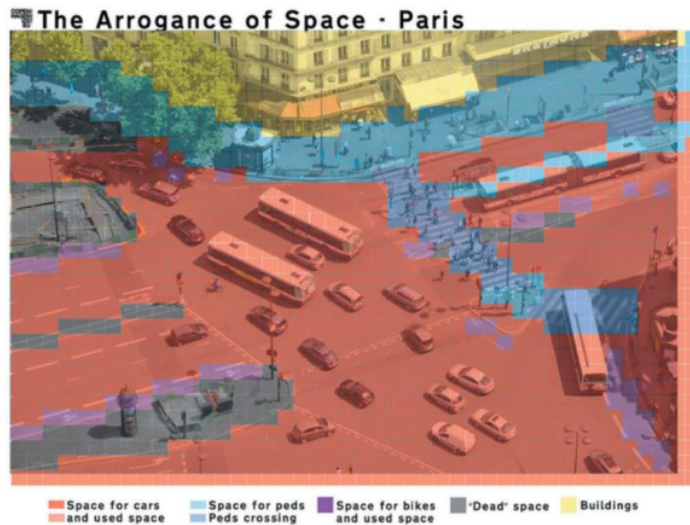
Figure 4: Space allocation per mode in street space (Colville-Anderson, 2018)

The allocation ratio was related to modal split to draw conclusions about an "unfair" share of street space for cycling in Berlin (Agentur für clevere Städte, 2014), Freiburg (Gössling, 2016), the Netherlands (Mileudefensie, 2017) and through crowd-sourcing in a number of other cities (Szell, 2018). This notion of fairness is questioned by Nello-Deakin who remarks that mode share or travel distance as proxies do not necessarily benefit active travel agendas since the different characteristics of modes prohibit an adequate comparison of their space requirements (2019). A simplistic division of urban space according to modes conceptualizes streets as movement corridors only, ignores their place function and does not address the overlap of functions as for instance in shared spaces (ibid.). Nonetheless, Creutzig et al. confirm that across ethical, environmental and even economic considerations, driving and especially parking (Shoup, 2018) are provided with a disproportionate amount of space while cycling deserves more (2020). However, Gössling acknowledges that such re-allocation of street space challenges established habits and symbolic values attached to automobile culture (Domarchi et al., 2008) and will result in resistance if social disruptions are not adequately addressed (2020: 3).

Socio-political discourses associated with bicycle urbanism

"Bikelash" is the "organized opposition to bike lanes" and describes social reactions to the prioritization of cycling over vehicular traffic through the re-allocation of street space to segregated cycling infrastructure (Field et al., 2018: 132). While bikelash indicates a rupture in transport

planning, since cycling is now significant enough to be publicly debated (Goodyear, 2014), opposition often leads to delays or the abandonment of active travel schemes (Vreugdenhil/Williams, 2013; Siemiatycki et al., 2016). Local planning officers and politicians will be surprised over fierce opposition to what they expected to be a simple, uncontroversial intervention (Vreugdenhil/Williams, 2013; Lubitow/Miller, 2013; Duarte et al., 2014). This is an expression of a techno-centric rationale in transport planning (Koglin/Rye, 2014) that views active travel interventions as apolitical and neutral solutions to transport needs without considering how the value-laden process of reshaping urban space shifts power relations and thus requires an appropriate community engagement strategy (Lubitow et al. 2016; Castillo-Manzano/Sánchez-Braza, 2013).

Figure 5: Re-organization of movement in Poblenou Superblock (Scudellari et al., 2019)

The Superblock model in Barcelona's Poblenou neighbourhood is a case in point as it encompasses a variety of BEI that re-allocate street space to advance active travel, improve public space quality and restrict vehicular movement (Roberts, 2019). In line with filtered permeability, a Superblock is an urban cell within whose interior through-traffic is restricted through modal filters expect for residents and delivery services (figure 5). Vehicular space is reduced to a single lane, speed limited to 10 km/h and street parking removed entirely. The resultant 60-70% of street space freed from car use is then re-purposed by adding street furniture to further facilitate pleasant environments for active travel (Wang et al., 2016) and social interaction in public space (Scudellari et al., 2019). Irrespective of positive impacts on residents' health due to reduced air pollution (Müller et al., 2020), the BEI were controversial among local communities. A specifically formed opposition group was able to convince, with the help of local media, the majority of people to vote against the scheme in a non-binding referendum (BCNUEJ, 2018). Although an initial engagement workshop was held, residents criticized the inadequate communication, and that they were not consulted over whether they support the project in the first place (Scudellari et al., 2019: 17).

Wild et al. suggest that opponents to cycling interventions come from different demographics with their own reason to resist such schemes (2018). Local businesses fear the reduction of parking space and traffic will lead to a loss in costumers as for example in Brighton (Melia/Shergold, 2018). However, local retailer often overestimates the number of costumers arriving by car (McCormick, 2012; O'Connor et al., 2011) and there is no evidence for a decline in business prosperity, which is reflected in abating resistance from this group once the implementation is complete (Hass-Klau, 2015; Melia, 2016; Crane et al., 2016).

Conservatives are likely to oppose cycling interventions because their values often resonate with automobility (Urry, 2004), privatisation of road space and a suburban living ideal centred on the separation of uses to which active travel paradigms pose a threat (Henderson, 2006, 2015; Walks et al., 2015; Wild et al. 2018). Pedestrian safety in locations where those share street space with cyclists is also often overemphasized by conservative community groups (Castillo-Manzano/Sánchez-Braza, 2013, 1022). The intention of shared spaces to create opportunities for conviviality (Hamilton-Baillie, 2008) is indeed disputable because it might lead to "hostile atmospheres [experienced by cyclists] given the ambiguity over who belongs where" (Simpson, 2017: 444) and concerns over accessibility for disabled people (Lord Holmes of Richmond, 2015; WEC, 2017).

Research looking at how cyclists in London use and inhabit road infrastructure that was primarily designed for motorized traffic is useful in understanding how interventions to existing conditions impact on the practical experience of cycling (Spinney, 2019; Aldred/Jungnickel, 2012; Latham/Wood, 2015). Cyclists themselves will oppose projects if they feel they were not adequately engaged in the design process leading to unsafe cycling infrastructure as Duarte et al. point out in the case of Curitiba, Brazil (2014), Vreugdenhil/Williams (2013) in Tasmania, Australia and Amigo for Madrid, Spain (2016).

Lastly, people concerned with gentrifying effects of cycling interventions join in bikelash (Lubitow et al., 2016; Sheller, 2015). Ruth Glass coined the term gentrification to describe a process by which a middle-class population moves into an undercapitalized neighbourhood and consequently displaces low-income residents through an uplift in property value (1964; Lees et al., 2008; Smith, 1979). Whereas this dynamic usually refers to privately owned parcels, Stehlin notes that streets and public places also factor into potential rents at neighbourhood scale because the "quality and characteristics of streets as infrastructures become effectively inherent to the parcels in that they connect them to rest of the urban fabric" (2019: 9). While an increase in retail rental value after

street improvements (Carmona et al., 2018) may displace businesses (Özdemir/Sulcuk, 2017), the impact of cycling infrastructure on residential value is marginal (Jenkins; 2017; Carmona et al., 2018).

However, BEI, allow new (safe cycling) or restrict practices (driving) for certain users of the street space which might change the desirability of the neighbourhood and therefore the potential for rents to be capitalized (Stehlin, 2015: 123). In accordance with Mobility Space, the opposite process is imaginable as well: "practices change the meaning and potential of streets, and they shape the kind of amenities that generate value and spur further investment" (ibid.). This confirmed by Pucher and Buehler who find that highest cycling mode shares and cycling infrastructure provision can be observed mainly in gentrified areas of city centres (2012). Cycling infrastructure is unlikely to occur in marginalized communities (Flanagan et al., 2016), while increases in cycling ridership also correspond temporally and spatially with gentrification (Herrington/Dann, 2016). Municipalities have embedded the provision of bicycle infrastructure within urban growth agendas by targeting specifically the affluent creative class (Florida, 2002) deemed necessary for city to remain competitive (Hoffman/Lugo, 2014; Stehlin, 2019), while sustainability and equity rationales remain of secondary concern (Ibsen/Olesen, 2018). This raises questions about who cycling infrastructure is meant to serve. If municipal cycling strategies ignore racial and gender bias in ridership (Aldred et al., 2017), inappropriate cycling infrastructure can even stabilize existing inequity in urban mobility (Lam, 2018).

This chapter reviewed an abundance of research that either examines physical intervention to the built environment and its relation to cycling (conceived), probes phenomena of practical experience (perceived) or discusses political meanings (lived) attached to cycling interventions. While those studies usually focus on one aspect along, this dissertation analyses the three aspects of bicycle urbanism simultaneously with the help of Mobility Space and from the angle of Spatial Justice. Combining spatial perspectives that often only operate at either the neighbourhood (network connectivity, filtered permeability) or street scale (space allocation, experience) to comprehensively investigate bicycle urbanism in a barely covered suburban context, is another distinguishing feature of this research. The dimensions of Mobility Space inform the research objectives along which this work is structured, and which require a the combination of corresponding methods.

3. Methodology

a. Methodological Approach

The research question of how and to what extent built environment interventions related to bicycle urbanism affect Spatial Justice requires an understanding of how those BEI alter urban space (objective 1) before one can ascertain how this has enabled or restrained uses of urban space (objective 2). Following these insights one can understand how the BEI were interpreted by various social groups (objective 3). The research findings will then be discussed in relation to the right to appropriation of space and the right to participation to draw conclusions about how the identified BEI affect Spatial Justice.

Due to the contextualizing nature of the inquiry, a qualitative research design was chosen. A single case study further enables the researcher to conduct in-depth analysis of a specific phenomenon (Yin, 2009) – in this case, BEI as part of the Waltham Forest Mini-Holland programme in London. London was chosen as the broader context for this study due the ambitious cycling strategy it adopted against persisting car-dominance (TfL, 2018), and Walthamstow Village as the small-scale study site to examine context-dependent BEI (TfL, 2015a).

At the time of research in early 2020, the United Kingdom was facing severe movement restrictions in response to the pandemic outbreak of COVID-19. Public life was reduced to a minimum, and the author left London. It was no longer possible to carry out some of the data collection as initially planned and methods were adapted. The initially planned methods will nonetheless be described to provide a complete picture of the intended research design (Table 1).

Research Question			
How and to what extent do built environment interventions related to bicycle urbanism affect spatial justice?			
	Methods		
Research Objectives	Descriptive analysis of satellite imagery and mapping	Site observation	Semi-structured interviews
1. What are the built environment interventions that indicate a transition towards bicycle urbanism?	(dark green)		(light green)
2. How have these interventions enabled or restrained a diversity of uses in urban space?	(dark green)	(dark green)	(light green)
3. How were these interventions interpreted by various members of the community?			(dark green)

Table 1: Applied methods, light green indicates the adaption of methodology to accommodate Covid-19 restrictions (Author)

b. Methods

Descriptive Analysis of Satellite Imagery and Mapping

The first method involves detailed mapping of all BEI associated with the Walthamstow Village scheme with the help of satellite imagery from Google Earth Pro, Google Street View and vectoral drawing software Adobe Illustrator. Firstly, planning and policy material published by Transport for London (TfL) or London Borough Waltham Forest was reviewed to acquire an overview of intended purposes and spatial distribution of planned interventions. A planned site visit to confirm existence and describe functioning of the interventions at scale of the street through photographic images was rendered impossible due to COVID-19 restrictions. Imagery from Google Street View and Google Earth was used instead. The interventions were then mapped at neighbourhood scale. With reference to characteristics of bicycle urbanism identified in the literature review (e.g. filtered permeability, space re-allocation, cycling facilities), the aggregate functioning of the interventions and their impact on the political organization of space were analysed descriptively. Five locations, at which several BEI concentrate, were selected to be examined at street scale. Street space analysis – colouring areas according to the predominantly intended uses (figure 6, Gössling et al., 2016), and mapping of additional infrastructure exposed how the streetscape design was altered by the BEI. In the vein of other qualitative described cycling environments (te Brömmelstrout et al.,

2018), the different interventions were then clustered in patterns, and respective implications on power relations in street space described.
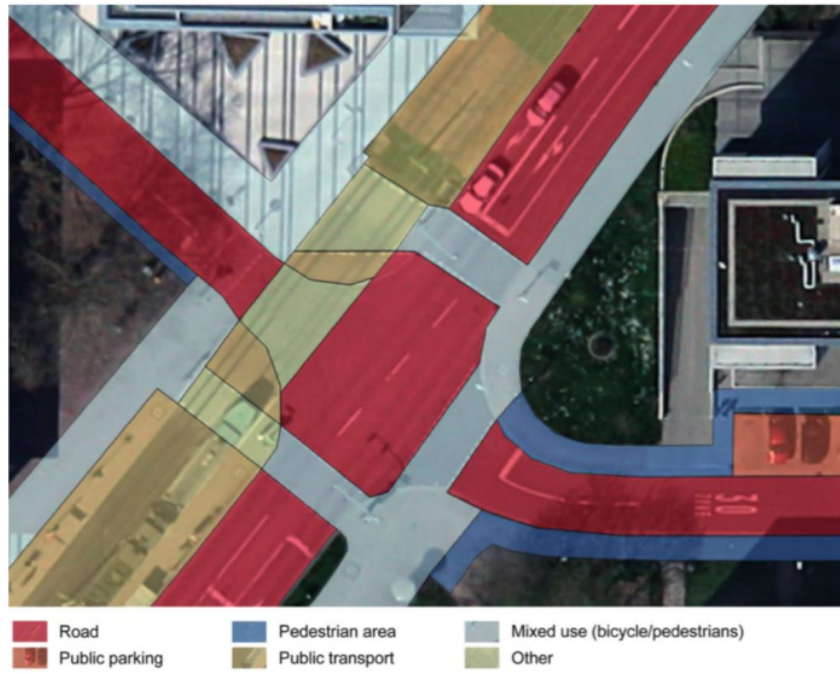
Figure 6: Street pace allocation analysis according to intended use (Gössling et al., 2016)

Site Observation

In order to reveal how bicycle urbanism affects Spatial Justice, the second research objective relating to the diversity of uses in urban space, examines how BEI enable or restrain appropriation of space. Site observation was chosen to understand how the BEI altered how people use urban space in selected locations in their everyday lives. If not for COVID-19 restrictions, observations over the course of two days with favourable weather conditions would have been conducted at specific locations in the study area. Four times daily (morning, noon, afternoon, evening) "static snapshots" are conducted during which the researcher walks for 5 min through the site and records all types of activities (walking, cycling, sitting) on a printed map (Al Sayed, 2014). However, COVID-19 related regulations not only restricted the author from being outside without essential reason but also precluded any observable public life. Instead, available imagery on Google Street View of the area was used to gather this data. Systematic observations through virtual site visits were already successfully applied to audit neighbourhood characteristics (Rundle et al., 2011; Vandeviver, 2014; Mooney et al., 2016).

Google Street View data is created by a 360° camera atop a vehicle driving through cities and thus replicates the "static snapshot" the researcher would have recorded himself in an ordinary site observation. Google Street View includes a repository of such snapshots from different dates, which was not only helpful to understand the streetscape from before and after the implementation of the scheme, but also provided data to aggregate different snapshots similar to a planned site observation. However, the data was not as complete, accurate and rich as initially assumed. While "spatio-temporal instability" due to disruptions in the imagery limits the application of the method (Curtis et al., 2013), the lack of exact time stamps for each snapshot restrained the researcher's ability to control for different points in time. Further, the intensity of recorded activity was often marginal to non-existing because imagery was taken at times uncommon for people to be outside (e.g. very early morning, outside business hours). Nonetheless, available snapshots of the five locations after the implementation were pre-scanned regarding data quality by estimating time from solar altitude and evaluating the intensity of uses to select the four with greatest activity levels to be analysed comprehensively (see Appendix). This selection is methodologically justifiable, because a day with adverse weather conditions during which no activity can be observed would have not been selected in an ordinary site observation as well. The observed activities were then overlaid onto the street space analysis maps (objective 1) and annotated to indicate which activities or uses occurred in the re-organized street space after the implementation of the interventions. In order to answer more comprehensively how uses were enabled or restrained by the BEI, the data was contrasted with interview responses on the participants' perceptions of uses in street space.

Interviews

Interviews were selected as appropriate method to reveal how bicycle urbanism can impact Spatial Justice. Prior to COVID-19, a focus group discussion was planned to comprehensively understand shared meanings and public discourses. Such a discussion involves people with different perspectives deliberating on a topic and reacting to statements of others, which elicits a more nuanced debate. However, social distancing requirements pre-empted social gatherings and an effort to digitalize this format involved technical challenges. Instead, four separate semi-structured interviews were conducted via teleconferencing software or telephone call alongside two epistolary interviews via E-mail. An epistolary interview is more accessible for participants with limited online communication resources, provides the participant with more response time and allows to reference additional material (Debenham, 2007). The in-person interviews were conducted in a semi-structured manner, which is a compromise between a fully formalized interview and a lose

conversation, therefore providing an element of uniformity while also ensuring flexibility, which gives the interviewer the possibility to react on themes that emerge out of the interview itself (Knight/Ruddock, 2009). Accordingly, a set of questions was prepared along which the in-person interviews were structured, and which were sent to two participants via E-mail. Prior to the interview, the respondents were asked to sign a declaration of informed consent, assuring them that collected data will be anonymized. All interviews were recorded for later transcription (see Appendix).

Selected participants were identified based on their key role in the implementation process of the Walthamstow Village scheme, their influence on the public discourse surrounding it or because they are directly affected by the scheme's outcomes as local retailer or resident. Scholars familiar with the scheme recommended interviewees, who in turn recommended other participants. The sample represents a broad range of expertise and opinions:

- **LLC**: resident, London Cycling Campaign
- **WFCC**: resident, Waltham Forest Cycling Campaign
- **LBWF**: resident, Councillor, London Borough of Waltham Forest
- **WFS4A**: resident, community advocacy group WalthamForestStreets4All (epistolary interview)
- **LPA**: resident, officer local planning authority
- **LBO**: resident, local business owner (epistolary interview)

In order to systematically explore emerging themes related to the conceptual model, thematic framework analysis was chosen to interpret the collected data (Braun/Clarke, 2006). Based on this model, three thematic foci (conceived-, perceived-, lived mobility space) were derived and applied to the raw interview data by highlighting paragraphs (Appendix). After categorizing the data accordingly, within each category the respondents' statements were clustered to derive common themes that emerged with reference to the dimensions of Moblity Space. While this method was initially intended to only address objective 3 to understand how the BEI were interpreted by the community, it was later adapted to complement incomplete data from the other methods. The derived themes represent either perceptions of street activity (perceived) or shared meanings (lived) which people attach to BEI identified under research objective 1 and verified by statements from the interviews. If possible, perceptions of activities were verified with observation data to provide evidence on the right to appropriation of space. The shared meanings reveal how the right to the

participation in the production of urban space is understood and negotiated, which ultimately allows to draw conclusion about the impact of bicycle urbanism on Spatial Justice.

c. Ethics

There were no significant ethical challenges arising from the process of researching this dissertation. However, to any interview I acquired permission of the informant through a declaration of informed consent whether her/his name, specific job title or affiliation could be disclosed or should be anonymized. With regards to the virtual site observation in Google Street View, the provider already blurs the faces of people observed to protect their identity.

4. Case Study Waltham Forest Mini-Holland – Walthamstow Village scheme

While cycling rates are relatively low in the UK (DfT, 2018a), cycling as a modal share more than doubled between 2000 – 2018 in London (TfL, 2016a; 2019a). However, there is a significant discrepancy in the reduction of car dependency across London, with outer boroughs displaying smaller declines in vehicle kilometres (5%) than inner boroughs (17%) (TfL, 2016b). Although cycling promises great economic benefits (Grous, 2011; Rajé/Saffrey, 2016), investment in related infrastructure remained small, mainly due to a lack of funding and committed political leadership (Aldred et al., 2019b). Adequate infrastructure is essential in diversifying ridership (Aldred/Dales, 2017) which is so far dominated by younger, male and able-bodied social groups (Steinbach et al., 2011). Moreover, in the UK cyclists are perceived as an outgroup (Aldred, 2013a) and cycling itself is stigmatized, which can intensify controversy around active travel programmes (Aldred, 2019b). As part of Mayor of London's Vision for Cycling objective to increase modal share to 5% until 2026, the Mini-Holland programme aimed at reducing car dependency particularly in outer London boroughs (TfL, 2013). Following a competition, Waltham Forest was selected to receive approximately 30 million pound to put in practice these objectives. Recently, efforts to achieve modal shift were reframed under the more holistic Healthy Streets approach and area-wide improvements for active travel are now called "Liveable Neighourhoods" (TfL, 2019b).
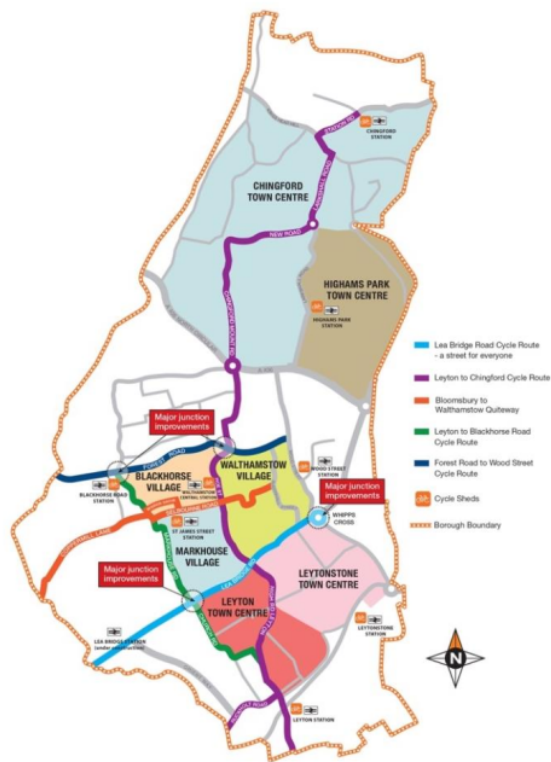
As one of the first projects in the UK to systematically restrict vehicular movement Waltham Forest Mini-Holland received local and national media (Hill, 2015; Walker, 2018; O´Callaghan, 2018) as well as scholarly attention (Aldred et al., 2019a; Danjak et al., 2019; Danjak/Walton, 2019) due to the controversy it caused (Chandler, 2016) and the accolade of awards it received (Davis, 2015). The overall objectives are laid out in the 2020 Cycling Vision, while more detailed issues pertaining to street design are covered in the Mini-Holland Design Guide (TfL, 2015a; 2015b). The title "Enjoy, Walk, Cycle Waltham Forest" reflects the programme's focus on active travel, but more holistic outcomes are emphasized throughout policy documents: "the programme will

Figure 7: Various schemes of the Waltham Forest Mini-Holland programme (TfL, 2019c)

benefit the whole community, not just people who cycle" (TfL, 2020b). This Mini-Holland compromises of BEI that target either local shopping streets (town centres), residential areas (villages) or the cycling network in general (routes) (figure 7; TfL, 2019c). The contentious interventions led to the formation of community advocacy groups either in support or opposition, the latter of which organized protests (Chandler, 2015) and applied for a statutory review of the allegedly fraudulent consultation process, which was rejected by the High Court (Mann, 2015).
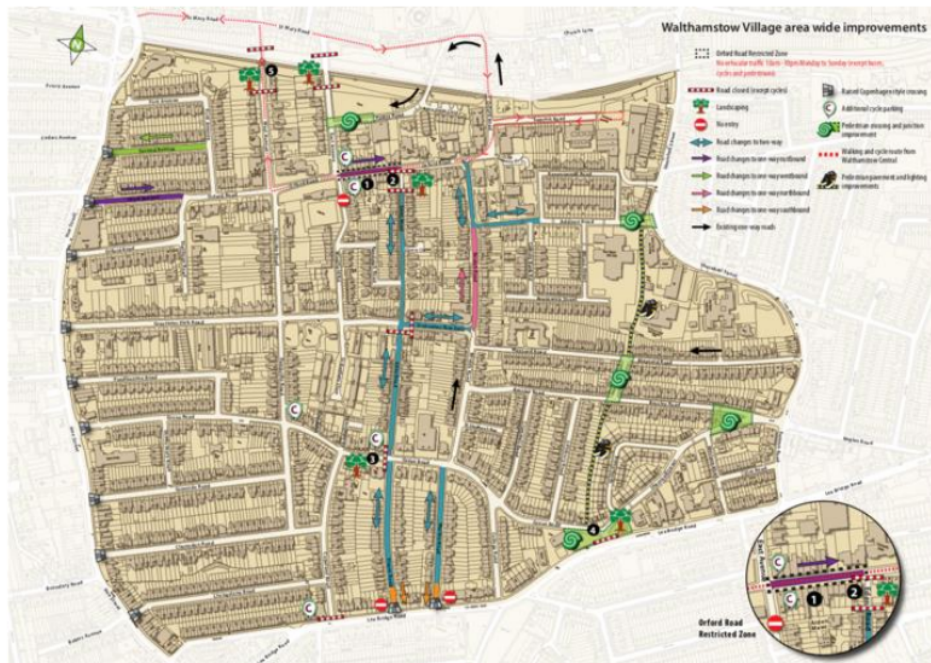
Figure 8: Planned interventions in Walthamstow Village (TfL, 2019c)

The implementation of the first residential area scheme (Walthamstow Village) started in September 2014 with a two-week trial to test impacts of the interventions and was completed after several stages of consultation and construction in 2016. The BEI included part-pedestrianization of Orford Road, modal filters, pocket parks as well as other traffic calming measures (figure 8). Traffic data from the Council's evaluation confirms an 56% decrease in vehicle traffic within Walthamstow Village whereas all three peripheral roads have seen an increase (ProjectCentre, 2016). Aldred et al. further report a positive impact on active travel behaviour as well as on the perception of the local environment (2019a). The BEI led to an increase in life expectancy due to reduced air pollution and higher physical activity levels (Danjak et al., 2019; Danjak/Walton, 2019). Higgins revealed that lack of trust in the Council and inadequate communication has contributed to public opposition (2019).

5. Findings

Whereas research objective 1 covers issues pertaining to conceived Mobility Space, objective 2 and 3 address the dimensions of perceived and lived Mobility Space respectively. The above-mentioned power relations in urban street space are discussed in relation to the findings of the conceived dimension (table 2). References to the interviews will be cited with an abbreviation assigned to each interviewee, followed by the exact line number of the transcript.

Mobility Space: bicycle urbanism - Walthamstow Village			
Conceived		**Perceived**	**Lived**
	power relations in street space	Community interaction	Charged public discourse
Pattern 1: Re-organiza-tion of Movement	Access Speed Convience Safety	High street vitality	Criticism of engagement process
		Quality & quantity of active Travel	Shift in pulic opinion
Pattern 2: Re-allocation of street space	Priorization of non-motor-ized uses	Accessibility for vulnerable populations	Inclusivity
		Children playing in the street	Adaption of participation model
Pattern 3: Re-design of Public Realm	Enable active travel & dwelling: attractive & safe environments	Crime & safety	Showpiece of mobility infrastructure
		Access of services	
		Driving restrained	

Table 2: Findings summary (Author)

a. What are the built environment interventions that indicate a transition towards bicycle urbanism?

The BEI of the Walthamstow Village scheme were identified and analysed with the help of descriptive analysis of satellite imagery and mapping. Additionally, interview data was examined to highlight statements related to conceived Mobility Space (material interventions, plans, etc.) to reveal interventions that would have otherwise been missed. Three abstract patterns were derived according to the BEI's effect on neighbourhood scale movement (1), street space allocation (2) and public realm design (3). The three patterns form a logical sequence within which each pattern constitutes the basis of the following. First, movement is re-organized at neighbourhood scale by disadvantaging vehicular traffic while facilitating active travel. Once vehicular circulation is

somewhat restricted, space that becomes available at street scale is re-allocated to benefit active travel and other non-mobility uses (Pattern 2). The space claimed in this way lastly provides the basis for a re-design of public realm to further enable enjoyment of active travel and other non-mobility related uses.

Pattern 1: Re-Organization of Movement within the Street Network

The aggregate effect of BEI at neighbourhood scale reveals alterations to the connectivity of the street network, albeit with different effects for various transport modes (figure 9), which replicates filtered permeability (TCPA/CLG, 2008) and emphasizes the salience of connectivity for cycling (Cervero et al., 2009).
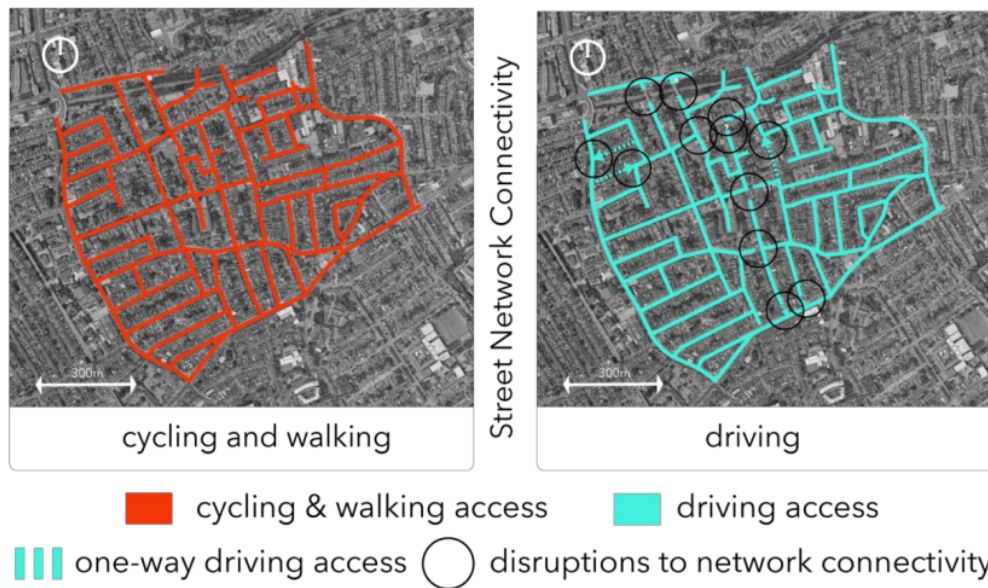
Figure 9: BEI effects on street connectivity (filtered permeability) (Author, Google Imagery)

This pattern is further sub-divided into *low-traffic neighbourhood (figure 10,11)* and *main-road network*. The former term is frequently used by persons involved in the implementation of the scheme (LCC:46-47,52,55,205; WFCC:48,99; LBWF:32) and summarizes interventions whose purpose is to coercively discourage car use by reducing vehicular *access* to, and *speed* within the neighbourhood as well as to prioritize active travel by enhancing *convenience* and *safety* for pedestrians and cyclists.

Figure 10: Interventions of low-traffic neighbourhood at neighbourhood scale (Author, Google Imagery)

Low-traffic neighbourhood is achieved through the implementation of modal filters, in either permanent (e.g. Grove Rd) or timed nature (Orford Road), and one-way systems (e.g. Beulah Rd) that make Walthamstow Village a "low traffic cell" within which cars are blocked from passing through some locations while active travel modes can (figure 9; LCC:62-71; WFCC:51-53; LBWF:35-38; WFS4A:112; E:57). This renders through-traffic impossible and thus decreases traffic volumes in the neighbourhood.
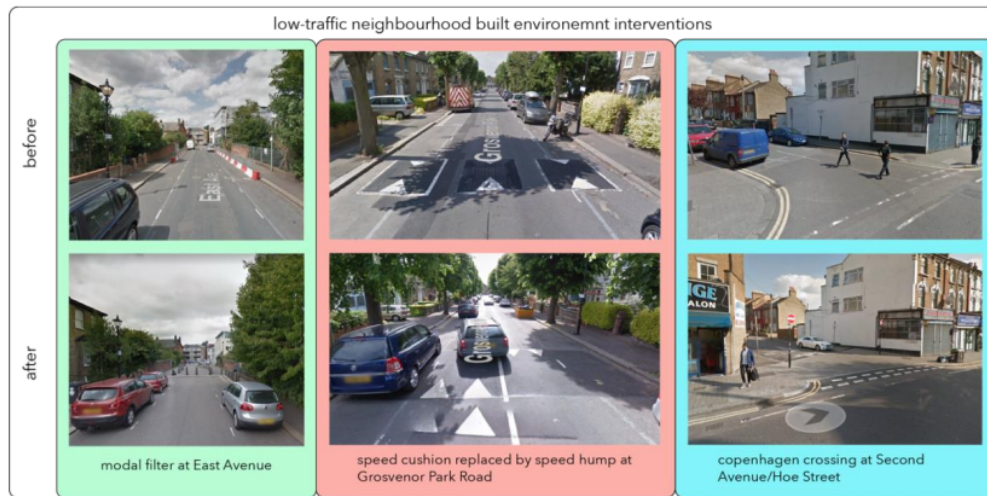
Figure 11: Interventions of low-traffic neighbourhood at street scale (Author, Google Imagery)

Sinusoidal speed humps replaced speed cushions to reduce vehicular speed and prevent unsafe vehicle-cyclist conflicts (WFCC:46-50). Copenhagen crossings "that both act as a means for people particularly on foot to cross the junction, given a better sense of priority but also acting as gateway treatments into the areas" (WFCC:53-55; WFS4A:70,164) are indicative of low-traffic neighbourhoods and represent a shift of power relations in street space by creating a convenient walking environment while indicating to motorists that pedestrians have priority over cars in the area (figure 11).
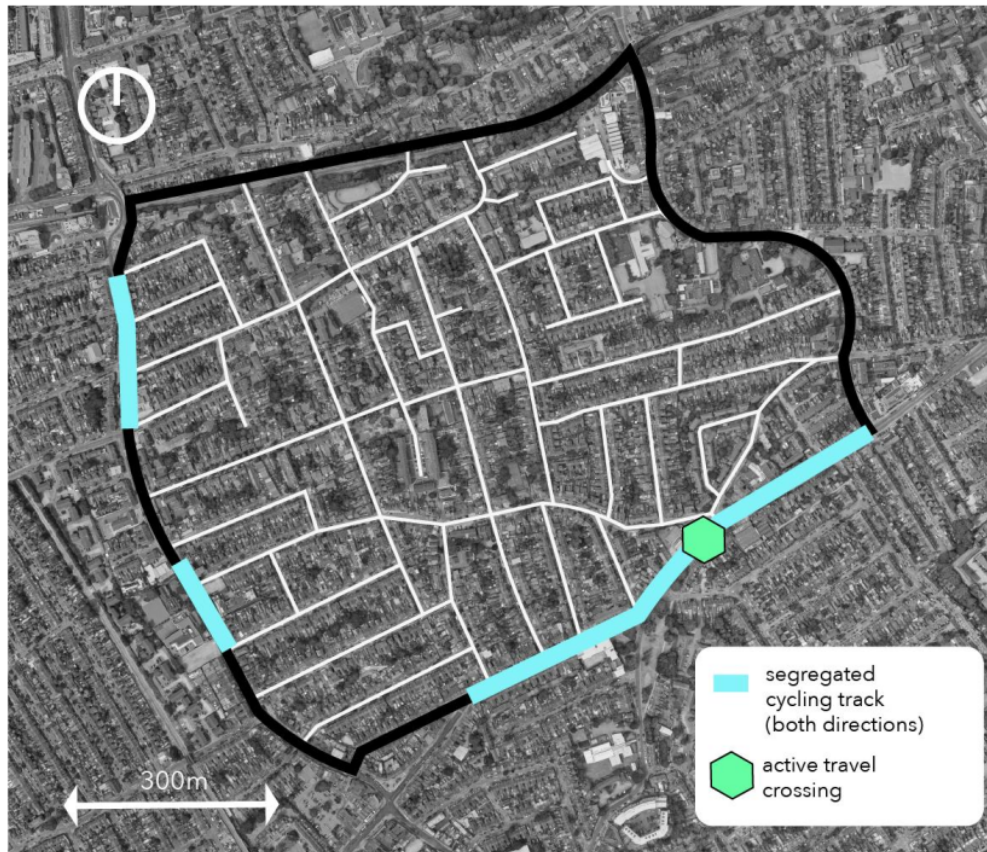
Figure 12: Main road network interventions (Author, Google Imagery)

BEI relating to the *main-road network* facilitate active travel along and across the main arteries on the periphery of the neighbourhood (figure 12, LCC: 52-54). Segregated cycling tracks provide a *safe* and *convenient* environment for cyclists (figure 13) while specific crossings give pedestrians *safe* access across roads into other neighbourhoods (WFCC:97-99).

Figure 13: segregated cycling tracks on peripheral roads (Author, Google Imagery)

Pattern 2: Re-Allocation of Street Space

While BEI of Pattern 1 re-organize movement on a wider scale, the second patterns addresses space distribution at street-scale. Due to reduced traffic volumes and speeds, space previously dedicated to vehicular circulation or parking is now re-allocated to function either as *walking environment*, *cycling infrastructure*, *open space* or a combination of those (*shared space/active travel space*) (figure 14,15,16).

walking environment — Grove Road

cycling infrastructure — Wingfield Road

open space — Walthamstow Village Square

shared/active travel space — Orford Road

before

after
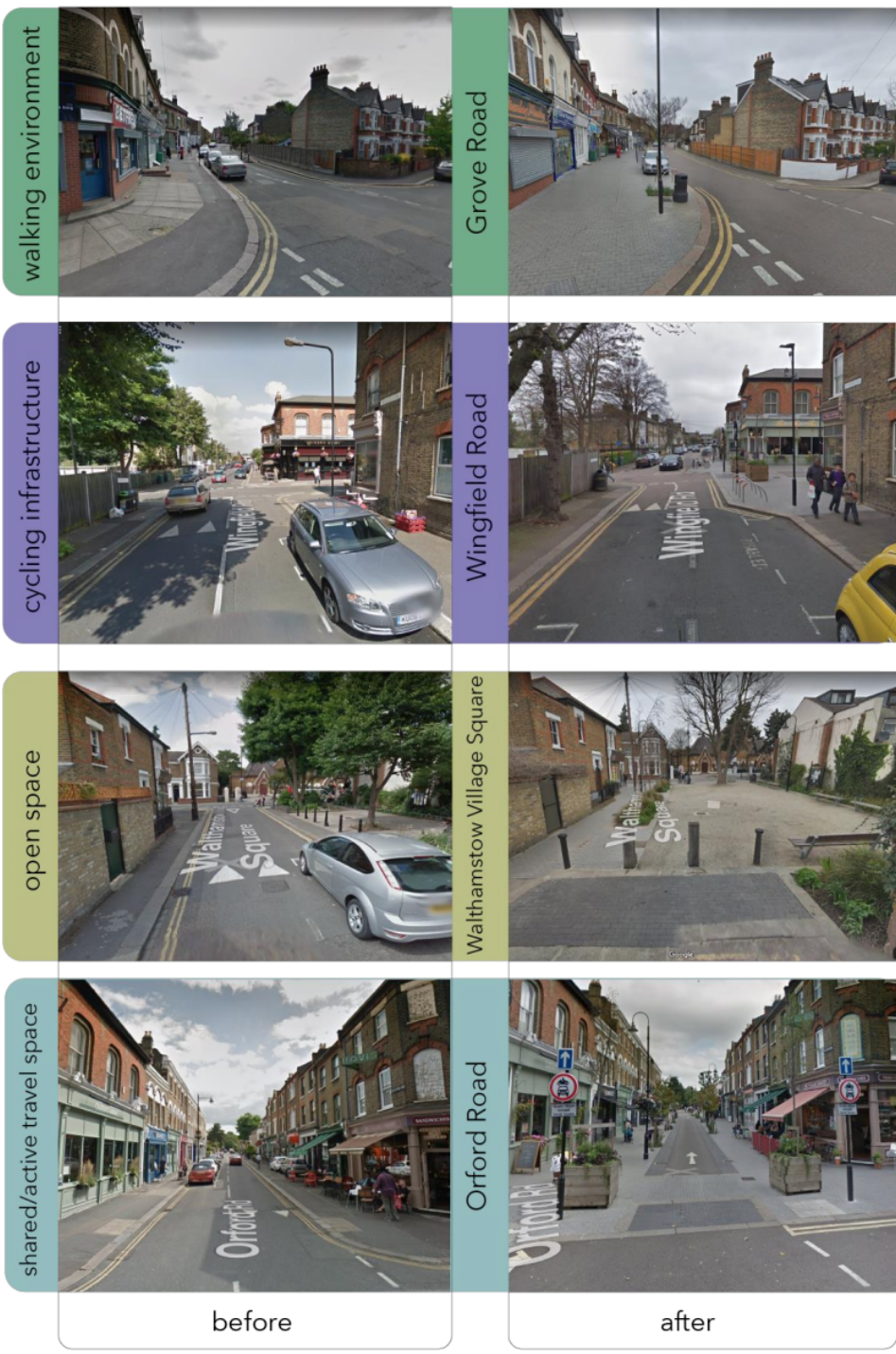
Figure 14: Examples of street space re-allocation (Author, Google Imagery)

In several instances the pavement was widened to take over former parking or vehicular circulation space (LBWF:49-51). Similarly, traffic lanes were transformed into cycling tracks along Lea Bridge Road. At locations where cars used to park cyclists will find a place to lock their bikes (LBWF:95-96). Further, whole road sections were transformed into *open space* that also act as modal filters (Walthamstow Village Square): "We had a small, couldn't even be called a square, it was a very small space. Because the filter has gone in at the junction of Eden Road and Orford Road, that square has more than doubled its size" (WFCC:144-146). Modal filters at West and East Avenues act both as open space for dwelling and as a shared movement space for pedestrians and cyclists (*active travel space*). Orford Road is an exception because buses share the space with other non-mobility uses, and vehicles can pass when the timed modal filter permits (10 pm – 10 am). This effort to "reclaim former highways and turn them into pocket parks" (LBWF:64-65) and "realigning the traditional road space in favour of active travel" (LBWF:95-96) is ultimately an expression of a *prioritization of non-motorized mobility and uses* that challenges established hierarchies in street space (Creutzig et al., 2020).
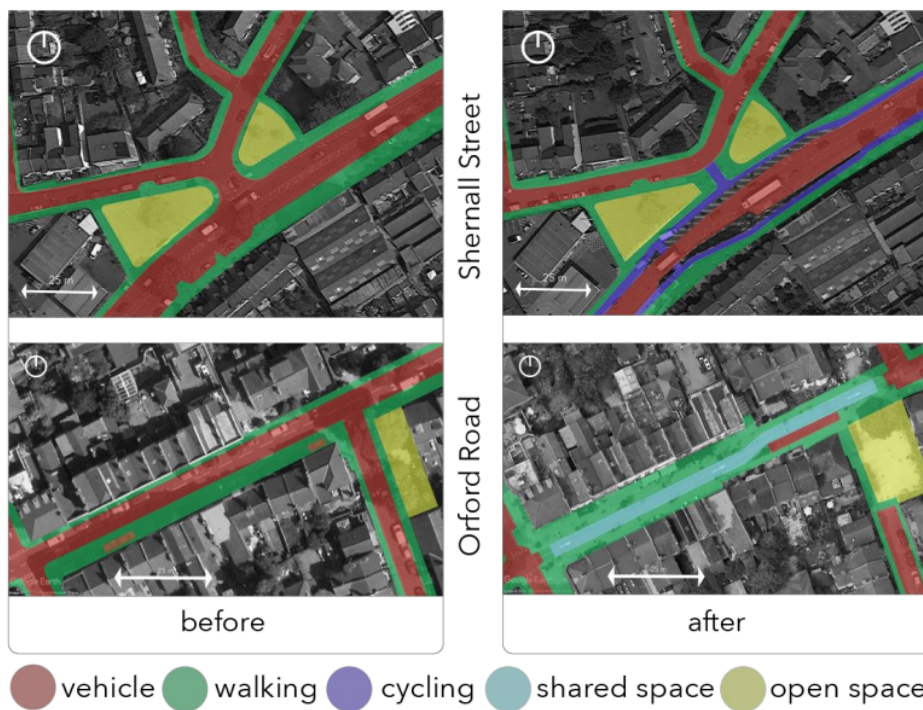
Figure 15: Street space analysis (Author, Google Imagery)

Grove Road

Eden Road

East Avenue

before   after

● vehicle ● walking ● active travel space ● open space
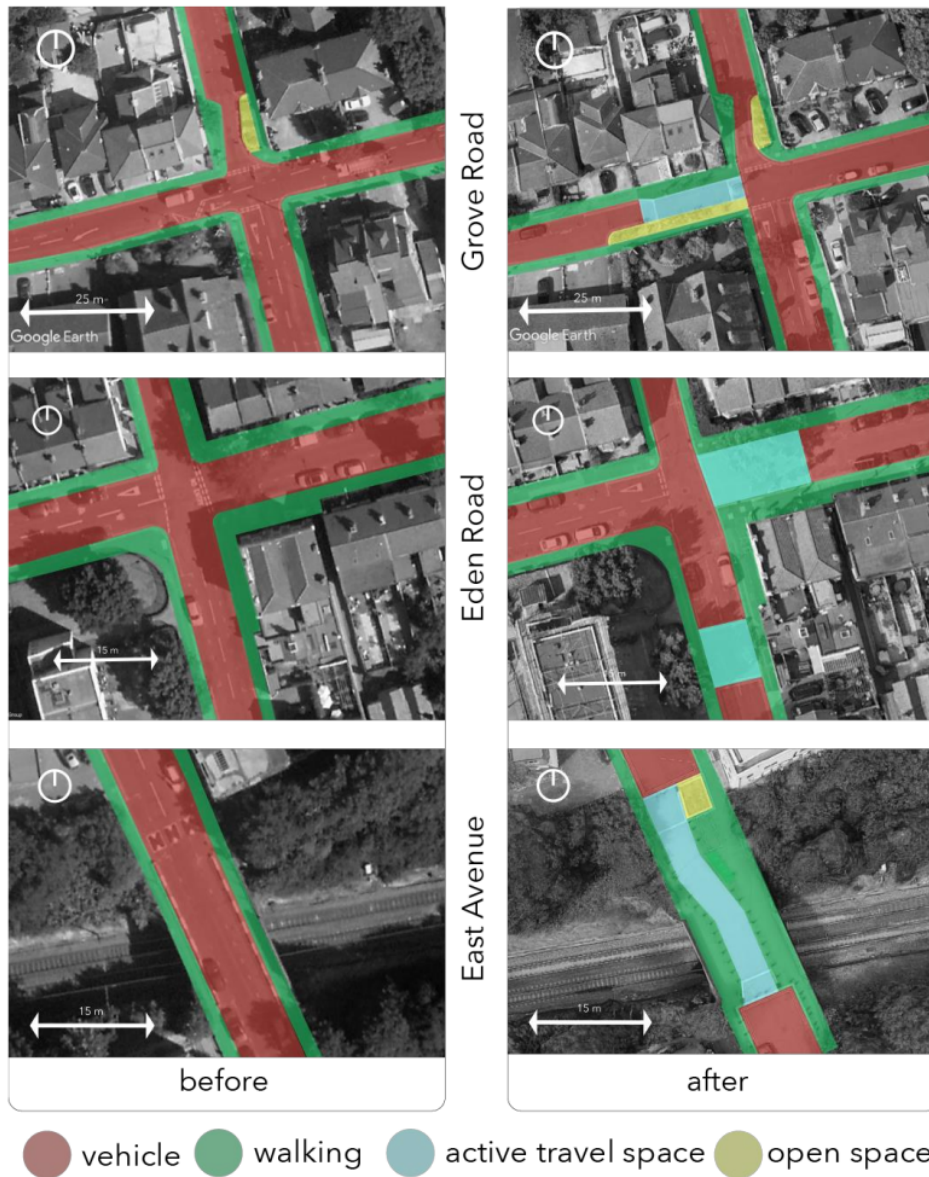
Figure 16: Street space analysis continued (Author, Google Imagery)

Pattern 3: Re-Design of Public Realm

Space claimed in Pattern 2 is re-designed to create pleasant and safe spaces that enable active travel and non-mobility uses (figure 17). Signage was installed, often on bollards at modal filters, to indicate directions within the neighbourhood for people walking or cycling (WFCC:72-73). This

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additional *orientation* device for active travel constitutes an advantage over vehicular movement. BEI displaying guiding functions prevent conflicts among active travel modes therefore providing for *safe* movement in the street space. While bollards, trees or surface treatments often demarcate space for walking only from space cyclists are invited to use in co-existence with pedestrians (active travel space) (LPA:193-197), those BEI are also relevant for place-making (WFCC:38-42). Further, street furniture (play elements, cycling parking) and greenery invite people to dwell in space previously occupied by vehicular traffic: "where there is an opportunity, either on filters or other places where road space has been freed up, putting in community planters or flush beds" (WFCC:75-77,117; LBWF:65-66; LBO:89). The combination of several of those elements at Orford Road are illustrative of an effort to *enable active travel and dwelling* by way of providing *safe* (Parkin et al, 2007; Pooley et al., 2013) and *attractive environments* (Harms et al., 2014; Wang et al., 2016).

Figure 17: Examples of Pattern 3 (Author, Google Imagery)

b. How have these interventions enabled or restrained a diversity of uses in urban space?

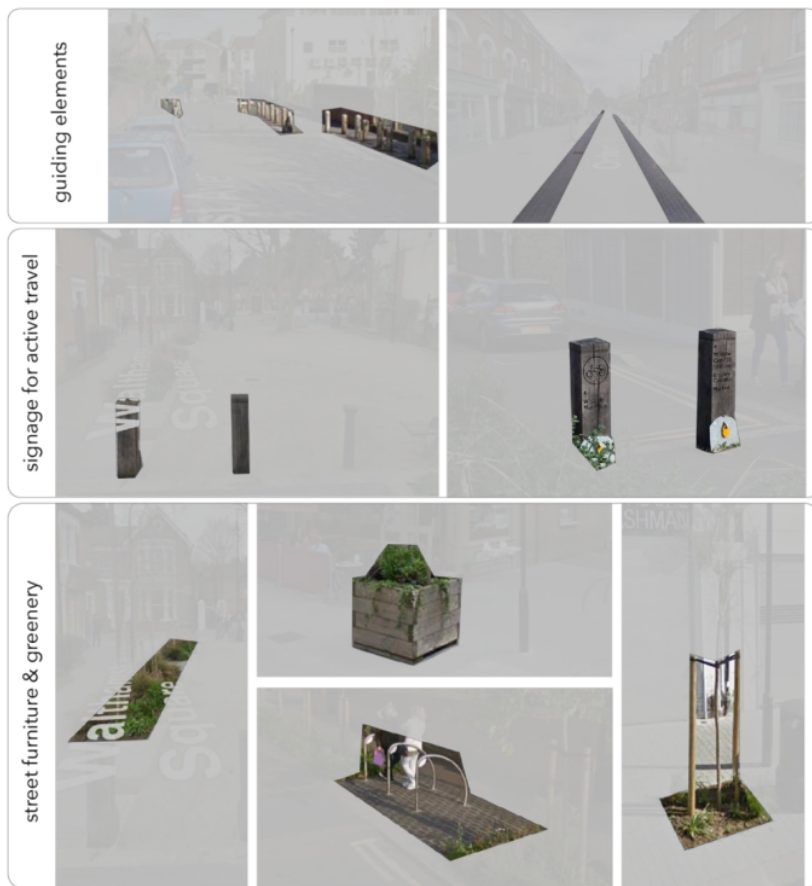The interviewees were questioned over whether they noticed a change in the way street space is used and what activities occurred since the implementation. From statements about daily experiences common themes were derived that were mentioned by several interviewees, albeit sometimes with different connotations but all related to the right to appropriation of space.

Community Interaction

Community interaction was a persistent theme throughout the interviews. Several participants reported that the interventions facilitated more contact amongst residents (LCC:106-109; WFCC:138-140; LBWF:219-222; LBO:99-100). The interventions made it easier for people to engage in informal encounters in the street space: "there was this huge shift in community cohesion [...] the sense of people feeling like they could come out of their front door and talk to people, just changed the area dramatically, so that was a big benefit" (LCC:127-130). The Council representative confirms this:

> "community cohesion and kind of neighbourly engagement has really come forward in these spaces because they are allowing those kind of interactions which previously wouldn't have happened" (LBWF:68-76).

The planning officer (LPA:33-35) and local cycling campaigner describe the open space created at Walthamstow Village square as a place hosting a variety of community events, including Christmas celebrations and play: "that now is a place where families, local people congregate. It is a lovely space, it is a real centre for the community" (WFCC: 146-47). The communal gardening that evolved from the re-design of public realm with flower beds and planters, brought neighbours together (LCC:116-118; WFCC:117-131; LBWF:244-246) and take shared responsibility and civic pride (LBWF:66-68) for the area which in turn creates community cohesion (WFCC:129-131,138-139; LPA:27-18, 257-258; LBO:99-100). However, this overall impression is not shared by WalthamForestStreets4All which claims that the vibrancy of the community was lost and "most of the time the road is dead" (WFS4A:64). Evidence from the site observation confirms Orford Road has become a "destination" (LPA:14-15) for community interactions: a larger group of people gathers on the sidewalk while a group of teenagers sell pastry at a pop-up stall on Walthamstow Village Square to by-passers (figure 18). These uses were enabled through a reduction of traffic (Pattern 1) as well as re-allocation of street space towards open space, walking environment and shared space (Pattern 2).
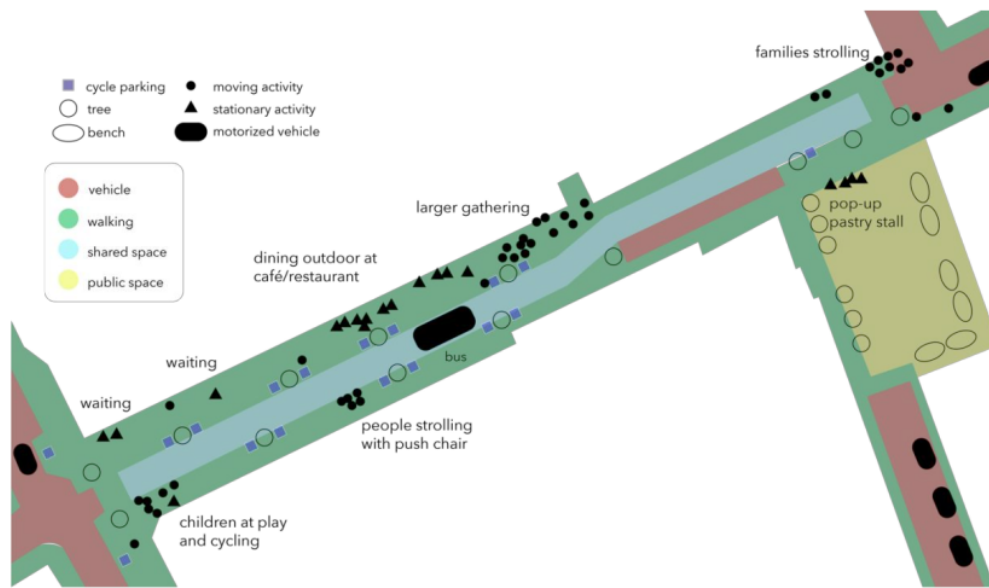
Figure 18: Observed uses at Orford Road (Author)

High Street Vitality

Another common theme concerns the perception of commercial activity on the high streets Orford Road and Grove Road. Most participants state that local business vitality has considerably increased, and new business have moved to the area as a result of the BEI:

> "It has dramatically improved that street of businesses [...] for the first time in over twenty years every unit on [Orford Road] is lit. There has always been for twenty years at least one or two units that were empty. Not anymore, same with Grove Road" (LCC:161-164).

While the planner confirms this change in business activity (LPA:79-81), WalthamForestStreets4All argues several businesses in the area have gone out of business due to road closures or parking restrictions while remaining shops are unaffordable (WFS4A:65-66,130-131,320-327). Nonetheless, reduced traffic volumes and widened pavements enabled people to sit and even dine in the street space of Orford Road (LCC:146-146; LPA:79-80): "All the cafés and restaurants [have] been out on the footways eating [and] drinking. It really has a café culture" (WFCC:108-111). WalthamForestStreets4All confirms this, although claiming those activities are uncommon among local residents: "Yes of course on fine days during the summer the restaurants put tables out on the pavement and it all looks very European and holiday-ish. It's not the life that most Walthamstow residents lead!" (WFS4A:131-135). Observation data confirms this for Orford Road (figure 18) where several restaurants serve customers sitting in street space previously dominated by motorized vehicle use (Pattern 1+2).

Quality and Quantity of Active Travel

The conditions for walking and cycling have been affected: "[the] hostility of the environment vastly improved, so people were able to walk in the street" (LCC:113-114). The increased comfort and safety for walking is attributed to the low-traffic interventions reducing speeds and volumes (LBWF:216-217) as well as the widening of pavements (LBO:24-25; LBWF:49-53). Similarly, less traffic bettered the perceived safety for cycling (LBO:88-89). Interviewees stated that walking in the middle of the road (observed at East Avenue, Grove Road, Eden Road; figure 19, 20, 21) feels more natural, because cars will slow down if they approach a pedestrian (WFCC:113; LBWF:53-55). That is in line with an improved sense of priority given to pedestrians as intended by some of the features such as Copenhagen crossings: "actually the car will slow down and the behaviour of the drivers has changed, because it now recognizes that it is a guest in that space as opposed to the pedestrian being a guest in that space, so it defers the pedestrian" (LBWF:56-58).
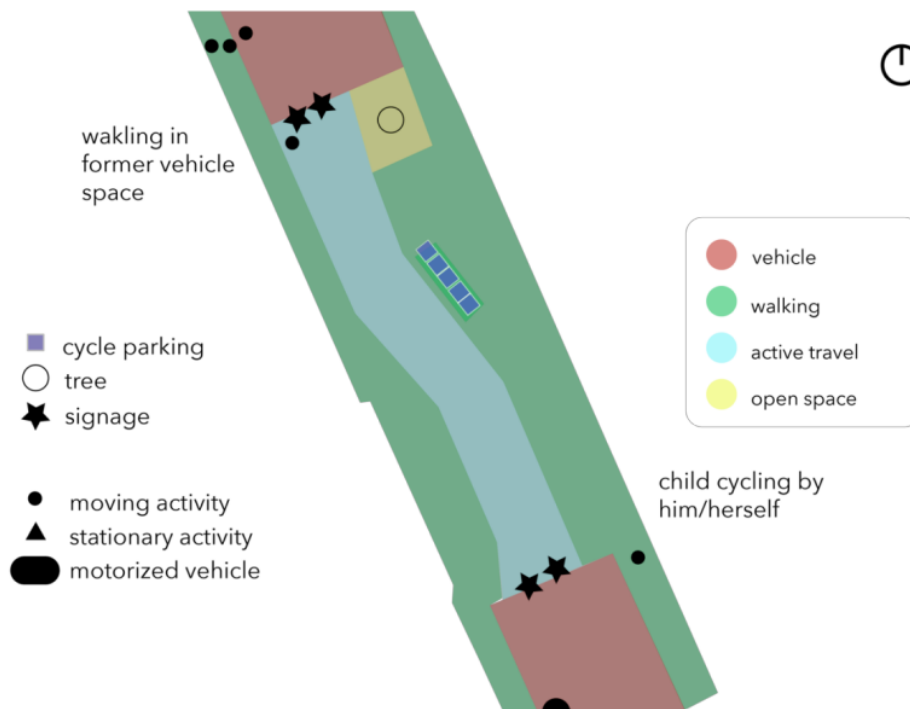
Figure 19: Observed uses at East Avenue (Author)

However, concerns are raised that walking has become more dangerous in locations where cyclists and pedestrians share the same street space (WFS4A:97-101). The planning officer claims that

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cyclist/pedestrian conflicts are only of marginal relevance because on Orford Road tarmac (Pattern 3, figure 18) marks the circulation space shared with cyclists in distinction from pavements where pedestrians usually walk (LPA:192-198). Another conflict previously experienced in the street space between cars and cyclists was eradicated by the replacement of speed cushions with speed humps that cover the whole road space, therefore not creating flat road bits for which different modes compete when passing each other (WFCC:64-71). This and other interventions have led to an increase in cycling: "you see loads of […] cycling in the village" (LCC:170-171).
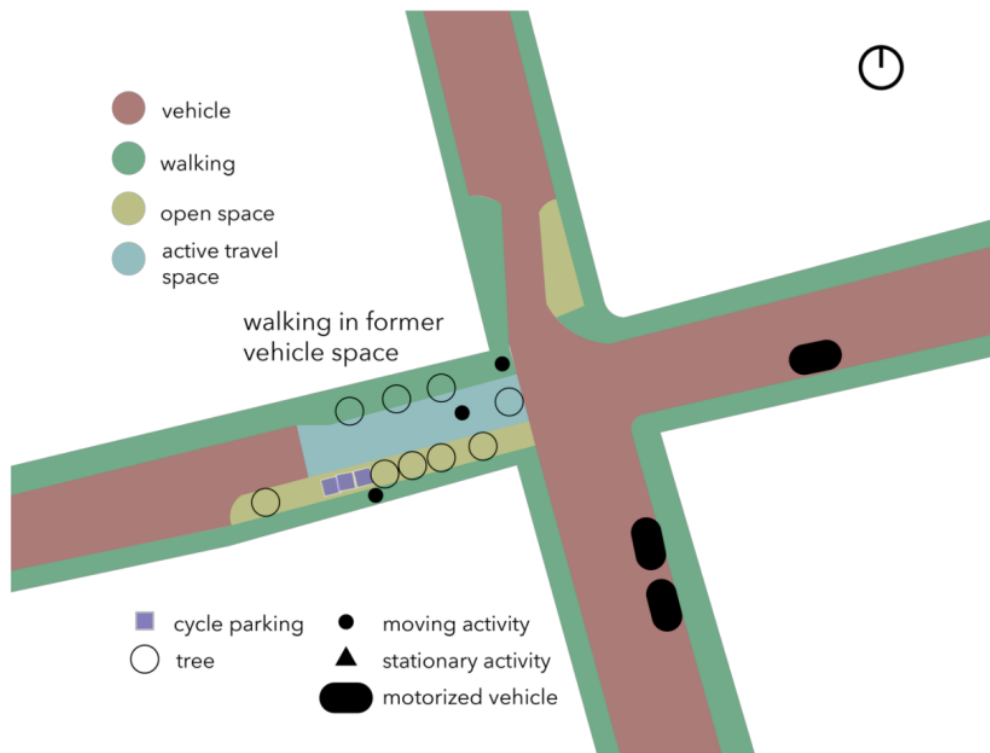
Figure 20: Observed uses at Grove Road (Author)

Accessibility for vulnerable populations

Another theme of perceived Mobility Space relates to accessibility for vulnerable persons like the elderly and disabled. According to the London cycling campaigner, low-traffic interventions enabled the elderly to move around more freely: "what you see routinely now in the village is people on mobility scooters getting around quite happily and elderly crossing the road quite happily because there aren't many cars so they feel far less under pressure to get stuck in their houses" (LCC:250-53). Especially Orford Road's shared space with an even surface is perceived to have

increased comfort for people with mobility aides: "The surfaces are practical, if you got a wheelchair or a pram, it is so much nicer to walk around" (LPA:22-23). From observing Orford Road, it is evident that people with prams are enabled to move around freely on a flattened surface also because parking is prohibited on pavements (figure 18, WFCC:107; LBO: 31-32).

In contrast, WalthamForestStreets4All claims that the interventions made the neighbourhood less accessible and even more dangerous to move around in for vulnerable populations. Speed humps are said to cause discomfort for people with disabilities when cars go over them (WFS4A:42-43). Further, road resurfacing at Copenhagen crossings would pose a risk when people unknowingly walk onto the road because the curb that previously indicated this change is now gone. This is particularly relevant for vision-impaired persons who use the curb to orientate (WFS4A:70-71; O'Callaghan, 2017). However, while some elderly perceive this as an advantage of shared spaces because it prevents people from tripping over curbs (LPA:135-138), the local planning authority received complaints that guide dogs trained to stop at the curb can no longer execute their aide function properly (LPA:139-141).

Children Playing in the Street

Several participants noticed more children play in the street since traffic is reduced in neighbourhood (LCC:114-115; WFCC:107; LBWF:216-19; LPA:25-27) and street furniture that invites play was installed (LBO:20). Site observation affirms children playing in street space previously dominated by traffic (figure 18, 21). While such activity was reportedly not possible for generations, a participant said:

> "I take my kids trick or treating on Halloween into the Village because […] there [are] just thousands of kids everywhere. And they are all over the street, there [are] toddlers running in the road […] there were 20 kids playing football in the street" (A:338-340).
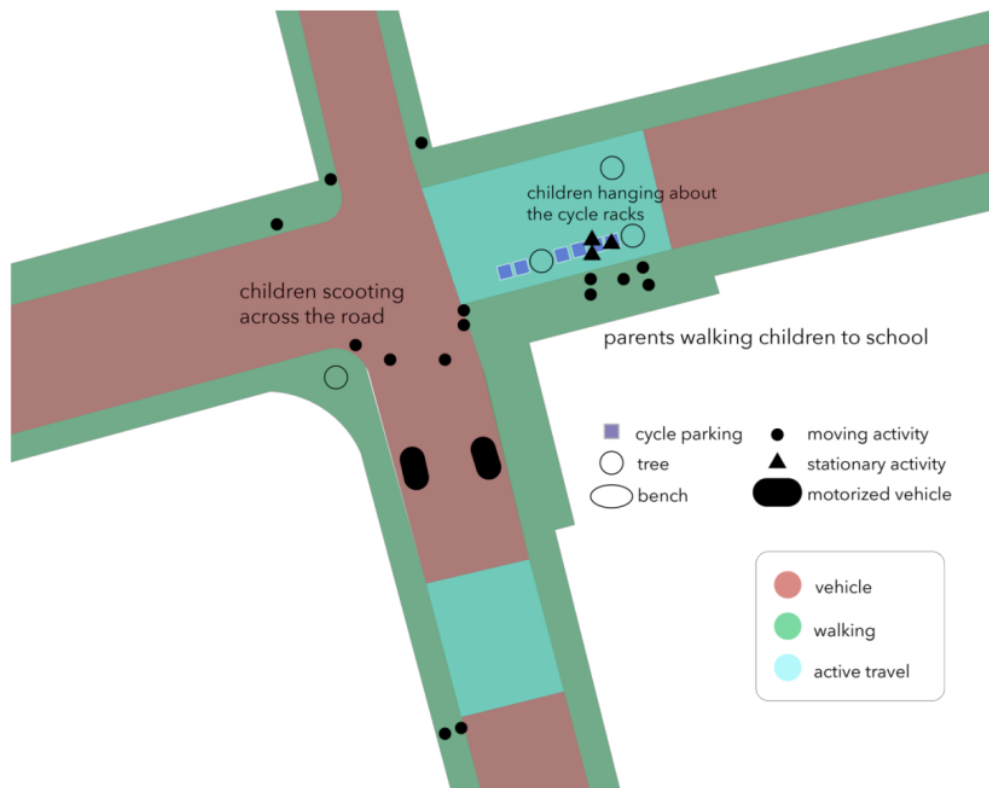
Figure 21: Observed uses at Eden Road (Author)

Crime and Safety

The BEI also shifted how crime is perceived in daily activities. The interventions at Grove Road are said to have eradicated anti-social behaviour: "there was quite a lot of drug dealing on that road, there was […] street drinking and […] again now you got nice cafés" (LCC:164-167). In contrast, WalthamForestStreets4All states that "Women have reported feeling less safe when there is no traffic passing at night" in streets affected by modal filters (WFS4A:154-55).

Access of Services

Several interviewees mentioned the impact of modal filters on the access of services (delivery, emergency vehicles, health care). WalthamForestStreets4All claims the BEI would delay emergency vehicles, care workers and prevent musicians from performing at the local pub because they cannot get their instruments delivered to the doorstep (WFS4A:43-44, 48-55, 93-94, 129-130). Indeed, ambulances were initially confused over the new road layout (LCC:255-258). However, the

planning officers states the concerned parties were consulted with and bollards to which emergency services carry keys were added to some modal filters (LPA:122-130).

Driving restrained

All participants indicate the interventions constrained driving and parking for private vehicles (LCC:70-71; LBWF:103-104; LBO:41). In parallel to experiences of ambulances, this confused drivers over the altered network layout (LCC:330-333). Driver's frustration was further attributed to increased congestion on main roads (WFS4A:89-93, 154) whereas the cycling campaigner and councillor report a change towards driving behaviour that respects pedestrians (WFCC:58-59; LBWF:57-58). The planner states that despite fears of inaccessible areas, every location in the neighbourhood except a small part of Orford Road is still accessible by car, although journey distances might be longer (LPA:43-45).

c. How were these interventions interpreted by various members of the community?

Reflecting the lived dimension of Mobility Space, interviewees were questioned about the contentions caused by the BEI, the groups involved in the public discourse as well as the engagement process to reveal how the interventions were understood by the community. Repeatedly mentioned issues were clustered to derive common themes relating to the right to participation in the production of urban space.

Charged Public Discourse

A politically and emotionally charged public discourse accompanied the Mini-Holland implementation. When Waltham Forest won the Mini-Holland bid, the scheme was a controversial topic in media and politics even beyond the borough: "There was national coverage of protests and lots of politicians in various stripes came out for and against it. It was very polarizing" (LCC:29-32; WFCC:250-252). The councillor said it influenced local elections (LBWF:211-215). The opposition protested in front of the Town Hall (LCC:192-193; WFCC:213-215) and at an opening ceremony of Orford Road pedestrianization (LCC:238-242) calling initiators "cycling Taliban" (Chandler, 2016). The contentions over Mini-Holland dominated public discourse throughout the

whole area (LBWF:135-138) and WalthamForestStreets4All reports social divisions alike to other political debates:

> "The borough has been split along similar lines to Remainers and Leavers .... Huge amounts of abuse, hatred, bile on social media […] I have NEVER experienced so much hostility and division in the borough as has been caused by the appalling way MH has been implemented" (WFS4A:302-307).

The emotional character of the debates is evident in the anger directed at people associated with the BEI: "so people that were hugely against the scheme, massively hated the scheme, hated me, I had people shout at me, I had death threats" (LCC:118-120, 266-268; LBWF:184), or in combative vocabulary used to describe the implementation process:

> "We were in essence using that inner core to help *shape strategy* and for *people to go out and do battle in the street* […] we had a *lot of people doing the fighting for us*" (WFCC:185-192).

Criticism of Engagement Process

Another shared meaning expressed by interviewees was criticism of the consultation process. Both cycling campaigners admit that the first engagement from the Council in form of a trial was poorly designed (LCC:186-191, 202-204; WFCC:200-202) and communication insufficient (LCC:312-313). Participant B attributed this to budget pressure exerted on the Council by TfL to spend the funds within three years, a time frame inadequate for comprehensive participation (WFCC:203-208). Neither Councillor nor planner mentioned this issue, but both defended an intensive six month-long engagement process with several components including surveys, co-design workshops, live trials and formal consultation (LBWF:138-143; LPA:170-185). In contrast, WalthamForestStreets4All describes the process as "farcial from the outset" (D:237) and questions its legitimacy:

> "the "consultation" events [emphasis added by respondent] were never genuine. They were just an attempt to get people on board with what had already been decided [and] were devised, organised and reported on by the same people who were tasked with delivering the bid" (WFS4A: 246-249).

They criticize Council representatives for not addressing or respecting their concerns (WFS4A:239-265). A specific point of contention that created further mistrust was the close cooperation between the Council and cycling campaigners: "LBWF prepared their bid ONLY in consultation with very vociferous cycling groups. They did not at the time consult with the general population" (WFS4A:239-241). When controversy over the interventions occurred, this relationship, described by a cycling campaigner as being a "critical friend" to the Council (LCC:15-19), was then adapted so that the local cycling campaign would act "behind the scenes dealing with engineers, with politicians" but not be publicly present in the engagement process (WFCC:171-175). Instead, cycling campaigners founded the group WeSupportWalthamForestMini-Holland to broaden the

spectrum of support beyond the realm of cyclists and include other social groups as well (ibid.). The business owner notes that people present at engagement events aren't representative of the borough's demographic and is concerned that some people do not feel properly included (LBO: 108-112).

Shift in Public Opinion

The overall public opinion shifted from scepticism to an embrace of the interventions once the community was able to experience those:

> "Since the early days, the against group has diminished massively. [...] The weight of evidence, the weight of actually being able to see it, feel it, touch it if it were has really helped shift the tone of the debate away from public people who just did not want to see any change whatsoever in favour of those who are desperate for this kind of positive change in their locality" (C:112-120).

A trial-period during which people experienced the benefits of abstract plans (conceived mobility space) instead of just being informed about negatively perceived driving restrictions (LCC:315-323) is an important factor to explain the shift in public opinion. This trend is reflected in the growing support of local businesses who were initially sceptical (LPA:58-62) but became supportive once they witnessed the positive impact on local commercial activity: "I think businesses were initially incredibly grumpy but if you talk to them now none of them would want to go back to the way it was" (LCC:159-161). A cycling campaigner believes the use of high-quality materials for the first interventions in Walthamstow Village acted as visual "motivator" to grow support for subsequent schemes (WFCC:42-45). While opposition in completed neighbourhoods diminished, critical voices changed locality to oppose new schemes in other areas such as Markhouse Village (LPA:263-266). Nonetheless, a local school which witnessed the benefits of road closures, proactively asked the Council for similar interventions near its premises (LPA:68-70), which is further evidence of how actual experiencing a Mobility Space can shift opinion eventually (Hass-Klau, 2015; Melia, 2016; Crane et al., 2016).

Inclusivity

Through the political perspective of inclusivity, the BEI are either understood as an elitist space for cyclists and younger affluent social groups to the detriment of elderly and poor, or as a symbol to create places which serve and enable people from all strata of society. A cycling campaigner reports that the initial framing of the Mini-Holland bid around cycling has been detrimental to the

implementation process since people who didn't identify with cycling perceived it as not benefitting them personally (LCC:92-99, 201-203). However, the councillor claimed the interventions were always made to support both walking and cycling (LBWF:45-47) and in contrast to other Mini-Hollands, local cycling campaigners "absolutely insisted it was seen as an active travel program […] simply because we are trying to reduce the amount of bikelash" (WFCC:90-92). Subsequent communication material branding the interventions as pro-cycling caused the impression that those would only serve one clientele and thus caused further backlash (WFCC:228-232). WalthamForestStreets4All states that despite the council claiming the scheme to be active travel-focused, needs of pedestrians and concerns of the majority were sacrificed to what they call the "cult" of cycling (WFS4A:230-237, 31-32). The planner confirms "a rivalry" between people who have lived for longer in the area and tend to be less supportive and those that recently moved from areas of London where cycling cultures are more established (LPA:231-237). However, cyclists are also members of oppositional groups and criticize cycling interventions (WFS4A:113-114).

Beyond questions of mobility, the opposition interpreted the interventions to cause "gentrification for young urbanized at the expense of the disabled and the elderly" (LCC:247-24; WFS4A:313-316). However, the Councillor said both supporting and opposing community groups are demographically balanced (LBWF:203-204), but higher-than-average ages are noticed (WFCC:176-180; LBO:62-63). The Councillor rejects the gentrification argument as an attempt to discredit Mini-Holland's objective to benefit everyone by reducing air pollution (LBWF:251-255) whereas the London cycling campaigner predicts a lift in housing prices due to the BEI (Stehlin, 2019), but views this is as a structural problem that should be considered when implementing such schemes (LCC:373-381). The retailer claims debates around gentrification distract from the necessity to address structural inequality and unaffordability of housing (LBO:116-119). The link to housing is further confirmed by the planning officer mentioning that real estate agents use the term Mini-Holland as part of their marketing (LPA:246-247).

Adaption of Participation Model

The implementation of the BEI was understood as a learning experience for planners and the council in doing community engagement in the social media age. Several participants reported the Mini-Holland controversy was unprecedented and left Council officers surprised over the degree of public interest that followed (A:19-22,195-199; C:132-135). The latter is attributed to the Council's pioneer role (C:169-170) in implementing such radical interventions: "this was the first big scheme of this type in decades and I think we had to learn on our feet. It was also the first time

that Waltham Forest, and I think also in London, someone did a major scheme in the social media age" (A:182-185). When planners realized that previously used engagement procedures did not match the transparency and topicality challenges posed my modern social media communication, it replaced traditional methods with digital online tools such as the participation platform "commonplace" (B:270-273; C:157-163) and was thus able to reduce opposition to subsequent schemes (A:204-206; B:247-248) and pre-empt accusations over lack of transparency (E:217-222).

Showpiece of Mobility Infrastructure

The BEI became a symbol for state-of-the-art active travel infrastructure with relevance beyond the local context. Not only is it inspiration for other London boroughs such as Haringey (D: 175) and a promotion case study for London Cycling Campaign (A:36-40) but the BEI have inspired national (A:438) and internationally municipalities who sent policymakers to learn from Walthamstow Village study tours (A:273-27). Moreover, interventions are seen as emblematic of a shift away from automobile dominated street life (C:236-246), resonate with air pollution reduction agendas (C:120-125) and recently stand out in discussions over a re-design of urban streets to accommodate social distancing: Waltham Forest is considered "a blueprint of what we do moving forward" (C:187-198): Further, the neighbourhood has received attention through national awards for its community catered gardening (B:80-82).

6. Discussion

This chapter contextualizes the findings in relation to Spatial Justice and concepts outlined in the literature review to ultimately answer the research question. While Spatial Justice relates, amongst other things, to the political organization of space, any analysis of distributional patterns which become explicit through the lens of right to appropriation of urban space, must be complemented by an investigation of the processes by which urban space is discursively produced and how affected groups participate in such. The findings reveal that the BEI advance Spatial Justice in multiple ways by altering the political organization of Space (conceived) in Walthamstow Village. This in turn affects the Right to the City by enabling people to use and experience their neighbourhood in novel ways (right to appropriation). The implementation process made the community conscious over the contested nature of urban space and the collective negotiation processes (lived) implicit to profound changes of established mobility systems.

Political Organization of Space

Since modernist urban planners designed urban space from the outset to favour cars while marginalizing active travel (Koglin/Rye, 2014), fundamentally challenging the political organization of such space is inevitable if a profound transition towards bicycle urbanism is the objective. The built environment interventions identified under Pattern 1 address this by modifying street design to re-organize movement (Cervero et al., 2010). Impacts that reduce vehicular speed and access while simultaneously enhancing convenience and safety of movement for active travel reflects the notion that BEI that benefit the latter are often to the detriment of the former (Aldred, 2019a). While a partial separation of the street network accessible for active travel from its vehicular counterpart is indicative of filtered permeability (TCPA/CLG, 2008), the concept is only executed to a limited degree in Walthamstow Village in comparison to Houton's fully segregated network of cycling routes (Foletta, 2011). Another explicit example of prioritizing cycling needs in street design is replacing speed cushions, whose car-centric design doesn't anticipate potential conflicts with cyclists (Latham/Wood, 2015), with cycling friendly sinusoidal speed humps. Echoing literature that diagnoses a disproportional share of space is dedicated to cars (Nello-Deakin, 2019; Gössling, 2020; Creutzig et al., 2020) and attribute changes in street space allocation to changing planning paradigms (Carstensen et al., 2015), this research finds a re-allocation of street space in Walthamstow Village from automobile's prerogative to active mobility modes, open space and spaces shared between various user groups. The latter category of active/shared spaces addresses critiques of street space analysis that neglect place functions of streets and possible overlaps of

mobility modes (Nello-Deakin, 2019). The re-allocated space is re-designed by BEI summarized under Pattern 3, which reflects an effort to enable active travel and dwelling by means of providing safe (Parkin et al., 2007; Pooley et al., 2013) and attractive environments (Harms et al., 2014; Wang et al., 2016). The sequential logic of the identified Patterns resembles the distinction between a functional and a structural phase in the implementation of Barcelona's Superblocks: only after a functional phase re-organizes movement and space within the block (Pattern 1+2) to make different uses feasible, the structural component makes the interventions permanent by re-purposing the reclaimed space with street furniture (Pattern 3) to enable new uses (Scudellari et al., 2019). Similarly, Carmona et al. propose street improvement schemes to firstly provide adequate space for pedestrian activity before public realm design can create comfortable spaces for social activity (2018).

Right to appropriation of urban space

Generally, the political re-organization of space has enabled a greater diversity of people to exert their right to appropriation of space, since those can now use urban space more safely and comfortably for active mobility, social interaction, or play.

Participants' reports that the interventions improved active travel conditions and increased those activities can be verified quantitatively by traffic counts (walking 19%, cycling 28%) (ProjectCentre, 2016). Given the nature of the interventions and interviewees' statements that driving is restrained, 44% less vehicular traffic reported in Walthamstow Village (ProjectCentre, 2016) comes as no surprise. A study from another outer London borough confirms the findings that low-traffic interventions indeed enable walking because the removal of through-traffic is associated with an increase in perceived pedestrian safety and ease of crossing (Aldred/Croft, 2019a). An increase in perception of safety reflects a reduction of collision at the locations of Copenhagen crossings (ProjectCentre, 2016: 126) and is in accordance with research that reports reduced risks of accidents in comparable traffic calming schemes (Elvik, 2001; Ewing/Dumbaugh, 2009). Similarly, segregated cycling tracks subsumed under Pattern 1 have the potential to enable social groups (e.g. women, elderly, parents with small children) that perceive sharing the road with vehicles as too dangerous to cycle, which ultimately leads to a greater diversity in ridership (Aldred, 2015; Aldred et al., 2017; Aldred/Dales, 2017). The reduction in traffic (ProjectCentre, 2016) reportedly facilitated greater social interaction in urban space, which mirrors a long-established inversed correlation between car traffic and social cohesion (Appleyard, 1969), recently confirmed by Hart and Parkhurst in Bristol (2011).

Participants reported a revitalization of Orford Road and Grove Road, which aligns with Hall et al.'s assertion that local high streets are important destinations for social interactions (2017). This perceived positive impact of the BEI on the local economy contributes to existing research which attributes active travel and public realm improvements to a reduction in retail vacancy, an increase in retail rental value (Carmona et al., 2018) as well as an increase in retail sales (Lawlor, 2013). By observing a qualitative proliferation of activities on Orford Road, where BEI of all three Patterns were implemented, this dissertation's finding reflects Carmona et al. seeing a 216% increase in static activities (sitting/socializing) in locations where "the quality of the built environment is sufficiently conducive to make people wish to stay" (2018: 6).

While well-being of children is associated with the degree of freedom to move around and play unsupervised (UNICEF, 2013), traffic is the most common factor why this independence is not granted (Shaw et al., 2015). The reduction of volumes and speeds in Walthamstow Village in combination with street furniture that invites play, can thus be associated with a found increase of children playing in the street. Community gardening is another activity facilitated by the BEI said to foster social cohesion as reported by the Interviewees (Veen et al., 2016).

In opposition to all those rather positive impacts on the right to use urban space are statements indicating negative experiences due to the interventions. Conflicting opinions over the effect of BEI, particularly shared spaces, on accessibility by vulnerable populations reflects national debates (Lord Holmes of Richmond, 2015; WEC, 2017) that recently saw a halt of similar schemes by the Government's Inclusive Transport Strategy until solutions are found to ameliorate disabled people's safety concerns (DfT, 2018b). Further, a statement according to which walking at night became dangerous since the natural supervision of car traffic is gone echoes similar reports from Poblenou (Scudellari et al., 2019: 16) but contrasts assertions that this is compensated by supervision from active mobility (NTA, 2011). To draw conclusions about the highly context-dependent nature of safety (Melia, 2012) is beyond the scope of this work as to relate the BEI to a reduction of anti-social behaviour as reported by one interviewee.

Nonetheless, community and businesses learned how the BEI change the way they experience urban space in their daily lives (perceived) because active mobility became safer, fostered social interaction, re-vitalized local high-streets and enabled marginalized social groups, with some reservations, to move around more comfortably.

Right to participation in the production of urban space

The political re-organization of space has affected the right to participation in the production of urban space. The contentious negotiation over shared meanings attached to the scheme has not only made more people aware of how the built environment they inhabit is influenced by mobility priorities but community members also engaged in the collective decision-making process over what these priorities should be and how their neighbourhood should look through protests, community advocacy groups and consultation responses.

In opposition to techno-centric views of modernist planning that see BEI as rational and neutral solutions (Koglin, 2020), the findings of this research show that challenging established automobility habits (Domarchi et al., 2008) by re-organizing space and movement within it will elicit politically charged contentions and resistance (Gössling, 2020). In parallel to Poblenou, the implementation process in Walthamstow Village was accompanied by a controversial public debate that involved the formation of opposing as well as supporting community groups, became a salient issue in local politics and received great media attention (Scudellari et al., 2019). The cause of resistance was not so much cycling infrastructure per se but rather restrictions on vehicular traffic, concerns over the impact of this on local retail as well as cyclists-pedestrian conflicts, of which the former two were also concerns associated with a filtered permeability scheme in Brighton (Melia/Shergold, 2016). While conflicts between cyclists and pedestrians in shared spaces is a legitimate concern (Simpson, 2017), this issue can become overinflated by conservative motorist, as was the case in Sevilla's cycling hire scheme (Castillo-Manzano, 2013).

Survey data from Lea Bridge Road (ProjectCentre, 2016) confirms other research that local businesses overestimated the number of costumers arriving by car (McCormick, 2012; O'Connor et al., 2011) which is why negative impacts of the BEI on retailers did not materialize. Correspondingly, public opinion shifted from an initial scepticism amongst residents and Walthamstow Village businesses to an embrace of the scheme, which is in accordance with studies that saw a decline in opposition, especially from retailers, once the benefits of the scheme could be experienced (Hass-Klau, 2015; Melia, 2016; Crane et al., 2016). This further illustrates that the opposition was never a coherent group that fell apart once the individual segments' reason to resist waned (Wild et al., 2018). Apart from business owners and people who identify with automobility culture and a sub-urban lifestyle – likely conservative voters (Henderson, 2006, 2015; Walks et al., 2015), also cyclists themselves are part of the opposition in Waltham Forest mainly due to technical concerns over cycling interventions (Duarte et al., 2014; Amigo, 2016).

The BEI have, as discussed above, enabled new uses (e.g. outdoor dining, cycling and playing safely) in Walthamstow Village, thus raising the "neighbourhood-use value" (Stehlin, 2014). With those practices corresponding social groups are attracted (Stelin, 2015), described by the planner as younger, affluent and cycling – "creative class" (Florida, 2002) that is perceived as a threat to established populations. A higher use-value of urban space can easily translate into higher exchange value of neighbourhoods (Lefebvre et al., 1996), resulting in higher property values that in turn lead to the displacement of groups unable afford this uplift. This reflects gentrification as a salient theme of opponents in Walthamstow Village as is the case elsewhere (Lubitow et al., 2016; Sheller, 2015). Reports that Mini-Holland is used as a branding term in real-estate marketing is reflective of Stehlin's claim that improvements to the street environment will also impact the value of adjacent properties (2019). While the rejection of BEI-induced gentrification by the Council reflects opinions of industry experts (Jenkins, 2017), Carmona et al. found a small yet noticeable impact of public realm improvements on housing prices at other locations in London (2018). Further, a variety of studies emphasized the link between an uplift in cycling ridership (Herrington/Dann, 2016) and cycling infrastructure (Flanagan et al., 2016) with gentrification. Similarly, the reported re-vitalization of Orford Road with potentially increasing retail values (Carmona et al., 2018) could also lead to the displacement of small shops in tenancy following a pedestrianization scheme in Istanbul (Özdemir/Sulcuk, 2017).

Due to budget pressure and planners' unawareness of the political nature of the BEI, the significance of the first engagement with the public was underestimated (Higgins, 2019) leading to inadequate communication that further triggered opposition. A proactive engagement campaign that frames larger community benefits in relation to marginal restrictions (Castillo-Manzano/Sánchez-Braza, 2013), or, in the case of Copenhagen, communicates interventions in an entirely positive way (Gössling, 2013) would have helped to address counter narratives of the opposition early on. According to the participants, the scheme was framed from the beginning as benefitting both cyclists and pedestrians but failed "to appeal to a broad set of community values that are less open for disagreement" (e.g. safety for children and community vitality) (Field et al., 2018: 138). The Greater London Authority's renaming of Mini-Hollands as Liveable Neighbourhoods across the city is presumably an attempt to do so (TfL, 2020b).

Leyendecker cautions policymakers to consider different groups and their varying reasons to oppose separately when collective benefits of space redistribution projects are communicated (2020). In Walthamstow Village unwarranted concerns of businesses could have been pre-empted

by highlighting the potential benefits of the BEI to the vitality of Orford Road. The close relationship between the Council and the cycling campaign has further exacerbated a general distrust towards local authorities (Higgins, 2019; Özdemir/Sulcuk, 2017) and made the programme vulnerable to criticism. Nonetheless, given broad media attention and public scrutiny, the Council realized the potential of social media in understanding complex urban politics (Moore/Rodgers, 2020) and adopted a digital participation tool that addresses transparency concerns while enabling people to better comprehend decision-making processes related to BEI. Despite, or perhaps even because of the contentions it caused, Walthamstow Village became a symbol for a transition towards a more people-centred urbanism, that is studied worldwide and reflects the possibility of meanings attached to the built environment to even cross national borders (Aldred/Jungnickel, 2014).

The implementation of the scheme made people more aware of how the urban space they inhabit is produced by, amongst other things, mobility priorities and related socio-economic processes. The community further took action to voice their opposition or support of the scheme and challenged the local authority to overhaul its engagement model which will subsequently facilitate more comprehensive and transparent participation.

7. Conclusion

This dissertation has shown that built environment interventions related to bicycle urbanism affect Spatial Justice by means of altering the political organization of space in such way that it enables a greater variety of people to exert their right to the appropriation of space. The implementation of BEI has elicited contentious debates that made the community conscious of how urban space is produced and prompted them to engage in the decision-making process. The latter aspect even challenged Waltham Forest Council to adjust its participation model to become more comprehensive and transparent, an essential prerequisite for urbanites to fulfil their right to participation in the production of urban space. Both aspects are integral to the Right to the City, which is ultimately a call to advance Spatial Justice.

By acknowledging a "socio-spatial dialectic" (Soja, 2009) and the entanglement of movement with politics via urban space, the conceptual framework Mobility Space draws equally on insights of urban spatial theory as well as mobilities research, and was developed to fully understand the intricate relations between material (conceived), experiential (perceived) and discursive (lived) aspects of bicycle urbanism. The application of the concept demonstrated that any attempt to analyse spatial expressions of mobility priorities will necessarily be insufficient if it does not consider how all three dimensions are mutually constitutive. Due to the concepts' grounding in two different intellectual currents of urban studies, Mobility Space represents a novel analytical tool which can be flexibly applied in research of urban planning and design or social sciences. Future studies could, for instance, switch the direction of effect by looking at how shared meanings attached to a Mobility Space influence the way it is used or physically conceived.

Considering the recent proliferation of adopted cycling strategies in often car-dominated urban areas throughout the world, academic coverage of societal impacts of transforming the built environment to accommodate the needs of cyclists remains scarce. In attempting to illuminate this scientific void with a thus-far rare case study from the UK, this dissertation has demonstrated how mobility transitions affect society by means of restructuring urban space. Urban planners must be aware that any intervention to the built environment is never only a technical solution but reflects power relations of society and has profound effects on who can use urban space and what meanings are attached to it. By examining concrete physical interventions in Walthamstow Village, the identified Patterns address the question what urban design for cycling looks like (Forsyth/Krizek, 2011). However, if a transition from car-dominated urbanism is to be taken seriously, the needs of cyclists should not be played off against those of pedestrians but must be catered for in concert

with walking environments to position active travel as a viable alternative to vehicular traffic. Understanding how the street space is experienced and used by different groups with varying abilities is here essential for urban professionals designing infrastructure that encourages this shift. The findings further contribute to knowledge about resistance to active travel interventions, by contextualising Walthamstow Village's opposition in relation to typical opposition groups and reoccurring points of contentions identified elsewhere. Urban planners can gain insights from this for devising community-specific communication and engagement strategies to reduce resistance to mobility transition or channel it into constructive participation.

Amidst the challenge to conduct field research of urban life during a pandemic, this dissertation proved to be resilient as methodology was adapted and digital tools helped to bridge physical distance between author, study site and participants. However, due to lockdown-related closure of shops, the author was not able to contact additional business owners, as initially intended. Retailers do not only have a comprehensive knowledge of community dynamics, but their insights would have been especially valuable in better understanding the found shift in public opinion. The sample of participants would have been less biased towards residents affiliated with civil society organizations. Another limitation of this study relates to the virtual site observation: While the data obtained from Google Street View was helpful to understand the organization of streets, it was not rich enough to replace an actual site observation. Nonetheless, the unprecedented mobility challenges posed by the pandemic brought additional attention to the topic of street space allocation and affirmed the topicality of this dissertation's subject. Insights from this research could for instance inform further inquiries into political implications of making temporary street space programs, such as London's Street Space Plan, permanent (TfL, 2020a). Given the urgency of the matter, most of those were implemented in a manner that leapfrogged several steps of ordinary planning procedures, including community consultation, but require in the long term a comprehensive socio-political assessment to avoid negative outcomes across the population.

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9. Appendix

Objective 2: Site Observation – Google Street View Data preliminary analysis

Site	Google Street View Data Collection Date	Initial Comments on Data (time/date/weather conditions)	Activity Level
Orford Road	August 2017	Private vehicle in the street space, some closed shops, solar altitude suggest that the data was collected at a point in time outside of the modal filter (10 am -10 pm)	Barely any activity except for delivery trucks in loading bays and a few people walking past, strolling with dog
	March 2018	Retail and Gastronomy is open with tables outside on the streets, hopper bus follows Google Street View vehicle	Several groups of people walking, going about stationary activities, people sitting outside cafés
	March 2019	Closed shops suggest data was collected in early morning hours	Street is deserted except for a delivery trucks in loading bays
Eden Road/Grosvenor Rise East	March 2018	People leaving pub on site	Only a few people walking around the site
	March 2019	Parents seem to bring kids to school as several person in school age carry school bags – early morning hours	Several groups of people walk across the modal filter, kids with scooters
East Avenue (view from the south)	April 2016	Solar altitude suggests morning hours as point of data collection	Street space is deserted except for one person walking across the modal filter
	August 2017	Children with school bags walking across suggest a working weekday	A child is cycling across the modal filter, a group of children walk on the pedestrian pavement
West Avenue (view from the north)	April 2016	Children with school bags walking on adjacent St Mary Rd suggest a weekday	One person walking across the modal filter, one person sitting on a bench
	August 2017	Children with school bags walking on adjacent St Mary Rd suggest a weekday	No activity on the site
	March 2018	Views are quite far and blurry	Potentially children playing on the modal filter, one person walking across

Site	Date	Notes	Activity
Grove Road/Fraser Road	March 2019		A person with a push car walking across
	April 2017 (West)	Solar altitude suggests afternoon	No activity
	Sept 2017 (West)	Solar altitude suggests afternoon	2 persons chatting at the cycling racks
	April 2016 (East)	Solar altitude suggests morning/noon	1 person walking across the modal filter
	April 2017 (East)	Solar altitude suggests late afternoon	1 person walking his dog
	September 2017 (East)	Solar altitude suggests late afternoon	1 person cycling across the modal filter, 1 person walking across
Grove Road	March 2018 (East)	Solar altitude suggests noon	No activity
	March 2019 (East)	**Solar altitude suggests noon**	**3 persons walking across the modal filter**
	April 2017	Solar altitude suggests noon	2 People sitting outside a café, 3 people waiting on the pavement
	August 2017		2-3 people walking across the site, one person waiting
	March 2018		One person in the site
	March 2019		No activity
Shernall Street/Lea Bridge Road	April 2017 (North)	Solar altitude suggest afternoon	1 person sitting, a few people hanging around the green space, 1 person walking across the site
	September 2017 (North)	Solar altitude suggest afternoon	No activity
	March 2018 (North)	Solar altitude suggest afternoon	No activity
	March 2019 (North)		2 persons sitting, 1 person walking across, 1 person walking dog, 1 cyclist
	September 2015 (South)	Solar altitude suggests noon	One person walking across, 1 person with a push chair
	April 2016 (South)	Children in school uniform suggests weekday	A few school children walking on the green space, 2 persons waiting at the bus stop, 1 person walking across
	April 2017 (South)	Solar altitude suggests afternoon	1 person with push chair, a few other groups of people walking around the site, a group hanging out at the benches, 1 cyclist, people waiting at the bus
	August 2017 (South)	Solar altitude suggests afternoon, but the data seems not coherent for the whole site (e.g.	People waiting at the bus, 1 person reading on a bench

	made out of several pictures from different times)	
March 2018 (South)	Not coherent coverage of the whole site	No activity except for people waiting at the bus stop
March 2019 (South)	Children in school uniform suggest weekday, only data point in which the segregated cycle track on the north side of Lea Bridge Road is fully implemented	A few people walking around, 1 person with push chair, 2 persons sitting on a bench

Objective 3: Declaration of Informed Consent

My name is Tom Schwesig and I am undertaking a study on mobility transitions and spatial justice as part of the completion of the MPlan City Planning postgraduate degree at University College London. The results of my research will be used towards academic purposes only. Any information provided by interview partners will be anonymized and treated in utmost confidentiality. You have been selected to be an interview partner.

Your participation in this research is voluntary. You may refuse to participate, discontinue participation, or skip any questions you do not wish to answer at any time without any penalty or loss. Only I, Tom Schwesig, will have access to the research results associated with your identity. In the event of publication of this research, no personal identifying information will be disclosed.

May I kindly request you to sign this Consent Form and participate in the interview.

I hereby certify that I have read and understood the contents of this form and agree to participate in this study.

Name of Interviewee: Name of Researcher: Tom Schwesig

Signature: Signature:

Date:

Objective 3: Interview Protocol

Interviewer: Tom Schwesig
Interviewee:
Date/Time:
Duration
Media used:

Checklist

- o Declaration of Informed Consent Signed
- o Asked whether I can record the interview for the purpose of transcription

0:
- Short Introduction of the research project and the topics that will be discussed.
    - o **Framing of research**: Mobility transitions and the relation between space and society
    - o **Research objective**: Looking at spatial built environment interventions and spatial justice
    - o **Methodology**:
        - ▪ Mapping of Interventions via Satellite Imagery
        - ▪ Observing Uses – Google Street View as alternative to on-site observation
        - ▪ Interviews with planners, various community groups, council representatives
    - o **Case Study**: Waltham Forest Mini-Holland Scheme, Walthamstow Village Interventions in particular

Interview is semi-structured which means that I have prepared some questions but leave it flexible to re-act to your answers and have more of an informal conversation

Questions:

- What is your position in relation to the WF Mini-Holland scheme?
    - o Profession/Affiliation?
    - o Are you a local resident?

A: Built Environment Intervention

1. In your opinion, which are the key built environment interventions that make an area bicycle friendly?

    - More concretely what are the built environment interventions that make WF Mini-Holland scheme such?

2. It seems that there is a cycling interventions is not only relevant for cycling but also has an impact on driving and maybe even on pedestrian?

B: Use of Road Space

The Mini-Holland Scheme claims to "benefit the whole community, not just the ones you cycle"

3. Would you say that the built environment interventions in Walthamstow Village have changed how public space and street space is used?
   - In the everyday lives of residents and the different transport modes

4. Have these built environment interventions fostered a diversity of uses or do you also see an exclusion of certain uses/activities?

C: Concerns of Various User Groups

Evidently, the built environment interventions of Mini-Holland have been contentious with groups from various perspectives opposing or supporting the scheme.

5. In your opinion what were the most controversial issues that were at the heart of the Mini-Holland scheme contentions?

6. Who were the various groups involved and what were the members' characteristics?

7. Why did these groups take the stance towards Mini-Holland that they did?

8. What were concrete aspects of the built environment that people were concerned about?

9. Can you please comment on the participation process. Do you feel that all concerns and opinions have been addressed?

Objective 3: Section of Interview Protocol WFCC

The raw interview data was analysed with thematic framework analysis according to the dimensions of Mobility Space. Highlighted Statements refer to either dimension: conceived (red), perceived (yellow), lived (blue).

84   **One aspect that I have noticed while researching about it, is that those intervention that are**
85   **often called cycling interventions are not only relevant for cycling as such but also have an**
86   **impact on motorized traffic, have an impact on pedestrians in a way and also on public space.**
87   **This is something that I found quite interesting that it is not only relevant for cycling.**
88
89   No, and indeed in contrast to the other Mini-Holland programs in Enfield and Kingston, here were
90   absolutely insisted that is was seen as an active travel program. The other two schemes in London
91   were cycling initiatives, this one we pushed really hard to make it walking and cycling, simply
92   because we are trying to reduce the amount of bikelash, we got from the public. The cycling levels
93   here vary between 3 and 5 % or did before the scheme started and most residents would just say:
94   'We are you spending so much on the small proportion of people who ride bikes'. By including
95   walking which obviously most people do, I think it helped people see the benefits because we
96   actually were providing good facilities for people on foot as well. I guess what I haven't said is
97   there have been also a number of improvements around the periphery of Walthamstow Village
98   in terms of walking and cycling crossings of those major bounding roads to improve the
99   permeability there to the adjacent low-traffic cells.
100
101 **Would you say that the street space, the public space and how those are used has this changed**
102 **in a way since the implementation?**
103
104 I am mentioned two or three different streets, so Orford Road is the obvious one, because that
105 had through traffic taking out 12 hours a day, that's got a time filter 10 am till 10 pm. And people
106 use that space very differently. I mean people walk all over the road as a matter of course. Kids
107 scoot in it. You see people with wheelchairs. All the cafés and restaurants until Covid started,
108 been out on the footways eating drinking. It really has a café culture, quite a continental feel
109 really, something which we are not used to see in the UK. Certainly, the Orford Road which is a
110 local shopping street has seen huge changes because you just naturally get people wandering all
111 across it, very relaxed conversations, things like that. The street that I live in, Eden Road, just
112 around the corner, because the footway is very narrow and there is a lot of car parking, most
113 people tend to walk in the middle of the road now rather than use the pavements. So that again
114 is quite an extraordinary change, you would have never seen that before, it used to be a one-way
115 rat-run. People are much more comfortable, very relaxed about walking down in the middle of
116 the road with their kids, because it is safe. That we just didn't used to see before. Another
117 example is, just outside of this area, a planter went in and what was interesting: a couple of
118 neighbours got together and they really plant it up beautifully, it is a showpiece. You know, you
119 close the road, you got planters, how do you plant it up to look good all year around. They have
120 done really really well. What happened was, the tress all the way up that road, suddenly people
121 started saying 'actually my tree has got a bit of earth around it, we will build a little planter box

122 around it.' So box around it, plant it up and put flowers in it and that spread all the way along that
123 road which is probably up to 200 meters long and then into all the side-roads, all the local people
124 were like: we want flowers in our tree pits and such. Then they all built these boxes either
125 themselves or you know some of the neighbours has been doing it and it spread through several
126 streets now and that all came out of that one intervention in terms of the filter, nice and planted
127 up. A couple of local people got together, really put some time into it, this looks lovely to have
128 flowers in our street, I want some outside my front door. It just grew and that is something about
129 local people owning the paved space outside their houses not just where they park the car. It is
130 actually public realm that they engage in and that is really pretty impressive

RISK ASSESSMENT FORM
FIELD / LOCATION WORK

The Approved Code of Practice - Management of Fieldwork should be referred to when completing this form
http://www.ucl.ac.uk/estates/safetynet/guidance/fieldwork/acop.pdf

DEPARTMENT/SECTION BARTLETT SCHOOL OF PLANNING
LOCATION(S) 1. LONDON, UNITED KINGDOM
2. WALTHAM FOREST TOWN CENTRE, LONDON, UNITED KINGDOM

PERSONS COVERED BY THE RISK ASSESSMENT Tom Schwesig

BRIEF DESCRIPTION OF FIELDWORK 1. Semi-structured interviews with experts from academia and public, privat and third sector 2. Intercept Survey on the impact of cycling interventions (Mini-Holland scheme) on place quality on public streets in Waltham Forest, London

Consider, in turn, each hazard (white on black). If **NO** hazard exists select **NO** and move to next hazard section.
If a hazard does exist select **YES** and assess the risks that could arise from that hazard in the risk assessment box.
Where risks are identified that are not adequately controlled they must be brought to the attention of your Departmental Management who should put temporary control measures in place or stop the work. Detail such risks in the final section.

ENVIRONMENT	The environment always represents a safety hazard. Use space below to identify and assess any risks associated with this hazard
e.g. location, climate, terrain, neighbourhood, in outside organizations, pollution, animals.	Examples of risk: adverse weather, illness, hypothermia, assault, getting lost. Is the risk high / medium / low ? 1. The interviews will most likely be conducted in a building that offers shelter from any environmental hazards. The interviews will be conducted during working hours and most likely at the interviewees workplace which provides public exposure or via skype.Thus, the risk of assault is rather low. 2. The intercept survey requires to intervene in a persons daily routine, possibly on their way home or to a workplace. To be disrupted in this routine might cause annoyance or anger with some persons. Further, the Mini-Holland scheme in Waltham Forest is the cause political controversy as some social groups (motorists and business owners) feel disadvantaged by the measures. A polite attitude and respectful approach by the researcher followed by the clear identification as one will be precaution enough not to be the target of any anger. Addtionally, relatives and acquaintances are informed when the reasearch is collecting data. Data collection will take place in open public spaces. Appropriate clothing will be worn to prevent illness. Risk will remains low.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

- ☐ work abroad incorporates Foreign Office advice
- ☐ participants have been trained and given all necessary information
- ☐ only accredited centres are used for rural field work
- ☐ participants will wear appropriate clothing and footwear for the specified environment
- ☐ trained leaders accompany the trip
- ☐ refuge is available
- ☐ work in outside organisations is subject to their having satisfactory H&S procedures in place
- ☒ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

- polite and respectful atttitude
- inform relatives when collecting data

EMERGENCIES	Where emergencies may arise use space below to identify and assess any risks
e.g. fire, accidents	Examples of risk: loss of property, loss of life

Since the survey will be conducted on the street space of the case study area, one needs to be constantly aware of the traffic. Also, when approaching a possible participant, it be in such fashion as not to disturb the person which might cause traffic related accidents.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐ participants have registered with LOCATE at http://www.fco.gov.uk/en/travel-and-living-abroad/
☐ fire fighting equipment is carried on the trip and participants know how to use it
☒ contact numbers for emergency services are known to all participants
☒ participants have means of contacting emergency services
☒ participants have been trained and given all necessary information
☐ a plan for rescue has been formulated, all parties understand the procedure
☐ the plan for rescue /emergency has a reciprocal element
☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

FIELDWORK   1   May 2010

EQUIPMENT	Is equipment used?	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. clothing, outboard motors.	Examples of risk: inappropriate, failure, insufficient training to use or repair, injury. Is the risk high / medium / low ?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk

☐ the departmental written Arrangement for equipment is followed
☐ participants have been provided with any necessary equipment appropriate for the work
☐ all equipment has been inspected, before issue, by a competent person
☐ all users have been advised of correct use
☐ special equipment is only issued to persons trained in its use by a competent person
☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

LONE WORKING	Is lone working a possibility?	Yes	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. alone or in isolation lone interviews.	Examples of risk: difficult to summon help. Is the risk high / medium / low?		

During the interviews as well as when performing the intercept surveys, lone work is a possibility. The risk related to assault, isolation or difficulty to summon help in case of an emergency remains low since appropriate control measures will be taken.

CONTROL MEASURES | **Indicate which procedures are in place to control the identified risk**

- ☐ the departmental written Arrangement for lone/out of hours working for field work is followed
- ☐ lone or isolated working is not allowed
- ☐ location, route and expected time of return of lone workers is logged daily before work commences
- ☐ all workers have the means of raising an alarm in the event of an emergency, e.g. phone, flare, whistle
- ☐ all workers are fully familiar with emergency procedures
- ☑ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

Interviews are either conducted in workplace or public spaces during working hours, which makes it possible to summon help. The fieldwork related to the intercept survey will take place on open public streets in residential and mix-use areas in Waltham Forest which means that the possibilty of total loniness is minimal. However, not only will relevants and aquaintances informed about the researches whereabouts but the researcher will also carry a mobile phone to summon help in case of emergency.

ILL HEALTH	**The possibility of ill health always represents a safety hazard. Use space below to identify and assess any risks associated with this Hazard.**
e.g. accident, illness, personal attack, special personal considerations or vulnerabilities.	Examples of risk: injury, asthma, allergies. Is the risk high / medium / low? NO

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

- ☐ an appropriate number of trained first-aiders and first aid kits are present on the field trip
- ☐ all participants have had the necessary inoculations/ carry appropriate prophylactics
- ☐ participants have been advised of the physical demands of the trip and are deemed to be physically suited
- ☐ participants have been adequate advice on harmful plants, animals and substances they may encounter
- ☐ participants who require medication have advised the leader of this and carry sufficient medication for their needs
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

TRANSPORT	**Will transport be required**	**NO** ☐	**Move to next hazard**
		YES ✔	**Use space below to identify and assess any risks**
e.g. hired vehicles	Examples of risk: accidents arising from lack of maintenance, suitability or training Is the risk high / medium / low? no		

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

- ☑ only public transport will be used
- ☐ the vehicle will be hired from a reputable supplier
- ☐ transport must be properly maintained in compliance with relevant national regulations
- ☐ drivers comply with UCL Policy on Drivers http://www.ucl.ac.uk/hr/docs/college_drivers.php
- ☐ drivers have been trained and hold the appropriate licence
- ☐ there will be more than one driver to prevent driver/operator fatigue, and there will be adequate rest periods
- ☐ sufficient spare parts carried to meet foreseeable emergencies
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

DEALING WITH THE PUBLIC	**Will people be dealing with public**	**Yes**	**If 'No' move to next hazard**
			If 'Yes' use space below to identify and assess any risks
e.g. interviews, observing	Examples of risk: personal attack, causing offence, being misinterpreted. Is the risk high / medium / low?		
	The intercept survey requires to intervene in a persons daily routine, possibly on their way home or to a workplace. To be disrupted in this routine might cause annoyance or anger in some persons. Further, the Mini-Holland scheme in Waltham Forest is the cause political controversy as some social groups (motorists and business owners) feel disadvantaged by the measures. A polite attitude and respectful approach by the researcher followed by the clear identification as one will be precaution enough not to be the target of any anger. Addtionally, relatives and acquaintances are informed when the reasearch is collecting data. Data collection will take place in open public spaces. Risk of asault is low		

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

- ☒ all participants are trained in interviewing techniques
- ☐ interviews are contracted out to a third party
- ☐ advice and support from local groups has been sought
- ☒ participants do not wear clothes that might cause offence or attract unwanted attention
- ☒ interviews are conducted at neutral locations or where neither party could be at risk

☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

WORKING ON OR NEAR WATER	**Will people work on or near water?**	**No**	**If 'No' move to next hazard** **If 'Yes' use space below to identify and assess any risks**
e.g. rivers, marshland, sea.	Examples of risk: drowning, malaria, hepatitis A, parasites. Is the risk high / medium / low?		

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

☐ lone working on or near water will not be allowed
☐ coastguard information is understood; all work takes place outside those times when tides could prove a threat
☐ all participants are competent swimmers
☐ participants always wear adequate protective equipment, e.g. buoyancy aids, wellingtons
☐ boat is operated by a competent person
☐ all boats are equipped with an alternative means of propulsion e.g. oars
☐ participants have received any appropriate inoculations
☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

MANUAL HANDLING (MH)	**Do MH activities take place?**	**No**	**If 'No' move to next hazard** **If 'Yes' use space below to identify and assess any risks**
e.g. lifting, carrying, moving large or heavy equipment, physical unsuitability for the task.	Examples of risk: strain, cuts, broken bones. Is the risk high / medium / low?		

CONTROL MEASURES	**Indicate which procedures are in place to control the identified risk**

☐ the departmental written Arrangement for MH is followed
☐ the supervisor has attended a MH risk assessment course
☐ all tasks are within reasonable limits, persons physically unsuited to the MH task are prohibited from such activities
☐ all persons performing MH tasks are adequately trained
☐ equipment components will be assembled on site
☐ any MH task outside the competence of staff will be done by contractors
☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

SUBSTANCES	Will participants work with substances	No	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. plants, chemical, biohazard, waste	Examples of risk: ill health - poisoning, infection, illness, burns, cuts. Is the risk high / medium / low?		

CONTROL MEASURES   Indicate which procedures are in place to control the identified risk

- ☐ the departmental written Arrangements for dealing with hazardous substances and waste are followed
- ☐ all participants are given information, training and protective equipment for hazardous substances they may encounter
- ☐ participants who have allergies have advised the leader of this and carry sufficient medication for their needs
- ☐ waste is disposed of in a responsible manner
- ☐ suitable containers are provided for hazardous waste
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

OTHER HAZARDS	Have you identified any other hazards?	No	If 'No' move to next section If 'Yes' use space below to identify and assess any risks
i.e. any other hazards must be noted and assessed here.	Hazard: Risk: is the risk		

CONTROL MEASURES   Give details of control measures in place to control the identified risks

Have you identified any risks that are not adequately controlled?	NO ☒ YES ☐	Move to Declaration Use space below to identify the risk and what action was taken

Is this project subject to the UCL requirements on the ethics of Non-NHS Human Research?	No

If yes, please state your Project ID Number [ ]

For more information, please refer to: **http://ethics.grad.ucl.ac.uk/**

| DECLARATION	The work will be reassessed whenever there is a significant change and at least annually. Those participating in the work have read the assessment.

Select the appropriate statement:

- ☒ I the undersigned have assessed the activity and associated risks and declare that there is no significant residual risk
- ☐ I the undersigned have assessed the activity and associated risks and declare that the risk will be controlled by the method(s) listed above

NAME OF SUPERVISOR Dr Pablo Sendra

SIGNATURE OF SUPERVISOR   DATE   26.08.2019
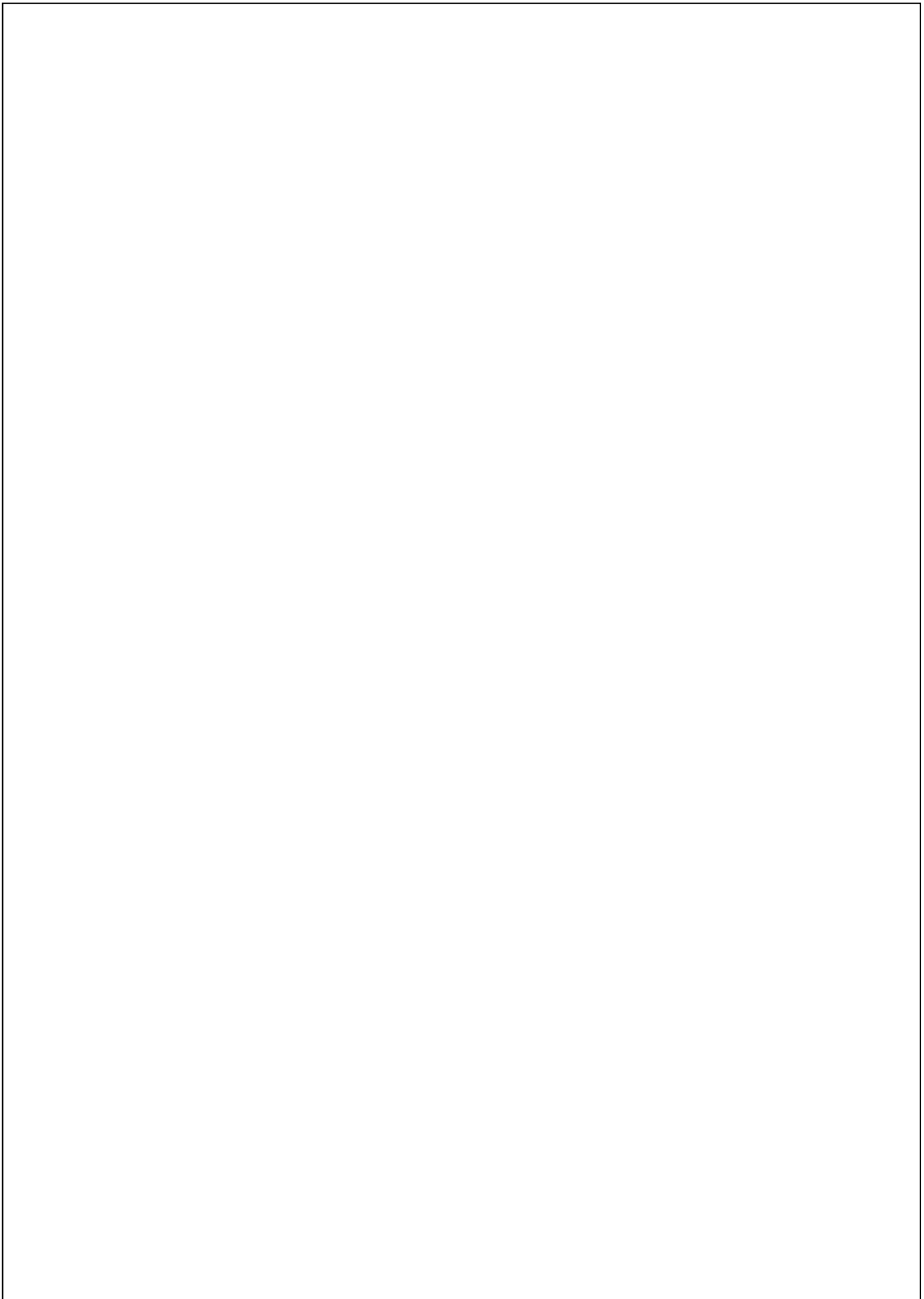
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FINAL GRADE

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GENERAL COMMENTS

Instructor

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