

# The temporalities of shared mobility practices from an environmental perspective

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**Zusammenfassung:** Um verheerende Folgen des Klimawandels zu verhindern, ist eine Reduktion der Privat-PKW Nutzung unbedingt erforderlich. Allerdings ist diese Mobilitätsform sehr wandlungsresistent. Dies ist unter anderem auf ihre nahtlose Integration in die zeitliche Organisation des Alltagslebens zurückzuführen ist: Sie ist schnell, flexibel, jederzeit und oft sofort verfügbar. Ermöglicht wird dies durch eine autozentrierte Raumplanung und Gesetzgebung. Unter diesen Bedingungen ist es für umweltfreundlichere Mobilitätspraktiken wie bestimmte Arten von shared-mobility schwierig, sich zu verbreiten. Das im Artikel entwickelte praxistheoretische Verständnis von Zeitlichkeiten hilft die Wandlungsresistenz der Privat-PKW Nutzung zu verstehen. Darüber hinaus erklärt es auch warum sich bisher hauptsächlich wenig umweltfreundliche Arten von shared mobility (business-to-consumer free-floating carsharing) und nicht umweltfreundlichere wie peer-to-peer carsharing oder mobility-as-a-service verbreiten konnten. Der Artikel kommt zum Schluss, dass eine Exnovation des bestehenden autozentrierten Mobilitätssystems für eine Mobilitätswende unverzichtbar ist.

**Abstract:** To prevent devastating consequences of climate change, a reduction in private car use is essential. However, this form of mobility is highly resistant to change. This resistance is attributed, in part, to its seamless integration into the temporal organization of daily life: it is fast, flexible, available at any time, and often instantly accessible. This is facilitated by car-centred urban planning and legislation. Under these conditions, it is challenging for more environmentally friendly mobility practices, such as certain types of shared mobility, to proliferate. The practice theoretical understanding of temporalities developed in the article helps to comprehend the resistance to change in private car use. Furthermore, it explains why predominantly less environmentally friendly forms of shared mobility (business-to-consumer free-floating carsharing) have expanded, while more environmentally friendly options like peer-to-peer carsharing or mobility-as-a-service have struggled. The article concludes that an exnovation of the existing car-centred mobility system is indispensable for a transformation of the mobility system.

## Introduction

Radical changes in the way Western society organises mobility are urgently needed merely for the less ambitious of the Paris Agreement's global climate change goals to be achieved and the dire consequences of climate change avoided (Blühdorn et al. 2020). Therefore, there is a pressing need to understand why highly unsustainable mobility practices, such as private car travel, are so resistant to change. Mobility practices can be understood in a practice-theoretical sense as strongly embedded in society and much more than individual choices. One of the main factors affecting the stability of the practice of private car travel is its temporalities: it is fast, flexible, and available at any time, often instantly, and without the need for planning. Fundamental societal principles of organisation and infrastructural decisions uphold these temporalities. If 'altermobility' practices (Vincent-Geslin 2010), that is, low-carbon alternatives to private car travel, are to be integrated into daily practice, we must understand how they can compete with these temporalities. Low-carbon alternatives are, first and foremost, public transport, cycling, and walking. Shared mobility can play an important role in providing a solution for situations that cannot be managed with these mobility practices. However, not all forms of shared mobility have a significant environmental impact; the mainstreamed urban business-to-consumer (B2C) free-floating (FF) carsharing, in particular, does not. The question thus arises of what propels some shared mobility practices into the mainstream but not others.

This article addresses this question by analysing the temporalities of three different forms of shared mobility (B2C FF carsharing, peer-to-peer [P2P] carsharing, and mobility-as-a-service [MaaS] systems) and comparing them to those of private car travel. The paper thus develops a vocabulary, based on practice-theoretical concepts of time, that is helpful to explain the stability and change of mobility practices. The vocabulary goes far beyond a conception of time as the duration of a practice and encompasses practice sequences, temporal stretches, and

synchronisations. These dimensions have strongly institutionalised and societal aspects (e.g., the synchronisation of school times).

The analysis highlights that the attractive temporalities of private car travel are not given; they arise from political decisions that privilege this mobility practice and deprivilege altermobility practices. For example, car-centred spatial planning facilitates travel by private car because parking is available very close to most destinations, roads are designed to allow cars to travel fast, and so on. This decades-long privileging has inscribed the 'need' for a private car into all sorts of social practices, such as parenting, shopping, and housing. It has created spatialities that seem to require the private car because of its unique temporalities. Shared mobility practices face the challenge of competing with the temporalities of private car travel to become integrated into everyday lives and connect with different social practices. The analysis shows clear differences among the shared mobility practices in terms of how well they connect; however, it also demonstrates that, as long as the practice of private car travel is buttressed by infrastructure, rules, and legislation, it will be difficult to integrate altermobility and shared mobility practices into everyday life. The space for innovations is thus limited, and it must be enlarged by exnovating the currently dominant practice of private car travel (Arnold et al. 2015; Mock 2022; Wetzchewald 2023).

The article contributes to two different research fields: the first is the thematic field around sustainable mobility, shared mobility, and the sharing economy. The main contribution here is to argue that a socio-ecological transformation absolutely needs exnovations, the deprivileging of private car travel and that the widespread focus on sustainability innovations and their upscaling (including in the academic literature) distracts from the main challenges. Second, it adds to the theoretical field of practice theories that reflect on the temporalities of social practices. In addition, it attempts to enrich a practice-theoretical analysis by introducing temporal trends to better describe the specific societal setting faced by current social practices. As such, it is a the-

ory-based and anticipatory work that aims to indicate important factors for a socio-ecological transformation, as suggested by Castelo, Schäfer, and Silva (Castelo et al. 2021). To this special issue dealing with mobility practices in the context of multiple crises, it contributes a theoretical perspective for understanding the ongoing reconfigurations of temporal patterns unleashed by the COVID-19 crisis. This perspective adds to other work in this special issue exploring this topic empirically.

To investigate these topics, this article proceeds as follows. Section 2 discusses shared mobility and the importance of temporalities from an environmental perspective to give some background information. Section 3 introduces practice-theoretical understandings of time and links them to four temporal trends. In Section 4, these understandings are used to analyse the temporal demands of shared mobility and compare them to the temporal demands of private car travel. Section 5 discusses the practical implications of these theoretical considerations, and Section 6 concludes the article. Reflections on the COVID-19 crisis are integrated throughout the article.

## 1. Shared mobility and temporalities from an environmental perspective

### *Shared mobility and sustainability*

The transport sector is highly problematic as it is the only major industrial sector that has increased, instead of decreasing, its emissions since 1990 and is thus very far from the climate goal of a 90% reduction by 2050 (European Environment Agency 2022). Thus, the current system of automobility (Urry 2004) needs to change radically. Changes must go far beyond shifting from private car travel to shared car travel and must include a reduction of the travelled distances rather than only a shift towards more environmentally friendly forms of transportation. Still, shared mobility can be one important element of such a transformation of the mobility system. Shared mobility is an umbrella term for services that provide short-term access to de-centrally allocated vehicles.

These services comprise a variety of organisational models (station-based, FF, hybrid), are run by different actors (private companies, public entities, civil organisations, hybrid constellations), and involve various vehicles (cars, bikes, cargo bikes, e-scooters, mopeds). Recently, MaaS systems have been gaining importance; these systems bundle multiple mobility options, such as public transport, shared mobility, and taxi services, in a single platform. In terms of user numbers, FF carsharing is by far the most widespread form, but it is primarily concentrated in large cities (Bundesverband CarSharing 2023).

To evaluate the environmental benefits of shared mobility, the most important variable is the extent to which it reduces private car ownership (Kolleck 2021). In this regard, studies show that while station-based carsharing reduces private car ownership, it is less clear whether FF carsharing achieves the same goal (Kolleck 2021). These differences can be explained by the different sequences into which these mobility practices are integrated: FF cars are mostly used in urban areas for spontaneous drives in the evening for short distances (half being under than 5 kilometres) (Riegler et al. 2016). Station-based cars tend to be used for longer drives over longer distances and for planned travel. Although the differences are clear, we must be careful when interpreting these results. Ruhrort (2020), for example, warns of categorising shared mobility options as either ‘friends’ or ‘foes’ of sustainability because the dynamics of transition processes are highly complex. Even if FF carsharing does not directly reduce private car ownership, it can still play an important role in normalising mobility practices beyond the private car. Additionally, most studies focus only on FF and station-based carsharing, but other forms deserve consideration; the distinction between different forms of shared mobility is continually blurring. There are hybrid forms, but above all, MaaS systems bundling the different forms are viewed as the future of shared mobility. Their environmental potential is high, but there are also concerns, such as a potential privatisation of the mobility sector (see Pietrón in this special issue).

While it is difficult to assess the impact of a highly

dynamic field such as shared mobility (Svennevik 2019), we can assert that if shared mobility is to have significant environmental benefits, forms other than FF carsharing must also become mainstream. Therefore, we must understand why some shared mobility practices proliferate more easily than others. To this end, this article analyses the temporalities of three shared mobility practices: B2C FF carsharing, P2P carsharing, and MaaS systems.

*B2C FF carsharing* schemes are run by private companies. With FF or one-way carsharing, users begin and end their trip at different locations within a defined area. With station-based roundtrip or station-based one-way carsharing, in contrast, users return the car to a defined place.

*P2P carsharing* is a form of station-based carsharing that facilitates the sharing of privately owned cars, typically using a digital platform to connect car owners and users. These platforms are run by private companies or civil organisations.

*MaaS systems* are digital gateways (usually apps) that provide access to multiple mobility options from the public and private sectors (public transport, shared mobility, taxi services, on-demand mobility, etc.). There are three different integration levels of MaaS platforms. At Level 1, information about the different mobility options is offered via one platform. At Level 2, one can also book and pay for a mobility option on the platform. Level 3 adds subscriptions and flat rates for the different mobility services (like a ‘Spotify’ for mobility).

### *Time and sustainability*

Time, timing, and temporalities are connected in multiple ways to the environmental impacts of a society. For example, the environmental damages associated with motorised transport are connected to the tempo and speed of driving; speed limits are an effective, low-cost way to reduce the impact of driving

on the climate (Lange 2020). Despite this advantage and the related benefits to public health, many Western countries vehemently resist implementing this measure. Hence, resistance to regulating the tempo of a specific practice undermines easily implemented environmental measures. Another example of the influence of a practice’s tempo on its environmental impact is the efficiency of online shopping. Speedy delivery options, such as same-day or instant deliveries, drive much of the environmental damage associated with e-commerce. While online shopping can reduce mobility and, thus, mobility-related environmental problems, fast delivery undermines this benefit by obstructing the potential of a sustainably organised (micro-) logistics system (Pereira Marcilio Nogueira et al. 2022).

Besides tempo, the temporal location of some practices matters from an environmental perspective, especially in relation to time peaks. Peaks in energy demand are among the greatest challenges to renewable energies; current research is exploring attempts to de-synchronise and flexibilise energy-intensive practices (such as refuelling e-cars or using washing machines and dryers) (Anderson 2016).

Finally, the time intensity of specific practices provokes debate in sustainability studies. Much research focuses on whether a reduction in working time might shrink the ecological footprint of Western consumption patterns (Smetschka et al. 2019; Liebig 2020) by freeing up time for sufficiency-oriented practices: unsustainably fast ‘convenience foods’ could be replaced by sustainable regional and seasonal ‘slow foods’; time spent repairing and mending consumer items could mitigate the environmental disaster of a throwaway society; and the time-intensive act of hanging clothing to dry could replace the high energy demands of machine dryers. However, there are concerns regarding the possibility of time-rebound effects; for example, a four-day working week could lead to increased leisure traffic (Liebig 2020). Similar concerns are raised with regard to the environmental effects of the transformed links between work and travel practices induced by the COVID-19

crisis. Replacing some work-related mobility with virtual communication has long been discussed as a potentially productive way to reduce overall car travel (Jessen 1995). Whether this potential materialises remains to be seen. While Manderscheid et al., in this special issue, as well as Manderscheid and Grubbauer (2023) are cautious and warn about the rebound-effects – people might, for example, tolerate longer commutes if they can be present less frequently at the workplace – Canzler and Knie, in this special issue, as well as Greene et al. (2022) are rather optimistic (while also acknowledging possible rebound effects).

These examples show that temporal issues matter when it comes to the (un)sustainability of everyday practices; thus, contemplating changes to these practices requires an understanding of their temporal demands and characteristics. Practice theories provide a useful framework for this endeavour because they offer a vocabulary for analysing how mundane everyday practices cohere to create societal rhythms.

## 2. Practice-theoretical understandings of time and the temporalities of private car travel

Over the past two decades, a surge of practice-oriented social theories has emerged in an effort to overcome the limitations of methodological individualism. These theories have been used extensively in the fields of sustainable consumption (see for an overview Corsini et al. 2019; Leger 2023; Warde 2005) and transportation studies (see for an overview Kent 2022). According to these theories, there is no such thing as a responsible, rational consumer. Instead, routinized social practices constitute much of daily life. Practice theories set these practices as the primary units of analysis, shifting the focus away from individuals and structural entities (like ‘the market’ or ‘the state’). Shove, Pantzar and Watson (2012) defined in a founding work of these theories ‘practices’ as specific connections between materials, like things, technologies and infrastructures; competences, like

knowledge, skills and understanding; and meanings, like worldviews, aspirations and connotations (see also Cass et al. in this special issue). Linkages of these elements form the ‘normal’ ways to do something that are so hard to change. Social practices take the form of ‘practice-as-entities’ (abstract and idealised forms of the practice) and ‘practice-as-performances’ (the enactment of the practice, the doing) (Schatzki 2002).

How do these practice theoretical principles apply to the topic of time? From a practice theoretical perspective, individuals do not manage their ‘own’ time, nor do social structures form time (Southerton 2020). Instead, time is in practices and practices are in time<sup>1</sup>. To illustrate this perspective, consider the stance practice theories would take regarding a temporal issue in contemporary Western society: acceleration and increasing levels of stress (Rosa 2013). Practice theories would reject viewing the temporal organisation of everyday life as an individual task; they would not ascribe feelings of hurriedness to poor ‘time-management’ (Southerton 2020). They would oppose such neoliberal positions that place the responsibility for societal problems on individuals (Graefe 2019). Practice theories would also dismiss the idea that acceleration is mainly induced by structural forces, like the labour market. Instead, practice theories focus on the practices themselves and their temporalities, underlining the ‘intersection of institutional and personal temporalities’ (Greene et al. 2022; Southerton 2003). Specific characteristics of practices, like sequences, synchronisation, temporal stretches and entrainment, create a feeling of ‘overall acceleration’ and hurriedness. For example, constantly filling breaks between sequences of practice with other practices – like booking a shared car while taking the bus home from work – can create

1 Blue (2019) makes this useful distinction between ‘time in practices’ and ‘practices in time’. However, he does so to criticise both approaches and to argue for an alternative he introduces, namely, ‘practices as time’. My position is that the border between the two approaches is not as neat as he suggests and that a recursive understanding of time in practices and practices in time is productive (and suggested by other scholars, as I discuss below).

a feeling of hurriedness. Viewing social practices and their temporal qualities as the foundation for phenomena like ‘acceleration’ and ‘time shortage’ helps to explain paradoxes like people feeling more stressed while having more free time than they have for decades (Prahl 2010). Hence, practice theories can expand our understanding of time as more than simply the duration of a practice, providing a more sophisticated vocabulary.

### *Three practice-theoretical concepts of temporalities and how they apply to private car travel*

‘[E]nacting a practice is a matter of weaving it into an existing rhythm and of honouring temporal injunctions inscribed in concepts of proper performance’ (Shove et al. 2012: 127). This ‘weaving’ is especially important for mobility practices because they are, literally, practices of connecting – they connect a sequence of practices enacted in different places – and thus weave the texture of everyday life (Hui et al. 2017). Below, I discuss three practice-theoretical concepts and apply them to the practice of private car travel. This discussion is not merely illustrative; rather, it demonstrates why it is difficult for altermobility practices to arise in a system of automobility (Urry 2004).

#### *Tempo*

When discussing temporal connections, the first concept to consider is the tempo of social practices. How long a practice takes and how it compares to other practices clearly matter, and the speed of private car travel accounts for its robust integration into everyday life. Thus, speed limits, cycle highways, high-speed trains, and the frequency of public transport are important. However, it is critical to view the duration of practices not as a given but as enabled by specific decisions concerning transport infrastructures. The fast tempo of private car travel would not be possible without decades of car-centred spatial planning that systematically privileged cars by, for

example, establishing an extensive system of roads, building vast sites for parking, and designing traffic light circuits to favour cars. Additionally, the speed of car travel would not be possible without decades of jurisdiction defining streets as existing primarily (and, in some cases, exclusively) to guarantee undisturbed car travel (Ruhrort 2019). The privatised nature of cars also contributes to the speed of the practice: because cars are typically privately owned, they are usually available at any time. Private car travel is indeed characterised by a high tempo, but this tempo depends on favourable conditions in the form of infrastructure and jurisdiction.

#### *Sequences of practices*

A sequence of practices is defined as the way practices precede or follow each other (Blue et al. 2020). Concerning car travel, a look at the sequences into which it is integrated reveals what the car is actually used for. Scholars speak in this regard of ‘derived demand’ (Bamford 2001) or of direct transport practices and practices facilitated by transport (Kent 2022). Car travel fits into all sorts of sequences; some even seem designed specifically to make use of a private car. For example, many sports activities require private equipment that needs to be carried by car, and many forms of holiday travel depend on the possibility of bringing many belongings (Manderscheid 2019). Mattioli, Anable, and Vrotsou (2016) found that practices of escorting children, shopping, and carrying heavy goods are the most ‘car-dependent’. For many other sequences, it is less obvious why a private car usually connects the sequence, but many car owners are rather monomodal. Thus, many car trips take less than five kilometres, and often a private car is used so frequently that sharing does not appear to be an option. It has been shown that once a car is there, people tend to use it for any trip and any sequence (Ruhrort 2019). Thus, the car creates its own demand, and, in a recursive relationship, a specific sort of spatial planning supports the creation of car-based sequences. In concrete terms, empirical studies show that the availability of cars leads to a spatial extension of the

places where different practices are enacted. Out-of-town grocery stores, suburban settlement structures, distant schools, and sites for leisure activities materially manifest the widespread availability of cars and their related infrastructures. Thus, the average sphere of actions has been substantially extended in the sense that the per capita daily amount of time invested in mobility and per capita daily number of journeys remain stable, but the distances travelled increase (Schäfer et al. 2009).

Private car travel also owes its stability to the short ‘temporal stretch’ (Mock 2022) of its sequences. This term indicates that, in many cases, the sequences of practices can be perceived not as one completed practice after another but as overlapping beginnings and endings of practices performed in parallel involving ‘periods of deferral and delay’ (Blue et al. 2020: 935). The temporal stretch for the practice of private car travel is short because the decision to take the car is usually immediately followed by the use of the car. In contrast, the temporal stretch for shared mobility practices is longer, as the booking of the vehicle must precede the actual use (by minutes or even days).

Analysing sequences not only helps to illuminate the stability of the practice of private car travel but also highlights opportunities for changes (Shove/Cass 2018). While some sequences are fixed, others permit variation and hence potential for reorganisation. Merging practices into new sequences might also allow the replacement of the practice of private car travel. For example, the practice of commuting to work via train could attract many users because it merges with the practice of working. As work has become increasingly conducted via laptops or smartphones, the sequence of practices has likewise changed from commute to work and only then begin work to take the train, begin work, pause work to travel from train station to office, then continue work. This alteration of the sequence ‘shortens’ the relative duration of taking the train compared to driving to work because the practice of driving disallows most working practices. The possibility to merge practices is an advantage of public transport over private car travel. Thinking in terms of sequences also allows us to

focus on avoiding mobility. This is crucial because, to reach climate goals, the strategies of ‘improving’ and ‘shifting’ must be accompanied by the strategy of ‘avoiding’ mobility (Bongardt et al. 2013; Rammler 2016). If ‘what comes after’ private car travel is not location-bound, mobility practices can be completely forestalled. Against this backdrop, the environmental effect of new sequences of work and travel induced by the COVID-19 crisis and the related expansion of videoconferencing and remote work are highly relevant. The sudden transformation of practices caused by the COVID-19 crisis revealed the contingency of social practices; it showed that some (e.g., business trips for short meetings) were ripe for lasting change. Their stability before the crisis had depended on routines and institutionalised, unquestioned elements of the practice rather than reflective actions.

#### *Synchronisation*

‘[S]ynchronisation refers to the coming together of multiple people or practices at the same spatiotemporal location’ (Blue et al. 2020: 936). Meal times provide a definitive example. Studies have identified, not surprisingly, sleep and paid work as the most synchronised practices. Institutional arrangements, such as the 9-5 workday, the concept of weekdays/weekends, and the structure of the school year (Blue et al. 2020) contribute centrally to synchronisation. What have these socio-temporal patterns to do with (un)sustainable mobility? The 9-5 workday, for example, establishes the so-called ‘rush hour’, a widespread temporal synchronisation of the practice of working outside home with the practice of leaving the workplace. The rush hour is highly relevant for infrastructures such as road systems as the logic of ‘predict and provide’ is deployed when designing infrastructural systems (Hui et al. 2017: 165). Streets are sized based on predictions of how much traffic they might handle at times of peak usage. However, a vicious cycle ensues, as larger streets invite more traffic; if one anticipates no traffic jam on the way to work because the motorway is large enough, one is more likely to drive than to take the train. In mobility studies, this effect

is called ‘induced traffic’ (Becker 2016). Finally, if the infrastructure encourages more people to drive, that creates more ‘demand’ for more streets.

Parkes and Thrift (1979) further explore the idea of synchronisation, describing it as having ‘entraining’ capacities. They argue that some practices, for example, work practices, act as *Zeitgeber* and thus set the pace for others. Pred (1981)<sup>2</sup> embraces the idea that specific practices entrain others as ‘dominant projects’. Interestingly, in 1977, Parkes and Thrift predicted that ‘flexitime’ would shift the function of paid work as *Zeitgeber*, suggesting that *Zeitgeber* are contingent. Contingency is also acknowledged by Pred (1981) and strongly highlighted by Blue (2019), who expanded on the concept of entrainment. The literature on time policy measures returns to the concept of *Zeitgeber*, calling them *Taktgeber* (institutions or actors that can set rhythms) and arguing that time conflicts are rooted in conflicts between *Taktgebern* and *Taktnehmer* (institutions or actors that must follow these rhythms) (Henckel 2014). While these decades-old concepts of entraining forces are still productive, I use them in a more critical way than Shove et al. (2012) and Blue (2019), namely, to describe how they apply less and less in contemporary Western societies.

Cass and Faulconbridge (2016) use these theoretical considerations in the field of sustainable mobility. They find that practices with fixed timings function as *Taktgeber* and that ‘mobility rhythms created by the fixities and/or sequencing pressures of work, education and other practices are crucial in pushing individuals towards the use of the private car as the least time consuming mode for traveling’ (Cass/Faulconbridge 2016: 9). It is important to remember that – as argued above – the view of cars as the least time-consuming practice is enabled by societal conditions privileging private cars.

The COVID-19 crisis had a disruptive effect in this re-

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gard: it disrupted well-established everyday life routines. Societal rhythms and the nexus of practices were completely upended by the breaking of spatial links between practices (via stay-at-home policies). Breaking spatial links between practices leads to breaking temporal links and far-reaching temporal disorder. Entraining and synchronising temporalities (*Zeitgeber*), such as school times, shopping hours, and working hours, were eradicated, leading to the loss of the societal metronome and an altered rhythm after the pandemic.

### *Temporal trends*

How does this discussion of practice-theoretical understandings of temporalities help answer the research question, namely, why some shared mobility practices spread more easily than others? I argue that important factors explaining the (non-)proliferation of mobility practices are – next to material-spatial factors (Mock 2022) – the temporal demands and qualities of the practices and how they connect with the temporalities of other practices and fit within overarching temporal trends. I understand recurrent temporalities (specific form of sequences, synchronisation, temporal stretch, etc.) of widespread everyday practices as forming overarching temporal trends (such as acceleration or flexibilisation) within contemporary Western societies. Importantly, I understand this dynamic as recursive in that these trends influence social practice, but the practices themselves constitute these trends. This understanding aligns with both Southerton (‘temporal rhythms frame practices and condition how they are performed. The relationship between practices and temporalities should therefore be understood as recursive and mutually interdependent’ (Southerton 2013: 345)) and Walker (‘the rhythms of society as whole can thus be observed at an aggregate level, but they are made up or constituted by the many practices of people and organisations reproducing, over time, similar patterns of coordinated activity’ (Walker 2014: 51)). The classification of temporal trends I work with (Henckel 2014) defines four such trends: accelerati-

2 He argued, for example, that it is by no means given that paid work is the main ‘dominant project’ entraining other practices, but that this is a specification of advanced capitalist societies (Pred 1981: 16).

on, flexibilisation, expansion, and compression (author's translation). Henckel's work is well suited to the aims of this article because it synthesises diagnoses from many scholars and has already been successfully applied to the topic of mobility. These trends are tightly connected with the socio-economic structures of contemporary Western societies, such as the neo-liberal capitalistic economic system, and should be problematised and criticised, in particular in terms of their consequences for the common good, the environment, social inequality, etc. However, doing so is beyond the scope of this article, and I limit myself to a description of these trends and a discussion of their impact on mobility practices. The aim is to explain why unsustainable mobility practices are so resistant to change and how deeply embedded in basic societal principles these practices are, not to affirm the temporal trends in an uncritical way. Below, I describe each temporal trend and link them to the practice-theoretical concept of temporalities, creating a framework that will then be used to analyse the proliferation of shared mobility practices.

*Acceleration:* Acceleration is a key temporal trend in contemporary societies, driven by, among other things, digital information and communication technologies, accelerated innovation cycles, and the broad availability of modes of transportation that allow short and long distances to be travelled at a high tempo. In practice-theoretical terms, acceleration can be understood as practices characterised by a high tempo and short temporal stretches as well as practices that can be performed instantly.

*Flexibilisation:* Shove and Cass (2018) define 'flexibility as the converse of closely-coupled sequencing and/or rigid synchronisation' and state that 'flexible practices are those that are relatively detached (they are not tied to specific times or places); de-coupled (not requiring the co-presence of other things or people), or capable of being interrupted, restarted and broken into smaller parts' (Shove/Cass 2018: 9). Flexibilisation is characterised by the decreasing import-

ance of societal *Taktgeber* and the individualisation of time. On-demand practices are one manifestation of this trend.

*Expansion:* This trend results from practices that become less tied to specific times. As more practices can be performed at any time (e.g., online shopping, online banking, 24/7 stores), the boundaries of societal time-spaces become blurred, and the synchronisation of practices decreases. This effect has been reinforced by the experiences of the COVID-19 crisis.

*Compression:* Compression describes the increasing simultaneity of different practices and the filling of time densely with practices. Sequences and temporal stretches of practices increasingly overlap, often enabled by digitalisation. Mobile devices allow people to perform all sort of practices while travelling or involved in other practices.

To summarise, entraining forces (*Zeitgeber*) are losing importance as a societal metronome, timings are becoming more flexible, and the degree to which practices are synchronised is shrinking. This leads to a 'softening of time' (Ling/Yttri 2002; Blue et al. 2020), which is accompanied by the expansion of time-spheres and the compression of social practices. However, there are many exceptions to this trend (e.g., educational practices), and it is important to remember that flexible working hours and time sovereignty are unequally distributed. Warde stated as long ago as 1999 that a weakening of socio-temporal structures and institutional temporalities renders the coordination of different practices and actors more difficult. Planning in advance becomes uncommon and more complex in ever more flexible societies; instead, 'micro-coordination' – the 'rearrangement of basic logistical details on the fly' (Ling/Yttri 2002: 144)<sup>3</sup> – becomes the norm (Canzler 2021: 407).

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3 At the time of Ling and Yttri's writing, smartphones were not yet available – thus, their idea is even more valid today.

	Acceleration	Flexibilisation	Expansion	Compression
B2C FF carsharing: Share Now	Well adapted: short temporal stretches; on-demand is the norm (no need to wait for approval or arrange physical meetings)	Well adapted: little planning required because of on-demand use; available at any time; one-way use is possible	Well adapted: because fully digitalised (app-based)	Well adapted: can be performed digitally and simultaneously with other practices
Traditional P2P carsharing: Getaround without features 'Getaround connect' and 'Instant booking'	Badly adapted: long temporal stretches; need to arrange physical meetings between owner and borrower	Badly adapted: much planning involved; times must be arranged; entraining forces (e.g., working hours of the involved persons) limit flexibility	Badly adapted: need for synchronisation and consideration of entraining forces	Well adapted: can be performed digitally and simultaneously with other practices
Digitalised P2P carsharing: Getaround with features 'Getaround connect' and 'Instant booking'	Quite well adapted: Instant booking shortens the sequence	Well adapted: Instant booking requires little planning; keyless opening system 'Getaround connect' eliminates the need for physical meetings	Well adapted: because fully digitalised	Well adapted: can be performed digitally and simultaneously to other practices
Level 2 MaaS systems: Jelbi	Well adapted: Includes on-demand use; enables multimodal mobility that is potentially quick; eliminates the need for registration, etc. on different platforms	Well adapted: possible to switch between means of transport, available at any time	Well adapted: because it is fully digitalised	Well adapted: can be performed digitally and simultaneously with other practices
Private car travel	Perfectly adapted: very short temporal stretch; immediate use	Perfectly adapted: little planning required; available at any time	Perfectly adapted: because no need for coordination with other people or businesses	Badly adapted: driving cannot be performed simultaneously with most other practices

Table 1: Temporalities of mobility practices

### 3. Temporalities of shared mobility

First, any form of shared mobility requires coordination with other people or businesses and is hence temporally more demanding than the use of private vehicles. Consequently, in the sequence of the practice, every form of shared mobility involves at least one element more than is required for the sequence of private car travel, namely, the booking. However, the actual temporal configuration of these sequences differs considerably among shared mobility practices, as do other temporal aspects. To illustrate, I examine a representative scheme for each form of shared mobility practice: ShareNow<sup>4</sup> for B2C FF carsharing, Getaround<sup>5</sup> for P2P carsharing, and

Jelbi<sup>6</sup> for MaaS systems. For Getaround, I distinguish between the sharing of cars with and without the features 'Getaround connect', which allows locking/unlocking of the car using a smartphone instead of a key, and 'Instant booking', which allows booking without waiting for the owner's confirmation. The following table gives an overview of the examination, and more information is provided in the appendix. For comparative reasons, the temporalities of private car travel are also provided in the table.

These different temporalities are important when it comes to the connectivity of shared mobility practices with other everyday practices. In societies dominantly characterised by the temporal trends of acceleration, flexibilisation, expansion, and com-

4 <https://www.share-now.com/at/de/>, last accessed 3.8.2023

5 <https://de.getaround.com/>, last accessed 3.8.2023

6 Jelbi – Berlins Öffentliche und Sharing-Angebote in einer App. last accessed 3.8.2023

pression of time, mobility practices that have long temporal stretches, require planning, agreements with other persons, and binding commitments, and must deal with entraining forces, such as traditional P2P carsharing or P2P (cargo-)bike sharing, struggle to connect with other practices. The need to arrange meetings with other people and thus synchronise timings within limited time spheres seems to inhibit the proliferation of these practices. Indeed, the fewer social interactions involved, the better, it seems. The often-cited motto ‘sharing is caring’ – the idea that the sharing economy creates social bonds – is questionable. Instead, it is much easier to connect for mobility practices that can be performed instantly, without much planning, and without having to deal with entraining forces, on demand, spontaneously, and at any time, such as private car travel and, to some extent, FF carsharing. Hence, FF and those forms of P2P carsharing that imitate the temporalities of FF carsharing ‘rival the flexibility and convenience of the private car’ (Kent/Dowling 2013: 87) and try to provide what Cass and Faulconbridge call a ‘car-like flexibility and autonomy’ (Cass/Faulconbridge 2016: 6). To date, only FF carsharing in big cities – a practice with rather low environmental potential – has been successful in this sense and become mainstream. Therefore, under given circumstances, the hope that shared mobility could lead to low-carbon mobility does not hold. A radical transformation of the mobility system therefore involves the questioning of and dealing with these temporal trends.

MaaS systems could be a game-changer. Their temporal demands and characteristics seem to fit very well with the temporal trends of contemporary societies. Indeed, flexibility is the central logic of MaaS systems, as some offer the use of a variety of mobility options without the need to register or engage in binding commitments. One advantage over private car travel could be that public transport – a central part of MaaS systems – is best adapted (and contributes) to the trend of time compression and simultaneous performance of practices.

These reflections are in line with some previous findings. Kent and Dowling (2013, 2018) wrote about the

temporal inflexibility of some carsharing schemes and their challenges. For example, they found that ‘carsharing imposes more of a strain on the temporal continuum of the practices with which it needs to collaborate and compete. [...] Carsharing only works if associated practices can be packaged in time in the same way carsharing as a practice is necessarily scheduled, planned and practiced’ (Kent and Dowling 2013: 90).

Such demands resemble the demands of sufficiency-related practices, such as purchasing food in self-organised food cooperatives (which requires planning, as food can be ordered only on a weekly or monthly basis) or using home-exchange platforms (which requires accurate, long-term planning for all involved, especially when the homes are primary residences). A study on social innovations for sustainable consumption concludes that alternative consumption practices, such as carsharing, diffuse more widely if they are less innovative, less community-oriented and rooted in personal relationships, less dependent on self-organisation, and more formalised (Jaeger-Erben et al. 2017). These findings show that more radical alternatives to unsustainable consumption practices with a high environmental potential – practices that often involve personal collaboration – have structurally more barriers to proliferation. Changing unsustainable mobility practices and establishing promising shared mobility practices as widespread practices therefore touches upon structural societal questions and is much more than a question of socio-technical innovations.

#### 4. Practical implications: shared mobility as public mobility

What can we learn from this analysis of the temporalities of mobility practices regarding their environmental impact? A first implication is that, for the proliferation of sustainable and shared mobility practices, a better connectivity to temporal trends is favourable, requiring the digitalisation of the processes and innovations such as keyless opening systems

or ‘smartcar-software’<sup>7</sup>. Importantly, a better connectivity can also be achieved by decreasing the connectivity of private car travel and thereby creating more favourable starting conditions. A second implication is that we must question temporal trends, which means challenging the practices contributing to these temporal trends. If they are linked to traditional policymaking fields, such as healthcare, housing, or education, in particular, they are clearly alterable. In the next two subchapters, I go into more detail on these two implications and argue that public actors and public policymaking are central to both. This discussion leads to an understanding of shared mobility as part of public mobility (Schwedes 2021). Schwedes defines ‘public mobility’ as going beyond public transport, calling for the provision of other forms of altermobility including on-demand services or shared mobility schemes that are oriented to the common good and do not follow the market logic of profit maximisation. He sees his proposal for public mobility as an application of the foundational economy (Arcidiacono et al. 2018) to the mobility sector. The foundational economy describes how basic provisioning systems, such as food, health services, or housing, could be designed in a sustainable and just way. Aligning with these positions, I see a potential for shared mobility to contribute to a socio-ecological transformation when organised as part of public mobility. Below, I discuss how public policymaking is central to the two implications and the wide-reaching societal questions that come with an understanding of shared mobility as public mobility.

First, however, a short reflection on the delicate topic of interventions from a practice-theoretical perspective is necessary. In practice theories, the topic of interventions is disputed and gives rise to two opposed perspectives. One viewpoint assumes that social change results from the fundamentally uncontrollable evolutionary dynamic of social practices (Brand 2011: 190). The alternative viewpoint sees practices,

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7 This software works across car brands, replacing the installation of car computers currently necessary for keyless unlocking and other digital features involved in carsharing.

their components, and their relationships as potentially effective points of entry for social change; in this regard, practice theories can provide crucial insights for implementing policy. This article sympathises with the second viewpoint but with strong restrictions. Unlike some literature (Keller/Vihalemm 2017), it does not contend that practice theory may be simply applied to the design of social change projects but that a practice-theoretical analysis typically demonstrates the opposite, namely, that many social practices are very hard to change and the measures needed might be very far-reaching.

### *Increasing the temporal connectivity of shared mobility practices and decreasing the connectivity of private car travel*

Regarding the first implication – a better connectivity of shared mobility practices through more digitalisation – it is of central importance not to regard digitalisation in terms of merely technical innovations. Digitalisation processes that have environmental benefits are most probably not profitable, which is why the big carsharing companies only operate in profitable cities but not in rural or suburban areas, even though the big challenges of a mobility transformation lie precisely in these areas. Good customer service, 24/7 hotlines, and employees who attend to the proper use of the vehicles (e.g., removing e-scooters from zones where they should not be parked) are key for successful sharing schemes. Having such employees implies high human resource costs and, therefore, it will most probably not be private companies that implement more attractive and more digitalised shared mobility schemes in critical cases and areas that are unprofitable, yet, from an environmental perspective, crucial. In this sense, the role of public actors is central: while publicly run bike-sharing systems are common, publicly run car, cargo-bike, or e-scooter sharing systems are rarer. In MaaS systems, they play a key but contested role (see Pietrón in this special issue).

The role of such systems is also key in other forms of altermobility, namely, public transport (including

on-demand mobility), cycling, and walking, as they are the ones providing the respective infrastructure. These forms of altermobility are central for sustainable forms of shared mobility because they provide the basis for a sustainable mobility system, and the sharing of motorised vehicles only supplements them. The conversation about a mobility guarantee (which would establish quality standards for altermobility, such as requiring a public transport stop within 300 m of at least 80% of inhabitants) is very relevant in this regard (Laa et al. 2022).

The strengthening of altermobility must go hand in hand with the deprivileging and exnovation of private car travel if it is to have significant impacts on the mobility system. Elsewhere (Mock 2022), I have expanded on the exnovation of private car travel; cutting parking sites, implementing car-free zones, and recalling fiscal privileges for private car travel are just a few of the examples given. The deprivileging of car travel would partly impact shared car travel too, and the first thought could be that it might therefore hinder its proliferation. However, I argue that this will not be the case for the majority of users. Sustainable forms of shared mobility do not primarily rely on a good car infrastructure; rather, a good infrastructure of public transport, cycling, and walking is more important. Such exnovations weaken the temporal attractiveness and connectivity of private car travel. Speed limits, reduction of parking sites (creating longer walking distances), and reduction of traffic lanes (in favour of space for public transport or bike lanes) are all changes that decelerate the practice of private car travel and play a crucial role when comparing traffic times. Digital platforms (such as Google Maps) that compare the durations of different mobility practices typically calculate zero minutes to reach and park a private car. Some platforms add a certain number of minutes to these distances, reducing the extent to which the private car appears faster than other mobility practices. In this sense, spatial regulations can create a more equal starting point for mobility practices by deprivileging private car travel and its temporalities. Thus, it might be more powerful

not to focus on strengthening innovations but to implement exnovations to phase out private car travel (Ruhrt 2019; Canzler 2021). Innovating the mobility system via pull measures must be accompanied by exnovations in the form of push measures, though this is clearly a less comfortable and more conflict-laden strategy.

### *Changing the temporalities of connected practices and questioning temporal trends*

It is central to examine the practices with which mobility practices must link and their temporalities following concepts such as ‘derived demand’ or ‘end use practices’. For example, activities fixed in time can pose problems for carsharing (Kent/Dowling 2018: 468) and push the use of the private car (Cass/Faulconbridge 2016). However, we must recall the contingency of social practices and can question their temporalities, especially if they are linked to traditional policymaking and provisioning systems, such as healthcare, housing, or education. For example, low-quality public transport creates a ‘need’ for expensive private cars and nips a system of altermobility, including shared mobility, in the bud. Other provisioning systems also impact mobility practices, however, as they create different degrees of time and financial pressure – which, in turn, impacts the number of working hours and work-related mobility. For instance, a low-quality healthcare or pension system increases the ‘need’ for expensive private insurance. Low and limited quantities of affordable housing create a need for more financial resources for housing, and a low quality of public educational institutions pushes towards cost-intensive private schools or kindergartens. In contrast, longer and more flexible hours of operation for childcare institutions would directly impact time pressure and mobility practices insofar as the entraining force would lose importance.

Cass and Faulconbridge (2016) explain how the local provision of healthcare centres and shopping and leisure facilities could reduce much car mobility, as could a higher percentage of children attending

local schools. Thus, a context could be established that allows the rhythms of altermobility to integrate into everyday life (Cass/Faulconbridge 2016). This development would be in line with the concept of the 15-minute city and shows the importance of spatial planning and policymaking in this field for mobility practices. In such an infrastructure, a car is rarely needed, and the few times it is, shared cars can be used. However, the current trend towards individualisation and singularisation (Reckwitz 2017) pushes against this effort: increasingly specific childcare institutions, leisure practices, and shopping requirements extend the spaces of the practices to connect, and working against these trends is rather unpopular. For example, policymaking that leads to a higher percentage of children attending local schools and restricts individual choices will probably not find support as it is somewhat in contrast to individual freedom – which, in neoliberal societies, is the ultimate goal. Hence, the shift to altermobility touches fundamental questions of societal organisation, such as unconditional individual freedom of choice in diverse areas of people's personal lives.

If end use practices can be performed online, mobility can be avoided. The ongoing re-organisation and institutionalisation of practice arrangements in relation to remote work offer an opportunity to intervene in neighbouring practices; employers could align their regulations for business trips with environmental criteria, provide funding for their employees to use public transport or MaaS services, or implement fleet management. Measures that support avoiding mobility (remote work) combined with measures that support embracing altermobility (including shared mobility) are promising. Shove (2014) and Spurling et al. (2013) as well as Meinherz and Binder (2020) underlined the importance of interventions that address the 'interlocking' of practices and span diverse practices, and Mock (2022) discussed how rules and regulations connect practices. In this sense, public policymaking does, again, play an important role as it provides regulations for different forms of work-related mobility, such as their taxation. Hence, policymaking

across the diverse provisioning systems impacts on sustainable mobility as it heavily shapes the everyday lives that are to be weaved together by mobility practices.

## 5. Conclusion

For the massive transformation of the mobility system of Western societies that is needed to avoid the dire consequences of climate change, societies must radically shift to a system of altermobility as well as reduce the distances travelled. Shared mobility can play an important role in such a system by filling the gaps that cannot be managed by other low-carbon forms of mobility, such as public transport, walking, or cycling. However, not all forms of shared mobility show high environmental potential, and thus this article asked why some forms of shared mobility proliferate more easily than others. Studying the temporalities of mobility practices reveals important explanations: While the practice of private car travel has (or, better, has been given) temporalities that are very well adapted to the temporal trends of Western societies (such as acceleration and flexibilisation), shared mobility practices are less well adapted to such trends. I used practice-theoretical concepts of time, such as tempo, sequences, synchronisation, and entrainment, to analyse the temporalities of shared mobility practices as well as of the practice of private car travel. While it is easier to facilitate the proliferation of shared mobility practices such as B2C FF carsharing or strongly digitalised forms of P2P carsharing, as they imitate the temporalities of private car travel, doing so is hard for other, environmentally more promising, shared mobility practices. This analysis led to the conclusion that shared mobility has an environmental potential if organised as part of public mobility. In such a scenario, public actors play an important role in pushing altermobility and shared mobility by increasing the temporal connectivity of shared mobility practices (for example, through the digitalisation of shared mobility in non-lucrative areas) and decreasing the connectivity of private car travel, thus deprivileging and exnova-

ting this mobility practice. Such exnovations might include non-car centred spatial planning or the withdrawal of legal or fiscal privileges for private car travel. The article argues that none of the sociotechnical mobility innovations, including shared mobility systems, that have gained attention will lead to environmental benefits if exnovations are not implemented alongside them.

It also argues that provisioning systems, such as housing, healthcare, mobility, education, and childcare, and the way public actors organise them are central for mobility practices and their environmental impacts as they strongly influence the temporal organisation of everyday lives. It is clear, that the quality of the mobility provisioning system (public transport and beyond) is decisive, but other provisioning systems are also relevant. Whereas low-quality provisioning systems push private car travel (e.g., because of higher time and financial pressure), high-quality provisioning systems might allow the rhythms of altermobility to integrate in everyday lives. The proliferation of sustainable shared mobility systems hence goes far beyond a question of socio-technical innovations. Reflecting on what it means to change towards an altermobility system that relies only rarely on motorised individual transport and, when it does so, uses shared vehicles, leads to questions of the temporal organisation of societies and in consequence to fundamental questions of societal organisation including the role of public actors and limits of personal freedom. However, insistent calls of climate activists and scientist even for very simple and minor changes in the temporalities of the practice of private car travel, namely speed limits, are dismissed as illegitimate and are far from implementation in many Western countries.

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