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Article

Demotorization and Space: The Influence of Spatial Factors on Car-Dependency Reduction in France

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Abstract
Although car ownership continues to rise worldwide, temporary or more lasting phases of demotorization (reduction in the number of vehicles owned) are taking place at the household level. Existing studies show that the probability of demotorization increases at certain stages of the life cycle, for example, associated with a reduction in household size or income, or a move to a neighborhood with better transit provision. However, the rationale and temporalities of the decision-making processes involved remain obscure. This knowledge could be useful in informing public action on the measures needed in different categories of territories and populations to encourage a steady and sustainable fall in car ownership. As its contribution to these questions, this article focuses on the influence of spatial factors on household demotorization. The methodology draws on 51 interviews conducted in 2018 with demotorized households in four French urban areas (Paris, Lyon, Bordeaux, and Dijon). The findings highlight the role of the characteristics of the current place of residence, changes in the place of residence or place of work, and the spatial dimensions of travel socialization. If, as things stand, permanent and voluntary relinquishment of the car is only possible in very dense urban areas, our results show firstly that there is a strong case for working on mobility representations and practices from a very early age and, secondly, the importance of implementing planning policies and alternatives to the private car that are credible in areas of lower population density.

Keywords
car dependency; car ownership; demotorization; mobility biographies research; public policies; travel socialization

Issue
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1. Introduction

Given the scale and urgency of the challenges relating to health, energy, and the climate, the prospect of neighborhoods or even entire urban areas without cars or with significantly fewer cars is one that is beginning to be entertained by public authorities (Gao & Newman, 2018; Nieuwenhuijsen, 2020; Njeru & Kinoshita, 2019). These demotorization strategies (Aguiléra & Cacciari, 2020; Dargay et al., 2003), which aim to reduce household car ownership, are a continuation of urban policies that, for decades, have sought to diminish the use—i.e., the modal share—of the automobile (Glazebrook & Newman, 2018). They include the construction of eco-neighborhoods, annual limits on the number of new registration plates (as in Beijing), parking restriction policies, or else the development of carsharing and ridesharing services, which some hope will be facilitated by the large-scale rollout of self-driving vehicles (Le Gallic & Aguiléra, 2022).

The development of less car-dependent lifestyles seems moreover to reflect the aspirations of a growing number of citizens, in particular in industrialized countries and among younger people (Colli, 2020; Drevon

et al., 2022; Klein & Smart, 2017). The reasons are not only to do with a growing awareness of the damage cars cause to the environment, the climate, and human health. They are also about the significant—and with the current energy crisis, growing—burden the automobile places on household budgets (Curl et al., 2018), and about the stress, fatigue, and risks generated by day-to-day driving (Hagman, 2006), especially in big cities (Canzler & Knie, 2016).

Nonetheless, although car ownership seemed to level off in the early 2000s in several industrialized countries (a phenomenon termed "peak car"; see Metz, 2013), and although it is falling in some major centers in industrialized countries, globally household car ownership continues to grow in both the industrialized and emerging countries. Rising living standards, combined with profound changes to the spatial organization of populations and activities, notably urban sprawl, feed these dynamics in certain countries, whereas in others they are caused by the rising incomes of people living in urban centers (Guerra, 2015).

The growth in household car ownership is also driven by the persistence of positive representations of the car as a symbol of social distinction, comfort, and freedom. The car also continues to be an instrument of lifestyle individualization and flexibility of opportunities (Luke, 2018), especially in areas of low population density where alternative modes of transportation are in very short supply. While young people in industrialized countries are acquiring driver's licenses and buying their first vehicle later than in the past (Bayart et al., 2020), the main reasons for this are life-cycle changes, the development of urban living, and economic difficulties arising from worldwide crises, rather than a genuine break with the past.

While motorization continues to rise around the world, phases of demotorization, whether temporary or more lasting, may be observed at the household level. However, this phenomenon is not widely documented and in particular, there is a shortage of adequate data such as panel data (Aguiléra & Cacciari, 2020; Clark et al., 2016; Dargay et al., 2003). Moreover, the trends revealed by the available studies are very slight, which also contributes to explaining the low interest of researchers in the topic. In Ireland, only 2.7% of households had demotorized year on year between 1995 and 2001 (Nolan, 2010), 4.5% in Japan between 2005 and 2006 (Yamamoto, 2008), and 9.1% in the UK between 2009 and 2011 (Clark et al., 2016). According to Dargay et al. (2003), 4% of households in Germany, 5.2% in France, and 7% in the UK each year reduced the number of owned cars between the mid-1990s and the early 2000s. Moreover, demotorization is often only temporary: for example, Dargay et al. (2008) showed that in Europe, from 1994 to 2001, between 6% (in Belgium) and 16.9% (in Greece) of households had more than once made a change (either upwards or downwards) to their level of car ownership. However, no figures are available on lasting demotorization (several years), the only kind likely to be associated with real changes in mobility practices. The available literature also shows that partial demotorization, i.e., where the household retains at least one vehicle, is much more common than total demotorization (Aguiléra & Cacciari, 2020). Finally, while studies show that the probability of demotorizing increases at certain stages in the life cycle—particularly those associated with a fall in household size (e.g., divorce or a child leaving home), a loss of income, or a move to a neighborhood with better transit provision—the rationales and temporalities of the decision-making processes occurring within households that demotorize, whether voluntarily or by necessity, remain largely obscure. In particular, there is no clear explanation of why, among households experiencing "similar" conditions, for example moving from the suburbs to downtown, some dispose of a vehicle or even relinquish car ownership entirely, while others do not, or do so much later. Yet knowledge of this kind could be useful in informing public action about what measures to implement in different categories of territory and population in order to encourage a steady and lasting demotorization of our lifestyles.

For its contribution to this field, this article looks at the rationales of household demotorization (partial or total), taking France as its case study. With regard to methodology, our approach draws on the relatively recent field of mobility biographies research (MBR; Lanzendorf, 2010), which aims to understand changes in mobility practices by situating them in the long-term context of biographical trajectories and successive stages in the life cycle (Müggenburg et al., 2015; Scheiner, 2017), together with travel socialization studies (TSS), which focus specifically on the role of the (primary and secondary) stages of individual travel socialization (Baslington, 2008). These approaches postulate that the experiences, transitions, and disruptions experienced by households prompt them to reconsider and sometimes reorganize their lifestyles, including in certain cases their mobility practices. They show that changes in mobilities occur more frequently during key events in the life of households, events relating to the family sphere (birth of a child, marriage, etc.), work (redundancy, new job, change of workplace, retirement, etc.), or to the social and material environment, for example following a move to a new neighborhood more conducive to walking as a mode of travel (Clark et al., 2016; Oakil et al., 2014). TSS also emphasize the influence of lifelong mobility learning mechanisms, which contribute to shaping attitudes about modes of transportation but also individuals' perception of their capacity to alter their practices (Baslington, 2008; Underwood et al., 2014). The perceptions and meanings that individuals attach to their mobility-related decisions, and where they stand to the dominant social norms, play an important part in changes in practices (Sattlegger & Rau, 2016). Apart from the production of new theoretical and empirical knowledge, the goal of MBR and TSS is to arrive at a better understanding of the factors that influence the

transition to more sustainable practices, considering the mechanisms and temporalities that help to shape mobility preferences and habits, and identifying moments in the life cycle that are more conducive than others to the introduction of measures intended to change practices (BouMjahed & Mahmassani, 2018). However, so far this literature has paid little attention to changes in household car ownership (Aguiléra & Cacciari, 2020). Drawing on 51 face-to-face biographical interviews, this article addresses this research gap. More specifically, we address the following research question: What role do spatial factors play in household demotorization processes? Following literature review, spatial factors are investigated both as key events (such as moving home or the arrival of a new mobility service in the neighborhood) and as factors that influence travel socialization.

2. Method and Material

As part of the MODE project financed by the French National Research Agency (2016–2021), we conducted a qualitative survey through semi-structured biographical interviews with 51 people living in a (partially or totally) demotorized household. These households were chosen among the households in the Metaskope Panel (Kantar–TNS Sofres) which were participating in the Parc Auto study. The aim of this annual French study, which has been running since 1983, is to describe the various aspects of household car use, such as car ownership, car characteristics, car use practices, attitudes towards the automobile, use of different mobility services (rental, carpooling, etc.), and so on. We targeted the households in the urban areas of Bordeaux, Dijon, Lyon, and Paris that had declared a reduction in car ownership. As noted in other articles, we met households that had practised various kinds of demotorization: total (no car remaining in household) or partial (household still with a car), recent or less recent, demographic (due to changes in the household itself) or real (with no change in household structure), etc. Most of the households we met were in the totally demotorized category.

The sample contained a slight majority of women (29), people over the age of 60 (21), or people of working-class background (20). We were careful that the sample should be as diverse as possible in terms of gender, age, residential location, and occupation. While certain profiles (urban women of working-class origin in their 50s) were more common than others (few or no interviewees with militant views for or against the car), the diversity of backgrounds (spatial and social) was satisfactory. With the exception of 12 households, the people interviewed mostly lived in dense parts of the urban areas concerned. Nonetheless, an examination of their biographical histories revealed that 32 of them had, at one or more periods in their lives, lived in low-density areas (suburban or rural) characterized by high car dependency.

Face-to-face interviews were conducted in 2018 (i.e., before the Yellow Vests crisis). They lasted 60 to 180 minutes. Inspired by the MBR approach (Müggenburg et al., 2015; Rau & Manton, 2016), more specifically qualitative MBR based on a biographical and reconstructive approach (Sattlegger & Rau, 2016), or on travel socialization surveys (Baslington, 2008), the interviews were built around biographical storytelling by the interviewees about their socialization to everyday mobility and about the construction of a relationship to the car during this process, then about the process of demotorization. In order to reconstruct these narratives, the discussions focused on descriptions of the practices, social relations, and conditions that had shaped and continued to shape the interviewees' relationship to everyday spatial mobility.

The aim was to explore all the trajectories of the interviewees associated with the ownership of and relationship to the car and with their mobility practices, from childhood through to the time of the interview. While the story of their demotorization and their abandonment of the automobile was an important part of the interviews, the aim was also to situate these changes within the context of all aspects of their life experience (family, work, home location, etc.).

All the interviews were transcribed in full and analyzed thematically with respect to several themes such as life stages, key events in motorization and demotorization, or the social, material, and biographical context of everyday mobility. As several articles have already provided an in-depth analysis of our qualitative study (see Cacciari & Belton Chevallier, 2020), the present article mainly focuses on the spatial dimensions of demotorization, a theme that serendipitously appeared during the interviews as more complex than anticipated.

3. Results

3.1. Demotorization: A Heterogeneous and Complex Process

The reasons behind the demotorization of the households interviewed are diverse. The death of a partner, divorce, or a grown child leaving home are common reasons. In this, we see the role of the key events emphasized in MBR. A common occurrence is that the person quitting the household takes a vehicle. For households with multiple vehicles, this does not entail immediate changes in travel practices. On the other hand, in cases where the departing person was the only one able to drive, demotorization has more significant consequences, particularly when the departure is unexpected.

Beyond these events associated with changes in household structure, demotorization is linked with giving up of another kind, this time driving itself. Several people attribute this to the fear of driving. For some, this fear goes back a long way, the outcome of traumatic experiences in childhood (accidents, parental quarrels in the car, etc.) or in adolescence, notably when learning to drive. For others, it is more recent and is triggered,

for example, by road traffic accidents. In both cases, the fear of driving often long predates actual demotorization. Other reasons for giving up driving and therefore the car emerged from the interviews, such as physical incapacity (sight problems, backache, etc.), vehicle disrepair, or loss of the driver's license. For these different reasons, the relinquishment of the car is often involuntary, a divergence in the biographical trajectory. In the stories people told, this "forced" demotorization was initially seen as temporary—until their health improved, until they recovered their license, or until they had enough money to buy another vehicle. It could subsequently become permanent, the outcome of positive experiences with other modes of travel.

Whether voluntary or not, seen initially as temporary or lasting, relinquishing driving and car ownership is a process with multiple causes that can take time to emerge and that are often difficult to link unequivocally with a single motive. Other explanations for demotorization lie in the day-to-day experience of mobility. In particular, whether it follows a period of automobile deprivation when other modes of transportation have to be tried, or as a result of periods of excessively intense car use, awareness of the unpleasantness of car travel plays a major role. Congestion, parking difficulties, vehicle maintenance, and damage (especially when the car is parked in a public space) are all reasons that contribute to making the car an unpleasant or tiring mode of travel. Unsurprisingly, this view was particularly marked in households located in very dense urban areas, notably in the center of Paris or Lyon. Over time, the car became a burdensome object that our interviewees preferred to do without. Demotorization is therefore not linked necessarily and directly with a key event. It also arises from the experience of other ways of traveling, which prove more efficient and less unpleasant with practice. In other words, demotorization begins with a reduction in car use before car ownership is ultimately relinquished.

3.2. The Spatial Elements of Mobility Biographies as Factors of Disenchantment and Demotorization

Beyond the experience of other modes of travel, demotorization needs to be placed more broadly within the spatial aspects of the households' biographical trajectories. While the narrative of the growing sensitivity to the downsides of car use is essentially encountered in urban households, it is particularly marked among people aged between 30 and 50, often with children, who have in common the fact of having spent their youth in low-density or car-dependent areas. As a result, these people were socialized very young to the norm of the car, in other words, the view that the "best" way of traveling is at the wheel of an automobile.

More broadly, regardless of the household interviewed, the value attached to the car has not been the same in every place and at every time, reflecting the history of motorization in France in the post-war period. At the beginning of France's so-called Trente Glorieuses, the 30 years of post-war prosperity, and before that, the car was a very rare presence, whether in the city or the countryside. After this, the car occupies a growing space in biographical narratives, wherever people lived. In many cases, therefore, in childhood and then adolescence, the car is an object seen as somehow enchanted. Linked with childhood vacations, in adolescence and early adulthood it becomes tied to the quest for autonomy and social status, especially for men. Passing the driving test is a rite of passage, which over the generations has become increasingly essential and rarely challenged. In consequence, narratives about the car as enchanted or liberating are relatively common among all the people we met. Nonetheless, they are more marked among people who grew up in areas of low population density. Nicolas is a married teacher with two children, that has been living in Montrouge (near Paris) for 10 years, but grew up and lived near Bordeaux' greater suburbs until his 20s. As he explains:

> Nicolas: So, well, I started to learn with a qualified driver in the car when I was 16. I was in Bordeaux, I mean, near…in the countryside. More in the countryside, though, so as a result the car was pretty much essential, otherwise, it was impossible to get around.

Many of the people who were socialized when young to the norm of the automobile because they spent their childhood or adolescence in low-density areas talked about becoming particularly disenchanted with car ownership when they moved to the city. This disenchantment is not only linked with the problems of driving and parking in the city but also with the experience of mandatory travel, especially for work. However, this obligation to travel would probably not have resulted in demotorization in low-density areas, where people report that there is no alternative. It was urban disenchantment with the car that gradually prompted our interviewees to demotorize. The fact that it was gradual is attributable to the persistence of the norm of the automobile, which does not disappear overnight. People had to experience the downsides, abandon deeply embedded preconceptions about the disadvantages of public transit and (above all) the advantages of the car, in particular its reassurance value (to deal with emergencies, especially those associated with children or elderly parents), before deciding to say goodbye to it. Claire, 42 years old, is a good example of this process: after her divorce, she decides to leave her small village in the mountains (Savoie) to come back to Paris. Even though she grew up in Paris until she was 12, she has been used to the car, especially as a mother of four children. Also, it took her several years to get rid of her car, as she explains below:

> And what persuaded you to keep your car when you arrived in Paris?

> Claire: Habit I suppose, it's true I don't know…and of course, I have young children, and I admit that then when I got rid of it, I was terrified of not being able to cope. Because yes, for me, a family with children means a car is essential.
>
> And so…saying goodbye to it can't have been easy?
>
> C.: I told myself that it was a trial…To be honest, I thought that probably within 6 months I would have to buy another car. But in the end no!!! Because it's true I eventually realized that not having the stress of finding somewhere to park, worrying about damage…
>
> Not to mention the expense!
>
> C.: Right. But even without the financial aspect, the motivation is not purely financial….Because it's true that somehow owning a car in Paris, it's stressful, and then I know that I would always have to repark because often I couldn't park properly, I had to park badly, late in the evening, and then get up at 7 am to repark….I had to pay pretty much every day. And then, another thing, I remember that coming back from school, we would try to go past the car to make sure that it hadn't been vandalized too much….I thought that it would be a problem not having a car and finally, it was a release.

3.3. From Disenchantment to a More Utilitarian Relationship to the Car: Spatial Components of a New (De)Motorization?

While the downsides of owning a car, and the disenchantment with the car associated with them, are often cited as the natural result of living "in the city" (or, more broadly, in high-density areas), the interviews also reveal the influence of policies designed to reduce car use. The impact of these was particularly strong among people who had always lived in the city, even at times when using a car there was less problematic (in particular people born in the period between the 1950s and the 1980s). Apart from policies designed to discourage private car use and ownership, the interviews show that the availability of efficient alternative travel modes also plays an important role in demotorization processes among urban dwellers. In fact, transport alternatives and disincentives to cars play together in explaining the renunciation of car ownership for most urban people interviewed. This is the case regarding Geraldine, she is a 55-year-old married woman with no children, who has lived in Paris for 15 years, and who previously lived abroad and grew up in the outer suburbs of Paris. As she explains:

> Geraldine: And then, after that…I ended up selling it because it wasn't just at home where it took me 90 minutes to park, it was everywhere, you couldn't park anymore because there were Vélib bikes, because there were….Because parking spaces were being removed, Mme Hidalgo was shutting down parking spaces pretty much everywhere. I was forced to give up my car. […]
>
> So you sold your car….Can you give me the date when you sold it?
>
> G.: Well, I sold it…3 to 5 years after [her return]. I mean, I still tried. I'm stubborn. But now, I use rental cars when I'm on holiday….Public transportation and rental cars when I need a car. Or taxis, a taxi when I need to travel in Paris, I mean a taxi when there is no transit.

However, the links between spatial context and demotorization are not only about the characteristics of different areas and the mobility conditions they create. They also reflect the sociability of individuals and the social links that they form in these areas in the course of their lives. Several people explained how, in changing their spatial context, they also, above all, changed their social context. For example, living in more urban areas and spending time with people who are activists or more involved in the ecological transition favors a weakening of the norm of the car, and sometimes a rejection of the object itself. Thus, our interviews show that the political, social, and economic context of urban territories can also contribute to a form of disenchantment with the car that can result in demotorization. Agathe (age 33, engineer, in a relationship, one child) has lived in Lyon since she finished studying and is active in an environmental group outside her work. She grew up in a small, highly car-dependent village in the Haute-Loire, where her parents and some friends still live. Her narrative of demotorization led to a debate with her parents:

> Agathe: In the end, it was precisely that, to some extent, the difference with my parents, it was that they didn't understand why I wanted to sell my car, they wondered how I was going to live without a car, and for me, I wasn't worried about it at all!…I mean, no, I knew that I no longer wanted one, and of course, I knew perfectly well they were going to say that, but I was convinced that for me it was more a burden than anything else, and I knew that, well, there was the train, and they didn't have any idea about ridesharing either, and I must say that since I ditched the car I've never had any problem traveling, in order to…yes, it's true, I had to explain to them that it was possible to live without a car, in Lyon at any rate…where they live, no, but in Lyon in any case…. I have a lot of friends who have stayed, in fact, in Haute-Loire. I don't hassle them about it, because they don't have any other choice. But in Lyon, well, my mates, they're all like us in fact, they don't have cars, they have a bike and that's it.

However, the interviewees still communicate the persistence of one spatialized norm of the car. Whether they lived in the city or the country, all the people we interviewed stressed the importance, even the necessity, of having a driver's license, especially for their children or grandchildren. It is essential to be able to drive, whether for work, for vacations, or to be able to live in the countryside one day. No need to own a car, simply to be able to drive, just in case. In other words, the development of a utilitarian rather than an enthusiastic attitude to the car does not undermine people's spatialized representation of it. On the contrary, it reinforces that representation. It prompts them to relinquish the car when they live in the city or have access to efficient local mobility services. But it also prompts households to go back to the car when they choose to move to the countryside. In other words, people who have demotorized have not necessarily permanently ditched the car in favor of other transport modes in their life plans, particularly their residential plans. To return to the case of Agathe, a new mother, the interview reveals that she is considering moving to a more rural environment, which she sees as "a privileged environment, I find, for children, the countryside, less stress." She argues that "a healthy environment, a long way from the city, is ultimately a bit better" for her son. In consequence, she acknowledges that she will eventually have to think about getting a car, though now the goal is an electric or hybrid vehicle that will reconcile the need for mobility with the commitment to ecological transition.

4. Conclusion and Recommendations

This research shows that, as things stand, permanent and voluntary relinquishment of the car is more likely or feasible in very dense urban areas. While the proximity of stores and jobs or the existence of alternative transportation options facilitate travel by other means than the car, most urban areas are primarily associated with negative externalities that ultimately encourage people to relinquish car ownership: expensive parking, congestion, fatigue, etc. In this case, and as noted in previous research on decreasing car use (Beirão & Cabral, 2007; King, 2022), we can see the outcome of urban policies introduced several years ago, especially in France's most heavily populated urban areas.

Nonetheless, while car dependency is intimately linked with urban life, that is not the only factor. In fact, the perceptions and representations associated with the car evolve over the life cycle and, in our household survey, reveal a gradual disenchantment with car ownership which builds up gradually and cumulatively during the life cycle and therefore may not necessarily be linked with a significant key event, as is often seen in quantitative MBR. Previously a symbol of freedom and autonomy, or linked with childhood vacations, the car has become associated with frequent work trips, lift giving (children, elderly parents, etc.), and more generally with constraints that occur with varying intensity in different residential contexts and vary from one person to another. The disparate nature of this disenchantment explains why not all the people in our sample have demotorized in the same way, and why some urbanites kept their vehicles for a long time before relinquishing them. It also explains why car use continues, especially for vacations, for example by renting. Finally, the shift to a more utilitarian relationship to the car over the years does not fundamentally challenge the spatial representation of travel practices amongst people who have demotorized, who never rule out reverting to the car if they move home. In fact, it could be that the utilitarian position tends to reinforce that representation, especially as electric or hybrid cars can provide an ecological alibi.

Obviously, our results are based on a very particular category of households, those that have already to some extent given up on car use. In some areas such as Bordeaux or Dijon and the less dense parts of the four urban areas, it is a kind of household that is less likely to be encountered. Despite this rarity, our sample illustrates in its narrative and also its socio-spatial structures how demotorized households may appear in different kinds of places and how they do not necessarily differ from motorized households in any respect other than car ownership. This may help us to understand the drivers of lasting demotorization and how to foster demotorization by still-motorized households, one of several prerequisites to achieving car-free cities (Nieuwenhuijsen et al., 2019).

In terms of political recommendations, the consequences of these findings are twofold. Apart from very specific cases (physical incapacity, poverty, withdrawal of license, etc.), the process of relinquishing car ownership is gradual, which demonstrates the normative influence of the car, an object that individuals are socialized to from childhood. In order to reduce car dependency, therefore, there is a strong case for working on mobility representations and practices from a very early age. Finally, the spatially situated vision of car ownership and use raises questions about the scope and relevance of public policies. While car use restriction policies are acceptable and accepted in the core of metropolitan areas, there are no plans to introduce them in less dense areas where the car is seen, both by users and by the authorities, as essential. These facts show the importance of implementing planning policies and alternatives to the private car that is credible in areas of lower population density. In this regard, it is important to take into account the rich literature that highlights the huge differences in travel behavior, transport infrastructures and services, and willingness to adopt more sustainable modes between, on the one hand, metropolitan areas, medium-sized and small towns, and rural areas (Flipo et al., 2021), and, on the other hand, between the core and periurban parts of urban areas (whatever their size; Hasiak & Richer, 2021; Obregón-Biosca, 2022). The increase in homeworking that has followed the pandemic, which seems simultaneously to have led

to more (but shorter) trips in the vicinity of home (for purposes other than work) and to an increase in the distances between home and the workplace (Wöhner, 2022), notably in less densely populated areas, makes this shift in approach all the more urgent.

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Conflict of Interests

The authors declare no conflict of interests.

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