AUTOMATING THE LAST MILE ?

REFRAMING MOBILITY NARRATIVES THROUGH COLLABORATIVE DESIGN ETHNOGRAPHY

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Introduction

Industry, consultancy and policy agendas regarding automated mobilities typically focus on creating and applying technological solutions to perceived social or societal problems. One such 'problem', to which solutions are currently sought, is that of the *first and last mile challenge*. The concept of the last mile was originally used to refer to the final segment of freight transport journeys, and has recently gained traction in the field of passenger mobility, where it is used specifically to refer to gaps in transit coverage at the very beginning and end of commuter travel. First mile "solutions" are often constructed on the basis of an assumption that people use private cars to cover this part of their journey because they have no public transport options, or incentives to use public transport when it is available. Thus, within urban planning and transportation research it is suggested that improving access to transit networks or shared mobility options could have the potential to reduce individual private car use, and enable a shift towards to shared and connected mobility. Automated micromobility and autonomous vehicles (AVs) "solutions" have been examined extensively with reference to first and last mile mobilities for (sub)urban passenger journeys. However, this vision of technologies and digital platforms as solution is not only naïve in its technological-determinism. It is also limited in its assumption that commuter mobilities are linear, constrained to specific spatialities and temporalities and uncomplicated. It implies that commuters are able bodied, independent, digitally connected and affluent, and corresponds with the notion of the young middle-class professional male; a rational actor who responds to industry and policy stimuli as intended (Strengers 2013). First/last mile solutions tend to be designed as individual, service-based, and on-demand. They as such frequently fail to account for those mobilities that tend to be the most challenging or for the actual purpose and meanings of everyday mobilities. In these dominant narratives it is moreover unclear what the first/last mile *is* both spatially and temporally.

In this paper, we argue that we need to shift the agenda, and to understand the first and last mile beyond their status as a societal problem searching for a technological solution. Ontologically we need to know what, where, how and when it would exist, and how it would be experienced; methodologically we need methods to discover it; and ethnographically we need to understand how it is constituted experientially, conceptually, spatially and temporally, by those who are active in it. To achieve this, we draw on ethnographic fieldwork into the spatial and temporal circumstances of the beginnings and ends of people's journeys in two distinct suburban neighbourhoods in Sweden. On the basis of our analysis, we contest the notion of the first/last mile challenge and the proposal that shared AVs or micromobility platforms will solve it. Instead, we recommend that technological mobility solutions are designed with attention to the everyday mobilities of diverse groups of real people and the spatialities and temporalities of their localities.

Automating the last mile ?

Automated vehicles, shared mobility and mobility as a service have frequently been proposed as 'solutions' to the particular version of the 'last mile problem' as it is portrayed for lower density or peripheral suburban areas (Legacy et al., 2019; Maginn et al., 2018; Ohnemus & Perl, 2016; Shaheen & Chan, 2016). Effectively this means that universalised automated technology solutions are being

proposed on the basis of unsubstantiated assumptions about how people engage with the everyday spatialities and temporalities of their departure and destination sites. In this section we first outline current approaches to the first and last mile, as a 'challenge' to be solved, before identifying a series of critical issues concerning this dominant conceptualisation.

Solving the first and last mile challenge is frequently presented as a key factor in encouraging transit use and in compensating gaps in transit coverage (Gurumurthy et al., 2020). From a technologically driven perspective, it is believed that bad connections from public transport nodes to people's homes are the main reason for people's preference of the privately owned automobile (Curtis Lesh, 2013; Shaheen & Chan, 2016; Mohiuddin, 2021; Lu et al., 2021). This vision of first and last mile passenger mobilities as a problem/challenge has been accompanied by large transport companies aiming to position themselves as multimodal door to door service providers (Bonneville, 2018). In turn, manufacturers have started investing in the idea of Mobility as a Service and mobility on demand platforms, 'shared' mobility and automated vehicles and micromobility technologies.

Shared mobility solutions have tended to be prioritised in the quest toto "address first- and last-mile connectivity with public transit, extend the catchment area of public transportation", and encourage "multimodality for first- and last-mile trips rather than driving alone". On-demand shared mobility services are regarded as a more flexible alternative to "costly feeder bus services and land-intensive parking infrastructure" (Shaheen & Chan, 2016). While these solutions include less investment-intensive and more time-proven practices such as peer-to-peer ridesharing (Shaheen & Chan, 2016), a particular focus has been placed on autonomous vehicles. Beyond aspiring to provide access for elderly, low-income, and non-drivers, shared autonomous vehicles (SAV) are said to ensure the first and last mile of trips in low-density areas by integrating with public transport (Ohnemus & Perl, 2016). Overall, debates involving the last mile "challenge have been largely focused on motorized vehicles, autonomous and networked cars. However, some researchers have argued that we need to consider alternatives such as cycling (Behrendt, 2020) as well as first and last mile practices and projections that do not necessarily involve connectivity and data mobilities.

Technologically driven first and last mile 'solutions' have in common a particular form of technological solutionism (Morozov 2013) which assumes that the societal problem is that people use private cars to drive the first and last mile because they have not been provided with more sustainable, efficient alternatives. Yet in taking this view they fail to account for the diverse ways in which people really travel their first and last miles, or what these journey segments mean to them. For example, that passengers will prioritise elements of convenience and combined activities over simple time efficiency and modal choices; preferring longer transits with fewer changes in order to allow for comfort or in-transit activities (Kaufmann 2013). Moreover, while the first and last mile "challenge" is frequently presented as a homogeneous or technical issue, we need to account for diverse experiences of these journey segments both in different cultures, contexts and spaces. Research has shown that diverse travellers even experience and practice them differently in the same locality (Hickman & Vecia, 2016), and discourses and narratives about them vary accordingly. The very concept of the last mile is closely associated with dominant figures of the mobile individual, most notably affluent and able-bodied male white-collar commuters executing regular to- and from work travels, while research shows that, for example, men and women tend to not have the same relationship to mobility temporalities and spaces; and that vehicles for emancipation may very well become vehicles for the extension of (unequally distributed) domestic work (Demoli & Gilow, 2019; Gilow, 2020). It is therefore crucial to gain locally grounded, in-depth understandings of traveller practices, experiences and (shared) representations rather than assuming that new technologies can be applied to solve a common problem.

In this article, we argue that these questions of everyday practice, accessibility, diversity and inequality need to be unpacked. Drawing on our own in-depth ethnographic field work, we demonstrate how first and last mile experiences and practices play out in real everyday circumstances, the contingencies that shape them, and the meanings associated with them. The insights from our analysis of these everyday mobilities contest and question the assumptions underpinning dominant technological solutionist understandings of both the first and last mile themselves and the supposed challenges they present.

The case of Area B

The fieldwork site

Our fieldwork was carried out in the suburbs of one of the larger cities in Sweden, in hilly semi-rural area, where clusters of residential housing are stitched together along a main road that connects the areas among each other and to the city. The specific topography, as well as infrastructure and public service availability make this a particularly compelling case to study in the context of mobility transitions.

First and last mile suburban spaces have been seen as suitable laboratories for sustainable change (Loubié, 2019), among other things due to their complex environments, low public transport offerings, and often monomodal, car centred mobility. Suburban spaces in general, and our fieldwork sites in particular, are also uniquely suited as laboratories for mobilities research due to their explicitly changing nature. Not only are such peripheral spaces currently undergoing profound changes (in terms of demographic composition, spatial organisation and built environment), but the meaning and implications of suburban and peripheral spaces themselves questioned by these transformations. For instance, in processes of rural gentrification and continued suburban growth, agricultural spaces are becoming commuter territory, while at the same time rural territory is being reinvested not as a periphery to the city, but also as place of activity, as a source of revenue and a basis for more sustainable lifestyle.

In Area B, a rural area 15-25km from the city centre, where former summer houses had previously been transformed into permanent residences, new, dense housing development is challenging the existing infrastructure and demographic makeup of the area. Area B can be described as part of a *"middle-class countryside within the urban shadow":* high education levels, a large share of the population working in qualified sectors; and an important part of the working population commuting to the urban centre (Hedlund, 2016). At the same time, residents and local organisations are turning their attention to developing local activities and small-scale organic farming, adventure tourism and local food production are being developed. Lined on two sides by a nature reserve, lakes and wooded hills, the remaining fields and meadows are punctuated with horse stables and more isolated housing.

Methods

To undertake our research, we developed a design ethnography (Pink et al 2022; (Fors et al., 2021)) methodology, which specifically sought to reflect on the first and last mile concepts in relation to real everyday life experience, by investigating how people living in a specific locality navigated, experienced and constituted the spatialities and temporalities associated with the first and last mile in dominant narratives. A total of 20 participants were recruited using a snowball method, working through local neighbourhood organisations, and holding recruitment events outside the local supermarket. Participants were aged between 14 to 77 and living in variable household compositions, however, the majority of the participants were working parents of school-aged children. This reflects the importance of family logistics in local mobility and provided the opportunity to interview several members of the

same family in some cases. Most participants lived in detached or semi-detached houses with at least one car, the majority having more than one car per household.

In order to investigate and participate in how people actually engage in and experience first and last mile mobilities under the restrictions of the COVID-19 pandemic, we combined individual online interviews with on-site visual ethnography. In our online in-depth interviews, we focused on participants' biographical narratives, residential trajectories, perceptions of their neighbourhood and existing mobility and sharing practices that inform their everyday mobilities. These interviews provided insight into about participants' daily mobilities, their motivations and social context for modal choice as well as their representations of different forms of (future) mobility.

These elements were further investigated thanks to an innovative new research method we developed during this project to explore participants' practices in more depth: the two-care drive-along (Brodersen et al., forthcoming). There are several existing iterations of the drive-along method, including the 'in-car video ethnography' method (Pink et al., 2019), and the use of video-cameras installed inside cars (Laurier 2011). Our method instead involved participants driving their own cars while two researchers – Meike Brodersen and Kaspar Raats - followed them in a second car. Participants chose the starting point for these drive-alongs and guided the researchers through the area; they determined their routes in relation to relevant places and roads identified through a set of initial questions. While driving, participants and researchers communicated via mobile phone and the whole encounter was both video- and audio recorded. In a neighbourhood which is too dispersed to be walkable and where car travel is the dominant practice, the two-car-drive-along technique produced a situation where participants are invited to identify and string together the places and routes most important to (their) mobility in their area. Guiding a second car in convoy invites participants to make decisions about relevant places and questions and to make explicit self-evident practices and embodied knowledge about the place. This enabled the researchers to learn about the layout and local meanings of the area and how existing and imagined mobility decision-making practices were embedded in the socio-spatial context.

Situating the "First and Last Mile"

In this section, we draw on our ethnographic findings to demonstrate three key points: how the first and last mile are experienced and navigated by our participants; how the first and last mile space is constituted; and what we can alternatively learn by focusing on the temporality of the first and last mile. First, by showing how participants solve everyday mobilities, we complicate the notion that dominant car travel and ownership compensate for first and last mile access. Then we successively question the first and last mile as a unit of space and of time by exploring how participants' mobilities unfolds at the beginning and end of their journeys in and out of the area.

Living in Area B – complicating automobilities

Most of the participating households in Area B rely on two or more cars – privately owned or company cars, often a combination of the two – to ensure their everyday mobilities. In their neighbourhoods, using several cars per household for – at first glance - monomodal car travel, appears to be the norm. While this is in part explained by ease, flexibility and greater comfort, the motivations, rationales, and actual practices as they relate to car ownership, automobility and mobile routines are a lot more complex.

In participants' narratives, having several cars at their disposal appears as a necessity deriving from ordinary family logistics much rather than serving a function of representation. Indeed, the costs – both financial and otherwise – of (multiple) car ownership is put forward by multiple participants much

more than the value of car ownership. Gemma (49), for example, who lives in the area with her husband and two pre-adolescent children, has experimented with having one car or even no car at all while living in the area. As for many other participants, having a connection to the public transport system was initially a key factor in choosing their house when they moved to the area from out of town several years ago. They are reluctantly leasing a second vehicle in addition to her company car that to help solve their "puzzle" of everyday family logistics, but Gemma and her husband would much rather avoid the complications and responsibilities that come with car ownership altogether. As is the case for Gemma, who went through stages of having no car to one to needing several, the central justification for multiple car ownership is the necessity to drive children and other dependent persons to different destination, most especially extracurricular activities both inside and outside the area to the extent that parents claim that if it weren't for driving the children, they could manage without their second car or without a car.

However, the many trips that are made entirely with private cars actually often combine diverse activities and journeys. Some of these combined mobilities serve to solve family logistics (transporting pets and various family members on the same trip), while others function to combine different tasks and destinations. In either case, combining different objectives is brought forward as an argument for the car as a single transport mode. This is the case for Rolf or Per who like to keep the option of going to the gym on their way home from work or Simon's mother, who drops off her son at school on her way to taking the dog to day care, or Felix who stops at the small supermarket on the main road on his way back from work. Gemma picks up parcels at the local gas station on the way to the football field or when she does the shopping on her way home from work. All of them map routes throughout the surrounding space based on various layers of activity, guided by the imperative of stitching together destinations, needs and imperatives. Travelling by car is a way of adjusting for the demands of different household members but also to account for the serendipity of moving through space.

Moreover, even households with several cars do actually mobilise a number of creative and adaptive multi-modalities to "solve the everyday puzzle" and to cope with the changing challenges of daily routines, seasons and environments. Residents use commuter parking spaces, but also more informal and less infrastructure-driven hubs for their coordination. Antonia (42), who lives in a more remote place outside the dense housing clusters and further from the main road, drives her kids to school and drops off their bikes on the way down at the bus stop on days where they finish early so they can take a tram and bus back and cycle the last 3 km from the bus stop home along a dirt road. In the winter, she prefers to coordinate with her husband to either pick up the kids at school or at the bus stop. These specific combinations of multimodality, coordination and adaptation serve to fit various objectives and constraints and can be part of collaboration within families and communities. Amanda (42) drops off her daughter's team-mates at the bus stop after practice so they can walk or bike home from there, but when it is dark, she tends to drive them all the way to their door. Felix (44) used to drop off his sons at daycare and bus stop on his way to work, then his older son would pick up his little brother when walking home from the bus stop after school. Besides these combinations, participants also realised a number of their journeys without using their car, sometimes combining several other modes of transportation.

As these examples suggest, the linear journey modelled on home-to-work commuter travel does not reflect the way mobility was understood, experienced or performed by participants in our research. Their journeys were overwhelmingly combined activities that were not limited to a single point to point commuter journey that would take them outside the area. The journeys participants invested the most effort and planning into were multiple short drives within the same area or the surrounding boroughs. The actual characteristics of this space, its material qualities and meanings, influence the way

mobilities are organised and conceived of and works to complicate the notion of the first and last mile itself.

The spatiality of the first and last mile

What space counts as the first or last mile and what do we find there? In Area B, the most immediate surroundings encompass spaces far surpassing the literal mile or kilometre; and although the area is connected to the urban public transport system via an express bus route, the nearest bus stop may be more that 5km away. The way to the main road may often be up a steep uphill and winding road with little pedestrian space and low visibility. Sparingly lit and often unpaved, some of these streets require more intimate informal knowledge and are more forbidding in winter than in summer. This recalcitrant space makes micro-mobilities challenging and more unlikely, it resists the idea of the last mile in its scope and the commonly proposed solutions for it in its quality; sticks and stones become actors of local mobility. This also means that single mode transport or multi-car ownership are often motivated by a concrete lack in infrastructure and constraints posed by the built environment. This is the case for Pernilla (42), who lives along a busy road about 4km from the nearest school that she deems too dangerous for her children to bike or walk along by themselves, given that there is no cycle or pedestrian path, little to no lighting and utility vehicles driving at high speeds. Having to drive her children to school as a consequence also means that she is unable to take the bike and bus to work as she would prefer to do: "… *if I could take the bicycle every day and the children could go ...on their own to school, maybe we could have only one car. If … we had a bicycle path all to Olofstorp and to Lerum I could say we could manage with one car*".

While a lack of transit options and public policy, unsurprisingly, partially explain single mode transport and multiple car households, the reasons for these transport choices are more complex. The organisation of the transit system itself following a centralised hub and spokes model also contributes:

> *You can't really go with the tram horizontally or across, you can go towards the city centre [and back out]… it takes me maybe 20 minutes with the car, if I take the bus and trams it will take me maybe 50 minutes. (Antonia)*

The particularities of local space and its recalcitrant nature are also a reason why residents anticipate automation to be difficult and doubt the viability of a systematic, ubiquitous AV system:

> *I just have a hard time seeing how self-driving cars would work in real life. I would want to know the technology behind, how it works if unpredictable things happen around the car. And if you would go on a tiny road, like the last two kilometres to the Lake where I like to go… it's looking out for animals, since it's in the forest. And then also driving up the steep hills with the tiny stones in the ground I need to make sure that I can drive up safely, and not having the car getting out of my control and sliding down the hill again. (Emma, 20)*

The way participants anticipate friction (Tsing 2005) in implementing AVs in relation to the material specificities of their local environment also significantly underlines the value that is placed on locally situated mobility competence and learned ways of inhabiting local space. Appropriating the layout of local roads, developing knowledge about minute difficulties and informal solutions, navigating the routines and language of sharing these spaces with other users, is part of inhabiting the area – of belonging. During the two-car drive-alongs, these elements are an integral part of the way participants guide researchers through the area; while driving, they anticipate narrow spaces and give instructions on how to let other drivers pass, they anticipate a change in road surface or an upcoming interruption in mobile networks. The value placed on this intimate and incorporated knowledge – beyond the

classical acceptance of "motility" (Kaufmann et al., 2004) – is not replaceable through automation and delegation of the driving.

Moreover, details shared about the material qualities of local space indicate real difficulties in imagining the implementation of AVs – some roadblocks and one-way streets in the area are not indicated on any map; shortcuts and alternative routes accessible through micro mobility are poorly recorded and represented. Gravel roads, potholes, sharp turns and abundant vegetation do not seem to lend themselves particularly well to automation, while also confirming participants' perception that their area appears as a second zone to urban development and infrastructure.

Other than providing friction, the immediate radius around participants' places of residence (be it a mile or 10km) is also dense with social relations, activities, and meanings. The area concentrates connected short distance travels to key destinations that reflect part of the ways in which residents are engaged in local space. Having day-care and schooling options close by allows for more autonomous mobility for children and combined mobilities but also invest the immediate surroundings with meaning and social networks. In some close-knit housing clusters, children can roam more freely, parents give accounts of the ideal image of children knocking on each other's' doors to play. The immediate environment will contain "favourite places" which are not always the most frequent destinations but carry special value. In Area H, residents will choose to walk in order to stop and talk to neighbours all along the way. The last mile contains the large portions of residents' everyday life and their main destinations.

Rather than leaving the area efficiently, there is a demand for a quality of place within the local area that would allow make a lot of travels redundant and allow for more meaningful interactions within the space. Having access to shopping, entertainment and meeting places locally is mentioned as a priority by participants in Area B in contrast with ideas of leaving the area more efficiently, in an area that in an area that feels like it has not much of a centre.

Making local life more attractive often appears as a higher priority than improving transport options for those who already have the resources to ensure and maintain their mobility despite difficulties (see Ollivro 2005) and critical for those who do not. The demands formulated with regards to the quality of local space are closely related to the way residents perceive the governing of mobilities and infrastructure, in particular the idea that the area is relegated to a second zone and marginalised in some way either in public investment, infrastructure development or public perception:

> *The area is actually less prioritised compared to other parts of the city. The investments and keeping things in order is less prioritised by the city department that should keep track of that, it's the western parts they're more spending money and time. Which is the richest area… (Hans, 52)*

The temporality of the first and last mile

Alternatively, rather than the literal space within the first and last kilometre of each journey, these ends and beginnings could be conceived of as time that starts and concludes these journeys. Questioning the pertinence of last mile time by exploring what participants do within these times, how they define and delimit them, offers a new insight into the highly differentiated ways in which mobilities are negotiated and imbued with meaning.

For instance, the time that begins and concludes everyday journeys can be perceived as valuable time which, other than the cost of getting from A to B, is invested with multiple activities and serves a number of other functions. Amanda (41) works as a teacher in a school not far from the city centre. She lives with her husband, four adolescent children and an infant in a house they built in a recently

expanded housing cluster on top of a hill. When she travels to work, she takes the express bus to the urban hub closest to her work and then, instead of taking the tram that would take her almost destination, walks the last stretch up a slight slope towards school, repeating the same on her way back. To her, this time on the move works as a decompression chamber, as a space in which to transition between different social times, between private and professional life. It functions as a way to fit some exercise into her day and to wake up and wind down. This is where she can listen to podcasts and to reflect and anticipate. It is also, incidentally, the only time Amanda is alone.

Rather than optimising the speed and efficiency with which she reaches her destination, Amanda intentionally builds a time space into her day that, as well as being mobile, is valuable in itself. This resonates with previous literature on the use of mobile times (Bissell, 2010), and qualitative dimensions of mobility determining the preference of routes and modal choice rather than efficiency. This questions the idea of the last mile as "challenge" to overcome and repositions the beginnings and endings of journeys as part of a larger time ecology.

Amanda's ritual of working also reflects the value attributed by participants to the exercise and activity that is assimilated with active mobilities. Health and the joy of physical activity influence the perception of modal choice, routes and the experience of everyday mobilities, often more so than considerations of efficiency and optimisation. This particularly applies to children's mobilities, where encouraging exercise and autonomy becomes an essential part of parenting and is mentioned as a reason for favouring cycling and walking, for expressing guilt or regret of single mode car travel but also as a reason to express doubts about the use of automated, motorised, on demand mobility services. During interviews and workshops, participants conceded that while access to a vehicle for their children might carry advantages in terms of efficiency of family logistics but did not necessarily correspond to their desires and wishes for their children's mobilities. Felix insists that rather than having on automated on-demand service take his children wherever they need to go, he "*would prefer that my kids are walking, that they are moving and they take the bike […]*".

Not only do these types of mobilities carry value – they also question the idea of the "last mile" as travel time and effort to be eliminated. But Felix' concerns about his children's activity also reflect an element that is key to modal choice, vehicle ownership and the meaning of mobilities in the area: the way parenting is conceived of in relation to mobility. In fact, although ferrying children to activities is mentioned as one of the main reasons for multiple car ownership in interviews and participants in workshops claim that being relieved of this duty would be a priority for them to improve their daily mobility routines, driving children is an elemental part of parenting in AREA B. While there are diverging perceptions about whether the time spent together in the car can be defined as "quality time", providing mobility is a way of participating not only in children's lives but also in the local community. In Area B, this is linked to the way life cycles and residential trajectories/mobilities are connected. In an area with strong demographic changes and turnover, where most people move in from elsewhere to acquire property (or, in the case of Area H, where people settle as part of migratory trajectories), children are a key factor of integration and people with very young or adult children sense the difference. Hans, whose children are grown, notices that he is longer as integrated in the neighbourhood as he was, while Paul, whose son is not yet in pre-school, says he has little to no activities in the area.

As a key part of sociality in the area, driving the children also concentrates the preeminent established practices of sharing. While "sharing" services are frequently proposed as solutions to closing gaps in transport systems, varied and complex sharing practices are already established within the area, and that these are inextricably intertwined with relationships and identities within groups, organisations and family networks. While these sharing practices might be extensible, the group of people with

whom participle are willing to share is not limitless and anonymous; open and commercial sharing networks are unlikely to appropriately replace existing sharing practices that are embedded in meaningful relationships which they help to consolidate. Most sharing concerns sharing the task of driving children or otherwise dependant people. Like driving itself, sharing the driving task appears as a part of parenting, but it also functions as a way of *performing parenthood*. Beyond this performative quality of mobility (potential), owning a car means being able to provide part of a common effort and, by extension, of relevant local groups. Amanda shares the driving to track and field practice with other parents on the team:

> *We have a super text group - often the night before, I write "I will drive to the practise tomorrow, I will pick up at that time at petrol station" and then the other parents write "yeah he will go with you". There's not the problem that no one wants to drive it's the other way around, so it's a good group, everybody wants to help out.*

More generally, times around the end points of mobility become extensible when integrated into wider sets of activities and relationships. When the act of driving equates of acts of caring, as is the case with driving children and other dependent persons, the functional efficiency of point-to-point mobility easily becomes secondary; when the surrounding area is densely invested with different practices and combined mobilities, the last mile or end stretch of a journey as a time period loses its relevance.

Mobility and the frictions assimilated with it also extend largely beyond the actual travel time in a much more general sense. A substantial part of making mobilities possible lies in the time that is spent preparing and coordinating these mobilities, not only in the context of shared driving, but as part of everyday mobilities. Coordination and anticipation are a large part of maintaining both individual and collective mobility potential and the weight of this effort is usually not equally distributed within and among households. Situating the *production of mobilities* at the individual level by extension implies locating the coordination effort primarily in the household, which reproduces existing inequalities related to this skewed distribution. Among other dimensions, this has a distinctly gendered effect (Gilow 2020).

Locating the "challenge" in the modal choice for the last mile therefore fails to reflect the actual, extended space-time of mobility as well as the inequalities inherent in the work of making mobilities possible. But these times of coordination are also part of the friction that creates relationships and redefines modal choice. Coordinating mobilities – rather than solving the frictions associated with them with a generalised increase in individual single mode (auto)mobility is part of performing relevant social roles and serves to reactualise relationships, affiliations and meanings of place. This sets a clear limit to the automation of these practices, since the social dimension of local mobilities is not so readily replaced. It also reposes the question of where the 'challenges' in mobilities lie – and puts into question whether alleviating the friction of the time spent in the last miles of whether individually improving or reducing the time spent in the 'last mile' of everyday travel is the relevant question to ask. Changing the rules of this coordination might work as a way to shift mobility towards its place as part of the commons.

Conclusion

The above findings provide a reminder that the practices that fall within the realm of first and last mile passenger mobility are inherently social. The textured and complex social situations of anticipating and experiencing mobility resist the reduction to a functional problem of last mile efficiency. They also, more specifically, resist automation.

Automation works as a theme around which dominant discourse on mobilities is articulated. The idea of automating the last mile implies the idea the last mile is a challenge that is requires a solution and that the solution can be of technical, rather than organizational nature. It assumes mobility as an individual activity rather than a collectively shared practice and space of permanently recurrent negotiations. The results of the ethnography outlined above show that not only does the first and last mile as concept in passenger mobility require fundamental revision, but also the automation as a proposed solution to this supposed challenge is needs to be put into question.

Our results show that practices and perceptions of sharing mobilities are inextricable from the relationships, roles and groups that they contribute to creating and consolidating. Driving and sharing as local practices of parenting, the frictions of coordination and planning, are not limited to last mile space and time and extend beyond the reach of automation and MaaS. Similarly, the qualities and values associated with last mile space and time – investing the last mile time as personal time and moments of transition between social times, favouring the improvement of local services and meeting places, valuing the opportunity of exercise rather than striving towards greater comfort and efficiency – withstand the idea of being improved upon or replaced by automation.

On the contrary, focusing on automation draws attention away from more relevant questions that are meaningful to participants regarding their mobility. Our results indeed put into question the pertinence of automation as the central theme regarding last mile travel as other factors are more salient in participants' discourse around everyday logistics and their modal choice. Since hyperlocal infrastructure, contingencies in public service and the quality of local space all play major roles in determining modal choice and everyday logistics, automation stands the risk of adding another layer of imperfect infrastructure to an already existing mesh of physical infrastructure and mobile services. Participants do not cite a lack of information about mobility options as a key concern in their everyday mobilities; on the contrary, displaying a mastery of the different mobility systems, the particularities of local space and their interconnections appeared as source of appreciation. Our results also suggest that their ideal future imaginaries are more akin to collectively developed micro-adaptations of extant past or present public transport models than personalised automated on-demand mobilities in a MaaS setting.

However, prompting participants with the question of automation does provide the opportunity to confront diverging narratives of future mobilities. Questioning automation and prompting imaginaries about automated future mobilities works as a powerful revelator for the frictions and interstices in existing mobility practices and spaces, as well as the tensions that arise from conflicting narratives, ideals and interests in the transformation of mobilities. Rather than working towards automation as a script for the future, collaborative methods focusing on automation as an initial question expose the underlying power relations and as well as the existing and desired relational qualities inherent not only in everyday mobilities but in mobility transitions themselves.

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