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Published online: 12 Aug 2023.

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"The crisis justified the urgency, but now we have to go back to the rule of law": Urban mobility governance during Covid-19

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ABSTRACT

During COVID-19, many cities built pop-up infrastructure for cyclists and pedestrians. We analyse the experiences of Geneva and Lyon through a qualitative approach based on document analysis and interviews with institutional and societal actors. We explore what contributed to the development of pop-up infrastructure during COVID-19, and how these interventions were shaped by and affected policy-making processes and actors' agency. We found that COVID-19 accelerated social and political trends regarding urban mobility. In both cities, authorities used the crisis to push through existing plans. Authorities' commitment and the existence of ready-to-implement plans proved crucial. The implementation processes constituted a breach from usual procedures. In Geneva, this empowered actors who usually act from the margins. In Lyon, authorities adopted pop-up infrastructure as a way to reduce costs. Our study clarifies the potential of experimentation in a context of crisis for urban climate governance and highlights the democratic implications of such interventions.

Introduction

Over the past two decades, the governance of climate change has become a key strategic concern of cities (Bulkeley and Betsill 2013, Kern 2019). Mobility is one of the most carbon-intensive sectors, and the sector in which transformative policies have proven most difficult to implement (Marsden *et al.* 2020).

Mobility is heavily dependent on capital-intensive infrastructure that takes decades to plan and build, and mobility policy has been characterised by a reluctance for measures that enforce changes in mobility practices (Marsden and Docherty 2013). The embeddedness of mobility practices in everyday life and social structures adds complexity to transitions towards sustainable mobility systems, which are considered indispensable for meeting the climate goals of the Paris agreement (Meinherz and Fritz 2021).

Transition and transport governance scholars have long argued that disruptive events can become opportunities for sustainability transitions if they are seized for radical policy change and if response programmes encompass policy interventions for climate action (Marsden and Docherty 2013, Markard and Rosenbloom 2020). Indeed, during the lockdowns decreed to contain the COVID-19 pandemic, cities around the world responded to the pandemic's impact on mobility patterns with policy experiments for low-carbon mobilities, such as pop-up cycle lanes and pedestrian infrastructure (Griffiths *et al.* 2021). These interventions have been discussed as the latest episode of the experimental turn in urban climate governance (Bertolini 2020, VanHoose *et al.* 2022). With these pop-up interventions, cities reallocated road space from the car to active mobilities (cycling, walking). First studies conducted in Europe found that the pop-up cycle lanes favoured the uptake of cycling (Kraus and Koch 2021, Becker *et al.* 2022). These signs of success point to the potential of such experiments to become seeds for transitions towards more sustainable urban mobility planning (Griffiths *et al.* 2021, Kamalipour and Peimani 2021).

Looking beyond environmental outcomes in terms of reducing emissions, scholarship concerned with governance experiments for sustainability transitions has long stressed the need for examining the democratic potential of such experiments and how they shape societal deliberations on mobility policy (Hajer and Kesselring 1999). This requires a 'vigorous interrogation of the ways in which power and agency are orchestrated' (Bulkeley *et al.* 2016), and of the ways in which experiments (re)configure actors' resources and capacities to partake in environmental governance processes (Bulkeley *et al.* 2016, Sengers *et al.* 2019).

With regard to COVID-19, scholars from the fields of urban studies and environmental governance stressed that whereas the emergency of the pandemic may contribute to much needed transformations of urban governance practices, crises such as COVID-19 may also empower those who wield formal forms of power, and justify and legitimise authoritarian government action (Kamalipour and Peimani 2021, McGuirk *et al.* 2021, Patterson *et al.* 2021). COVID-19 created a context in which 'state capacity [could be] revived, long-sought after reforms advanced, agendas reset, and new governance ends and dispositions included' (McGuirk *et al.* 2021, p. 189). Concomitantly, environmental governance scholarship calls for research that analyses the democratic implications of governance experiments implemented during crises like

COVID-19, and how such experiments contribute to the (dis)empowerment of different actors (Patterson *et al.* 2021).

With this article, we address these issues. We analyse how the disruption caused by COVID-19 played into cities' strategies and practices for climate governance and transitions towards low-carbon mobilities, and how it affected different actors' agency and their roles in the governance process. We ask:

- How did COVID-19 become a moment for cities to reallocate road space in favour of low-carbon mobilities through mobility experiments?
- How were the processes through which cities conducted mobility experiments during COVID-19 affected by and shaped different actors' agency and power?

Our study combines document analysis and interviews with political actors from two cities that built pop-up mobility infrastructure during the first waves of COVID-19: Geneva (Switzerland) and Lyon (France). We discuss these cities' experiences with pop-up infrastructure during COVID-19 in light of literature on the role of experiments in sustainability transitions, and bring this literature into conversation with environmental governance literature that discusses the limitations of experiments in urban climate governance, as well as with urban studies literature that discusses the democratic implications of experimental governance in the context of crisis response.

Experiments in urban climate governance

The pop-up mobility interventions implemented during COVID-19 have been analysed both as policy experiments (e.g. McGuirk *et al.* 2021, Becker *et al.* 2022), and as tactical urbanism (e.g. Barbarossa 2020, Kamalipour and Peimani 2021). Some authors even used both analytical angles interchangeably (e.g. Bertolini 2020, VanHoose *et al.* 2022). These two concepts have been theorised and discussed in different fields, with different conclusions regarding their role in the governance of climate change and sustainability transitions. In this section, we briefly introduce the strands of literature that have analysed the role of experiments in urban climate governance, and that have inspired first studies published on the pop-up infrastructure built during COVID-19.

Policy experiments are mainly discussed in the fields of transition studies and environmental politics and governance. In transition studies, experiments are described as interventions that can become seeds for transitions towards low-carbon, sustainable cities. Because they focus on learning-by-doing, testing and adapting, consensus building, and participation and community engagement, experiments are considered particularly well-

suited to address complex problems with uncertain outcomes, such as climate change (Matschoss and Repo 2018, Kern 2019, Sengers *et al.* 2019, Becker *et al.* 2022). Transition studies have long paid relatively little attention to the procedural implications of experiments. However, recent publications called for research that analyses experiments as political processes (Sengers *et al.* 2019).

The observation that 'the governing of urban sustainability' has largely become 'a politics of experimentation' (Bulkeley *et al.* 2016, p. 14) was also made by scholars in the field of environmental governance. Whereas in transition studies, experimentation tends to be conceptualised as a solution to the problem of climate change, scholarship concerned with urban environmental governance has identified experimentation as cities' strategy to tackle problems that lie outside of their institutional and financial capacities, but which have nonetheless been transferred into their realm of responsibility. Scholars in this field argue that the conjunction of urban climate governance and experimentation has resulted in fragmented and piecemeal urban climate action, which stands in contrast with the need for coherent and holistic transition strategies (Bulkeley and Betsill 2013, Bulkeley and Castán Broto 2013).

Tactical urbanism has mainly been discussed in the fields of urban studies and urban design. Tactical urbanism emerged as an informal practice of resistance, but has long been integrated into the toolbox of urban institutions. Both as an informal and institutional practice, tactical urbanism aims to prefigure lasting transformations of urban spaces by proposing temporary use models and conducting cheap and quick-to-implement tests (Lydon and Garcia 2015). Tactical urbanism shifts the focus from the outcome to the opportunities that the process can offer (Wohl 2018). Just like experiments, tactical urbanism is expected to facilitate learning-by-doing, testing and adapting, debate and community engagement. Concomitantly, urban design scholars expect it to be better suited than master planning to deal with the uncertainty and complexity that urban planners are confronted with (Silva 2016, Wohl 2018). In urban design, one can speak of success 'when experiments are more socially and democratically robust' (Evans *et al.* 2016, p. 4).

Urban studies scholars, however, point to contrasts between these democratic ideals and the motivations driving the practical implementation of experiments. They trace the origins of the increasing popularity of tactical urbanism as a planning practice back to the aftermath of the financial crisis of 2008. They describe tactical urbanism, as well as other types of urban experiments, as the response to or manifestation of urban austerity politics (Caprotti and Cowley 2017, Webb 2018). Furthermore, urban studies scholars argue that experiments can be used by urban institutions to break local resistances by implementing a precedent, to sidestep democratic safeguards in planning processes, or to silence claims of the population by putting in

place small-scale and low-cost interventions instead of addressing the actual issue (Wohl 2018). On these grounds, they call for research that scrutinises 'the democratic potential of temporary intervention' (Webb 2018, p. 59), as well as how crisis frames are mobilised to legitimise experimental action (Caprotti and Cowley 2017).

Case studies and research method

Case studies

We contrast the experiences of Geneva and Lyon and thus of two cities that were confronted with different lockdown regimes and that differ regarding the length of pop-up cycle lanes built during the pandemic. The cities are located in different administrative contexts: The French mode of governance roots in a centralised tradition and corresponds to a representative democracy. Local levels of governance have no legislative capacity, and citizens have no possibilities for direct intervention in the legislative process. Switzerland is a federal state and corresponds to a semi-direct democracy. Local and national levels of governance share political and legislative powers, and citizens can intervene in the legislative process through initiatives and referenda. In both cities, the first wave of the COVID-19 pandemic coincided with local elections. Both cities had legislation in place that called for the extension of cycling infrastructure, and had a modal share of cycling below 10% before the pandemic (see Table 1).

In Lyon, the media uptake of the interventions and their public reception was moderate, and there were barely any media interventions by either proponents or opponents of the interventions. In Geneva, opponents of the interventions – in part from the same political party as the cantonal government – intervened in media and the cantonal parliament to call for their immediate removal. Proponents of the interventions organised an online petition and a demonstration in support of the pop-up cycle lanes that mobilised thousands of people. Table 2 provides an overview of the timeline of events in spring and summer 2020 and of different actors' interventions.

Research design and data

In our analysis, we followed a two-step approach (see Figure 1).

First, we analysed official communications and press releases by authorities, as well as newspaper articles, radio and TV shows concerning the pop-up mobility infrastructure built during spring and summer 2020 (see Table 3). We conducted an online search using the keywords 'mobility', 'transport', 'bicycle' together with 'COVID-19', 'pandemic', 'Corona' and 'Geneva' and 'Lyon', and followed links to other articles contained in the

Table 1. Case studies (Sources for population data and modal split: OCSTAT 2019, SYTRAL 2018. Sources for legislative and administrative context: document analysis).

	Geneva (CH)	Lyon (F)
Population	511'921 (Canton)	1'398'892 (Métropole)
Population density	1'801.3 pop./km^2 (Canton)	2'621.2 pop./km^2 (Métropole)
Modal share of cycling	6.8%	3%
Cycling infrastructure deployed in spring/ summer 2020	7 km	77 km in spring 2020, which were increased to 85 km during summer
Legal guidelines for the development of cycling infrastructure	LMCE (*loi pour une mobilité cohérente et équilibrée*): A cantonal law adopted by the population in 2016 that prioritises the development of active and collective means of transport in the centre of the agglomeration.	LAURE (*loi sur l'air et l'utilisation rationnelle de l'énergie*): A national law from 1996 that stipulates that road construction or renovation projects must include the development of cycle lanes.
Distribution of competencies between government levels	The region (Canton) is in charge of mobility planning and validates projects. The municipalities implement them.	The region (Métropole) is in charge of mobility planning and validates and implements projects. The municipalities are consulted.
First lockdown	16/3/20: Semi-strict lockdown with school and shop closures, restrictions on public, political and private meetings, and the recommendation to work from home. Gradual re-opening starting from 27/4/20, with the first major re-opening (schools, shops) on 11/5/20.	17/3/20: Strict lockdown with school and shop closures, restrictions on public, political and private meetings, and confinement of everybody but essential workers. Gradual re-opening starting from 11/5/20.
Elections	15/3/20: Elections in the municipality of Geneva.	15/3/20: first round of general municipal elections in France which concerned both the regional level (Métropole) and the municipalities. 28/6/20: second round of general municipal elections (initially scheduled for the 22/3 and postponed due to COVID-19).

documents that we identified. We filtered for documents published between March and October 2020. Thereby, we covered the first lockdown and its (partial) easing. We analysed these documents to construct timelines to trace what happened when in each city, who intervened in the process at each stage, and which arguments and discourses were brought forward by whom (see Table 2). This analysis allowed us to construct our interview sample and provided the background information for conducting and analysing the interviews.

Second, we conducted semi-structured interviews with key actors. The document analysis had allowed us to identify actors that contributed to shaping the processes and who represented a diversity of perspectives. We interviewed representatives of the authorities in charge of mobility policy planning, of the departments in charge of implementing mobility interventions, as well as of interest groups and institutional authorities that have a stake in mobility politics but that do not hold any decision-making power.

Table 2. Timeline of the implementation of pop-up mobility infrastructure in Geneva and Lyon.

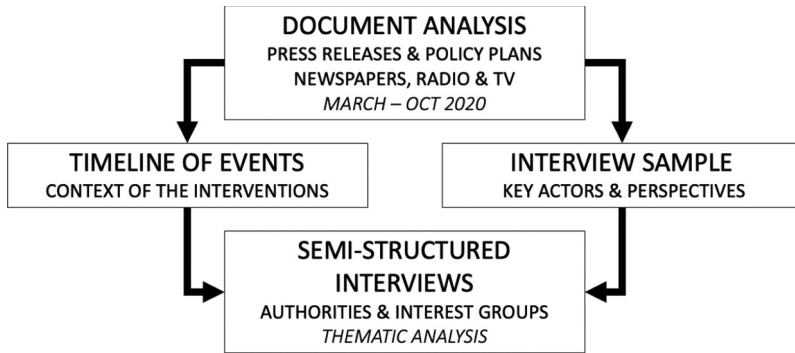| Geneva	Timeline	Lyon
The municipal councillor in charge of mobility (radical left) steps down without a replacement candidate from his own party. A member of the green party is elected. Handover of power on 1/6.	**15 March** *Elections*	First round of general municipal elections. The exiting metropolitan and municipal governments' party (right wing) scores second behind the green party.
	16/17 March *First lockdown*	
Cantonal government: Announcement of the pop-up cycling and pedestrian infrastructure together with the announcement that schools and shops would reopen. Aim: avoiding an increase in traffic jams, ensuring that social distances can be respected on public transport, accommodating the uncertainty regarding the development of the pandemic through adaptable and reversible infrastructure.	**Mid-April** *Announcement of post-lockdown mobility strategies*	Metropolitan government: Announcement of a tactical urbanism plan for cycling. Aim: ensuring that social distances can be respected on public transport, facilitating sustainable means of transportation, accommodating the uncertainty regarding the development of the pandemic through adaptable and reversible infrastructure.
The municipal mobility department begins road works for the pop-up infrastructure. They use temporary construction permits that are typically used for maintenance work and deviations.	**4 May** *Road works*	Metropolitan mobility departments begin road works for the pop-up infrastructure. The cycle lanes are painted in yellow, which is the colour used for construction-related deviations.
	11 May *Easing of the lockdowns*	
Active mobility and neighbourhood associations launch a very successful online petition demanding to maintain the pop-up cycle lanes. A demonstration in defence of the pop-up cycle lanes attracts 2000–7000 cyclists.	**13 May** *Road works* **Mid-May** *Mobilisation*	
The Cantonal government prolongs the construction permits for the pop-up infrastructure for two months but removes one cycle lane that was deemed to cause traffic jams.	**End of June** *Adapting the interventions*	Metropolitan mobility departments remove two cycle lanes that were deemed to cause traffic jams.
Members of right-wing parties organise a demonstration against the cycle lanes that attracts 200–300 people.	**28 June** *Elections* **4 July** *Mobilisation*	Second round of general municipal elections. The green party wins. Handover of power.
The cantonal government opens the procedures to install permanent cycle lanes on the sites of the pop-up cycle lanes. The Car drivers' association files an appeal against one cycle lanes.	**Early Sept** *Consolidation* **6 Oct** *Mobilisation*	The metropolitan government reinstalls one of the removed cycle lanes and announces to increase the amount of cycle lanes from 85 to 94 km.

Figure 1. Research design.

Table 3. Presentation of the document sample.

Authorship	Geneva	Lyon
Public authorities Geneva: 7 publications Lyon: 3 publications	Press releases by the Canton (N=4) and the Municipality (N=2), policy report by the Canton (N=1)	Policy plan by the Métropole (N=1), announcements in the Magazine de la Métropole de Lyon (N=2)

Media
Geneva: 9 outlets,
    18 publications
Lyon: 16 outlets,
    30 publications
	20 minutes (N=1), 24heures (N=1), Le Temps (N=3), Léman Bleu (N=1), Radio Lac (N=2), Radio Lfm (N=1), Revue Automobile (N=1), RTS (N=3), Tribune de Genève (N=5)	20 minutes (N=6), actu.fr (N=5), BFMTV (N=1), Euradio (N=1), France Culture (N=1), franceinfo (N=1), La gazette des communes (N=1), Le Progrès (N=2), Les Echos (N=1), Lyon Capitale (N=2), LyonMag. com (N=1), msn.com (N=1), Nouveau Lyon (N=1), Tout Lyon (N=1), Tribune de Lyon (N=4), Vélo Territoires (N=1)

In Geneva, we interviewed representatives from cycling, pedestrian and motorised mobility associations. In Lyon, we only interviewed cycling associations, because there were no interest groups for other forms of mobility (see Table 4). On the municipal level, in Lyon, we interviewed actors from the City of Lyon and thus the centre of the agglomeration, and from Rillieux-la-Pape, which is a municipality in the north-east of the agglomeration. In Geneva, we only interviewed actors from the City of Geneva, because no other municipality implemented pop-up infrastructure during spring and summer 2020. In both cities, we also interviewed representatives of the regional authorities. In three cases, two people representing the same actor participated in the interview.

For the interviews in Lyon, we collaborated with researchers from the Ecole Normale Supérieure (ENS) de Lyon. They assisted us in contacting interviewees. We conducted one interview in Lyon and

Table 4. Presentation of the interview sample.

	Geneva (*N*=8)		Lyon (*N*=9)	
	Government	*Public administration*	*Government*	*Public administration*
Institutions	Department for infrastructure [Canton of Geneva] (2 interviewees)	Cantonal transport office [Canton of Geneva] (1 interviewee)	Vice-presidency for transport [Lyon Metropolitan area] (1 interviewee)	Cycling working group [Lyon Metropolitan area] (1 interviewee)
				Department for mobility [Lyon Metropolitan area] (1 interviewee) Department for active mobilities [Lyon Metropolitan area] (1 interviewee)
	Department for construction and urbanism [City of Geneva] (1 interviewee)	Department for urbanism, civil engineering and transport [City of Geneva] (1 interviewee)	Mayor's office [City of Lyon] (1 interviewee)	Department for urban mobility [City of Lyon] (1 interviewee)
			Mayor's office [City of Rillieux-la-Pape] (1 interviewee)	Department for transport [City of Rillieux-la-Pape] (1 interviewee)
	Active mobilities	*Motorised mobilities*	*Active mobilities*	
Interest groups	Cycling association (1 interviewee) Pedestrian association (2 interviewees)	Car drivers' association (2 interviewees) Umbrella organisation of associations representing professional motorised mobilities (1 interviewee)	Cycling association focussed on education (1 interviewee) Cycling association focussed on lobbying (1 interviewee)	

three interviews in Geneva together with them. Three interviews in Lyon were conducted by a researcher from ENS de Lyon. The research was approved by the EPFL Human Research Ethics Committee (HREC No. 087–2020).

We conducted the interviews between April and June 2021. Interviewees were contacted by email. The interviews took place online. We recorded them through the videoconferencing software (Zoom) and kept only the audio files, which we transcribed verbatim. The interviews were conducted in French. We translated the quotes used in this article. The interviews followed an interview guide that we had pre-tested with two actors from a Swiss city that we did not consider in our study. We asked how the idea of putting in place active mobility infrastructure during the first wave of the pandemic emerged, and what motivated

these interventions and the form they took. We invited actors to describe the role they played in the process, which strategies they used, and whether and how they interacted with other actors. We asked institutional actors whether and how they invited non-institutional actors to participate in the process, and to which degree the pandemic and experimental approach facilitated or complicated such collaborations. We asked interest groups in how far the crisis context and experimental approach affected their capacity to partake or make themselves heard in the process. We closed by asking all actors which difficulties or opportunities the process presented for them, what they learnt from the experience, and what future they saw for pop-up infrastructure and experiments.

We analysed the interview data through a thematic analysis. Thematic analysis is a widely used approach for analysing qualitative data that is not tied to any specific epistemic or theoretical framework (Nowell *et al.* 2017). Thus, thematic analysis offers flexibility regarding theory and a pragmatic approach for structuring data. This combination has been found particularly useful for exploring the diversity of interviewees' perspectives and similarities and differences between them (Braun and Clarke 2006). We started out with large themes that were informed by the insights from the document analysis: the role that the pandemic played in the process, actors' strategies, actors' assessment of the pop-up infrastructure, actors' assessment of the implementation process, actors' perspectives on their own roles and the roles of others, and lessons learnt from the experience. We then iteratively coded the data to inductively identify categories that allowed us to flesh out the initial themes.

Results

We structure the presentation of our findings in three subsections. First, we present our findings regarding the question of how the pandemic became a moment for cities to reallocate road space in favour of low-carbon mobilities through mobility experiments. Second, we show that these observations have to be analysed as part of longer-term dynamics. Third, we present our findings regarding the question of how different actors' agency and power were affected by and shaped the processes through which cities conducted experiments during COVID-19.

Opportunities in crises and crisis context: how COVID-19 facilitated experiments in favour of active mobilities

The emergency and disruption of COVID-19 presented mobility planners with numerous challenges. As we show in this section, the

deployment of mobility experiments in favour of active mobilities was a way to address these challenges. At the same time, the nature of the crisis and of its impact on mobility facilitated this kind of intervention. Furthermore, the coincidence of the disruption caused by the pandemic with local elections contributed to turning the pandemic into an opportunity for experimental action in favour of active mobilities.

Unanimously, representatives of governments, public administration and interest groups in Lyon and Geneva affirmed that the need to maintain social distances after the (partial) easing of lockdowns required interventions in the domain of mobility to offer alternatives other than the private car to commuters who had previously relied on public transport.

In addition, the lockdown increased the demand for active mobility infrastructure. In France, restrictive lockdown measures meant that cycling was one of the few authorised outdoor activities. In Geneva, the reduction in car traffic increased the attractiveness of cycling. Social distancing measures also called for developing pedestrian infrastructure; in Lyon, to ensure smooth passages in front of school yards; in Geneva, to absorb the queues in front of shops.

Indeed, the pandemic not only called for interventions in favour of active mobilities – it also facilitated them. Firstly, the reduction in car traffic facilitated extensive road works:

> There was this perfect 3–4 month period during which there was much less traffic, so it was really an opportunity to rapidly put in place things without causing any major disruptions. - Lyon cyclist association

Secondly, the global nature of the pandemic created a momentum. It inspired interest groups to call for and authorities to take action, and facilitated the exchange of experiences between urban administrations. Thirdly, the sense of emergency that accompanied the pandemic accelerated governance processes and facilitated cooperation between governmental agencies:

> Usually, it takes two months until we get an answer from the people from the responsible department. But suddenly, it took only two days. – Lyon metropolitan administration

This general movement within the administration made it possible to overcome resistances that had previously paralysed this kind of mobility interventions:

> For ten years we've been asking for mixed bus-cycle lanes . . . and suddenly, the president of the public transport provider, when she saw the general enthusiasm for cycle lanes, she said 'I want to participate too, I'm gonna open up plenty of bus lanes'. – Lyon metropolitan administration

Lastly, our findings stressed that authorities' willingness to take responsibility for potentially unpopular measures was key in the process:

> The governor had to deal with a lot of harassment, many insults, even from journalists, 'you don't respect democracy', etc., but he insisted, he said 'there's laws that call for more infrastructure, we seized a window of opportunity to build it, it was necessary, I am taking my responsibility for this', and he insisted and didn't falter, and that's why it worked. – Geneva cyclist association

In both cities, the determination of members of government was, in part, related to the electoral context. In Lyon, in the first round of general municipal elections, the exiting government's party ranked second after the green party. The deferral of the second round presented the exiting government with a chance to try to win over ecologist voters:

> The period between the two rounds of elections was very long. Because of the sanitary crisis and the lockdown measures. With the exiting governor who clearly had to compete with the Greens … We were like 'oh wow he really places all his bets on cycling'. - Lyon metropolitan government

The mayor of the city of Geneva was stepping down without a replacement candidate from his own party:

> He was at the end of his mandate, the election had already taken place, he knew he'd leave his office, so there was this thing, well, 'I'm gonna do this just before I leave, I know that afterwards it's not me who'll have to face the consequences'. – Geneva cyclist association

These findings, firstly, indicate that not every kind of disruption may necessarily become a window of opportunity for any kind of sustainability transition. COVID-19 became an opportunity for the development of active mobility because of its very specific impact on mobility. Secondly, these findings show that the potential of unforeseen disruptions such as a pandemic may be enhanced by elections and the political pressures that comes with them.

When the old is dying and the new is ready to be born: the importance of existing trends and dynamics

In both cities, the pandemic's effects on mobility, and policy makers' responses to it, were aligned with and reinforced transition efforts that preceded the pandemic. As we show in this section, the mobility experiments' contribution to cities' efforts to decarbonise mobility has to be interpreted in the context of these trends.

All interviewees from both cities noted that the cycling boom of the first wave of the pandemic was the culmination of a slow but steady increase in the modal share of cycling that had been ongoing for over

a decade. Interviewees in both cities also noted that already prior to the pandemic, popular demand and support for the decarbonisation of urban mobility had been growing, notably as a result of the school strikes for the climate. Concomitantly, in the years preceding the pandemic, authorities of both cities had been developing plans for the extension of cycling infrastructure. These plans were almost ready for implementation at the time of the first lockdown. Representatives of the public administrations from both cities identified the existence of these shovel-ready plans as a key success factor for the experiments. They gave an indication of where cycling infrastructure was needed and possible to implement. Representatives from active mobility associations in Geneva identified the absence of such plans for pedestrian infrastructure as one of the reasons why the pop-up pedestrian infrastructure was unsatisfactory and eventually removed:

> The cycle lanes were part of a plan that was almost ready for implementation, whereas the pedestrian infrastructure . . . we've never heard about these projects before. So I think they came up with these out of nowhere just to say 'we've done something'. – Geneva pedestrian association

The mobility experiments deployed during the pandemic were an opportunity for authorities to put their plans for the extension of cycling infrastructure to test and accelerate their implementation. Representatives of the authorities from both cities affirmed that they had been hesitating to implement these plans; in Lyon, because they feared their consequences for motorised traffic; in Geneva, because they feared opposition from the population:

> We built projects that we'd been studying with my team since 2012 . . . but where we were always told, it affects traffic too much, it affects car parking too much, it affects deliveries too much . . . and suddenly, we were told 'go for it. Let's try it'. So it was very different because we got this *a priori* approval by saying 'let's try it'. - Lyon metropolitan administration

> We had this project in the pipeline for a bidirectional cycle lane which we struggled to implement because there was debate, and so we thought 'let's try it this way. We'll go ahead with a temporary project'. – Geneva cantonal government

The necessity to finalise the pop-up infrastructure before lockdowns were lifted, and to ensure they could be easily removed if they created problems, made interventions in the built environment impossible:

> Turing a car lane into a cycle lane is easy to put in place, and easy to remove if it doesn't work. Because it only requires some paint and a road sign . . . Once that concept was validated, we had to find the spots we could actually do that, because in Geneva, there's not many places where there are two car lanes going in the same direction, so we couldn't just do it anywhere. – Geneva cantonal administration

Consequently, whereas the initial plans were designed to minimally impact car infrastructure, the pop-up infrastructure allowed authorities to experiment with more radical reallocations of road space than they otherwise dared to:

> Whenever a Covid cycle lane allowed us to fill a void or to take up space, a particularly large car lane, where we thought we could reduce traffic a bit, we decided that we would put a cycling lane there. – Lyon municipal administration

> It allowed us to show that when there is one less car lane and everything's fine, well it allowed us to push forward projects that reduced the number of car lanes that wouldn't have been approved prior to this experience. – Geneva municipal administration

In Lyon, the pop-up infrastructure also allowed authorities to experiment with lighter infrastructure:

> We could see that well, some infrastructure can maybe be a bit lighter, cheaper as well as a result, and still improve the situation quite a bit. That's a good take-home lesson. – Lyon municipal government

However, authorities recognised that painted cycle infrastructure did not provide the same benefits in terms of safety, inclusivity and urbanistic quality as built infrastructure. Representatives of active mobility associations from Geneva voiced similar concerns regarding quality. And representatives of the public administration of Geneva highlighted that the lack of urbanistic quality of purely painted infrastructure was particularly an issue for pedestrian infrastructure, and that the corresponding projects were unsatisfactory and counterproductive.

In sum, our findings show the potential of disruptions such as COVID-19 to accelerate and potentiate on-going transition efforts, but also indicate the challenges of turning a disruption into an opportunity for interventions that had not already been in preparation. Our findings furthermore suggest that experiments can be a powerful tool to leverage disruptions to push forward plans for low-carbon mobility infrastructure. However, they also reveal issues related to the lower quality of such interventions.

Fifty shades of power play: process dynamics and their implications for different actors

To finalise the pop-up infrastructure before lockdowns were lifted, authorities had to complete projects that usually take years in just a few weeks. As we show in this section, this speedy implementation not only required sacrifices from the involved workers. It also required administrations to short-circuit processes that usually precede and accompany the planning and implementation of mobility infrastructure. This latter aspect had implications for different actors' possibilities to

participate in the process, and for authorities' capacity to evaluate the interventions.

To complete the pop-up interventions during the lockdown, employees of the cities' mobility departments had to sacrifice their free time and put other projects on hold:

> We've accumulated a crazy amount of overtime … I think in three weeks I accumulated 50 hours overtime, 52 I think. I worked on weekends, on evenings until 22:00 or 23:00 – Lyon metropolitan administration

> During 15 days, I wouldn't say that was the only thing I was working on but almost. And afterwards I took some of my employees and told them 'drop everything, now you're doing this'. – Geneva municipal administration

The lack of *ex ante* coordination of the implementation process led to incoherencies that negatively affected users:

> Some of the cycle lanes, between the first worker who came to put paint on the street and the last one who put the sign post, there was a whole week … and during that time it was pure chaos, for drivers, even for cyclists! – Geneva car drivers' association

Furthermore, representatives of the governments, public administrations and interest groups from both cities pointed out that the unprecedented speed of implementation came at the expense of the usual procedures of consultation, concertation and validation:

> We broke every single rule for public accounting, every rule for public procurement too, and quite some administrative rules regarding construction permits, with the argument that there was urgency due to the pandemic. – Geneva municipal administration

> To implement it so rapidly means not conducting 40'000 studies, not checking the rules on this on that, we told ourselves it's temporary so we can put yellow paint wherever we want. Because the rules on temporary interventions allow us to sidestep everything and thus to be quicker. – Lyon municipal administration

According to all interviewees from Geneva, the biggest differences to usual procedures were the lack of consultation and the use of legal dispositions that precluded *ex ante* appeals against the interventions. In Lyon, the lack of consultation was not specific to the pandemic context. However, all interviewees stated that whereas usually, numerous studies must be conducted to assess the impact of a project prior to its implementation, during the pandemic, projects were built without such studies.

In Geneva, the deviation from usual procedures affected societal actors' agency. The associations defending motorised mobilities usually relied on formal procedures to make their opinion heard. Concomitantly, they found themselves largely deprived of agency, both in terms of filing appeals and lobbying. However, the cycling association, which usually acted from

a position of opposition to authorities, found it easy to intervene in the process:

> Usually we organise initiatives or referenda, but also direct action in the streets, petitions, we build up bottom-up pressure, so for us it was very easy to intervene ... one has to move quickly, seize the right moments. – Geneva cyclist association

Both in Lyon and Geneva, authorities insisted that to account for the fact that they had to skip usual procedures of consultation and evaluation, they designed the interventions to be easily adaptable and reversible. However, in both cities, actors without decision-making power were sceptical whether authorities had the necessary information to decide if the infrastructure should remain in place as is, be adapted, or removed:

> To learn something from an experiment it's absolutely necessary to set clear goals, with regard to the situation from before the intervention in order to then check whether the intervention was effective. In Geneva none of this was done. – Geneva car drivers association

In Lyon, authorities confirmed that they did not have the capacity to conduct *ex post* evaluations:

> We were more in a mode of punctual assessments. More focussed on communicating than to really assess. We didn't have the time nor the means to conduct any kind of assessment. – Lyon metropolitan administration

Despite the absence of formal evaluations, representatives of the governments from both cities insisted that they continuously improved the interventions by taking into account feedback from user groups. Nonetheless, representatives of mobility associations from both cities, and the municipal government from Rillieux-la-Pape, questioned authorities' willingness to potentially revoke the measures:

> Once it's done, it's difficult to revoke it, there's a lock-in effect, I think they counted on this, and told themselves 'we'll sidestep all these procedures that can be blocked at all levels' ... I think they clearly had the intention to make these interventions permanent. – Geneva cyclist association

Notwithstanding these criticisms, representatives of mobility associations from Geneva highlighted the potential of experiments to test and finetune infrastructure projects, and to reveal public opinion on the direction that mobility policy should take:

> In the case of complicated projects like these cycle lanes, I think it makes a lot of sense to do this when the project is almost ready, to test it. In real life. Afterwards it's easier to discuss, one can go there, see for oneself, discuss what's really going on, and take the final decision! I think it's a brilliant tool for the finalisation of projects. – Geneva pedestrian association

> To conduct the experiment, in real life, 1:1, makes it possible to immediately see its impact, but it also allowed us to do a temperature check with our members. – Geneva car drivers association

Authorities insisted that the interventions had allowed them to accelerate the implementation of their mobility agenda, but that ideally, they would conduct such experiments in a more participatory manner:

> One has to respect the different partners, the interlocutors, the concerned municipalities, the residents. One can't be in bulldozer mode in normal circumstances. – Lyon metropolitan administration

Ultimately, all interviewees concurred that the interventions responded to a demand. In Lyon, municipal authorities, associations and residents asked for additional cycling lanes. In Geneva, representatives of the government and public administration were astonished that once they opened up the right to appeal, there was only one appeal. They observed that the fierce opposition of the first days had gradually faded. And a representative from an association defending motorised mobilities affirmed that the majority of their members were in favour of the interventions.

In sum, our findings shed light on the procedural implications of deploying mobility experiments in a context of urgency and by sidestepping usual procedures. Though most actors highlighted the potential of this kind of intervention to advance infrastructure plans, in a context of urgency, it may be difficult to consolidate experimental intervention with procedural requirements regarding public participation and formal evaluation.

Concluding discussion

In this article, we explored factors that facilitated the deployment of mobility experiments during COVID-19. We traced the processes through which these experiments were implemented; highlighting how they related to cities' plans for the decarbonisation of mobility, and how they affected different actors' agency. In the following, first, we critically reflect on the role that such experiments can play in endeavours to leverage crises for sustainability transitions, and in climate governance. Second, we discuss our findings with regard to principles of procedural and democratic legitimacy.

Experiments as a way of seizing disruptions for sustainability transitions, or as the latest episode of piecemeal climate action?

Our findings shed light on the conditions that must be reunited for crises to become windows of opportunity for the radical change that is needed to

advance sustainability transitions in mobility (e.g. Marsden and Docherty 2013, Griffiths *et al.* 2021, Becker *et al.* 2022). We observed that not only the fact that authorities had shovel-ready plans in the drawer was crucial in making the pop-up cycle lanes a success, but also that the interventions were aligned with pre-existing social and political dynamics in favour of low-carbon mobilities. Our findings confirm that the potential of experiments deployed in response to crises to accelerate mobility transitions depends on how mobility systems have been changing prior to the crisis (Kivimaa and Rogge 2022, VanHoose *et al.* 2022). Consequently, cities that are already in the process of decarbonising certain domains of society are more likely to be able to leverage crises to intensify these efforts (Markard and Rosenbloom 2020).

Furthermore, our findings highlight the importance of a factor that tends to be neglected in transition studies literature, namely elections. We observed that elections acted as a catalyst for experiments, which contrasts with studies that found that elections tend to negatively affect experiments and can lead to their cancellation (Feser *et al.* 2021). Thereby, our findings stress the need for further research that studies the conditions under which elections, as disruptions that are a regular part of democratic governance, can become windows of opportunity for sustainability transitions.

Our findings also brought nuance to the assumption that experiments are particularly well-suited to deal with urgency and uncertainty (e.g. Sengers *et al.* 2019, Kivimaa and Rogge 2022). Whereas the adaptive and quick-to-implement character of pop-up infrastructure allowed authorities to rapidly develop infrastructure for low-carbon mobilities during the lock-down, the context of urgency also resulted in extremely high workloads and in a lack of coordination during the implementation process, and made structured evaluations of the interventions impossible, thereby compromising the potential of experiments to provide opportunities for learning (e.g. Kern 2019, Sengers *et al.* 2019).

Lastly, our findings point to several limitations of experiments as a means to advance urban sustainability transitions. Firstly, though our findings showed that the deployment of experiments in response to the crisis allowed authorities to accelerate the implementation of plans for active mobility infrastructure, we also observed that the pop-up interventions did not allow authorities to break with the 'piecemeal and opportunistic approach' (Bulkeley and Betsill 2013, p. 140) that is characteristic of urban climate action. Secondly, though the interventions were ultimately decreed permanent, they were not in all cases transformed from painted to built infrastructure. Authorities from Lyon even acknowledged that to reduce costs, they intended to continue developing infrastructure by reallocating road space with paint. This finding resonates with the observation by urban studies scholars that pop-up interventions can become quick and cheap fixes that substitute higher-quality and more costly interventions (Webb 2018). It is questionable whether infrastructure that mainly serves

experienced cyclists can induce the kind of shift towards low-carbon mobilities that is needed to reduce the carbon impact of urban mobility.

Overriding democratic procedures or overcoming resistances against the implementation of existing laws?

Our findings offer a nuanced perspective on the procedural implications of mobility experiments. Transition scholarship stresses the potential of experiments to foster community engagement and participation in sustainability transitions (Matschoss and Repo 2018, Sengers *et al.* 2019, Feser *et al.* 2021). Our findings show that in the implementation of mobility experiments during COVID-19, processes of consultation and evaluation were overridden. Thereby, our findings corroborate the observation from urban studies scholarship that in particular when deployed in a context of crisis, experiments can foster authoritative governance, and be used to push through projects that might otherwise have faced opposition (Caprotti and Cowley 2017, Kamalipour and Peimani 2021, McGuirk *et al.* 2021, Patterson *et al.* 2021).

We found striking differences in how the deviations from usual procedures were perceived in Geneva and Lyon, respectively. This might be related to differences in political culture: That the interventions sparked controversy in Geneva but not in Lyon might be due to the fact that in Geneva, political actors and the population felt overridden by authorities who usually have to submit their intentions and decisions to popular consultations and referenda. In Lyon, interviewees affirmed that they were frequently confronted to government decisions without having their word to say.

In Geneva, the sidestepping of procedures by authorities empowered groups that usually act from the margins, and disempowered groups that usually act from within, by seizing formal means of contestation. The efforts of activist groups to mobilise the population in support of the pop-up interventions resonate with the observation that in defence of the public good and environmental justice, 'social movements can sometimes be potent champions for state power' (Karner *et al.* 2020, p. 5). Furthermore, our findings highlight the role of public authorities as champions of sustainability transitions. Whereas transition studies literature strongly focusses on non-state actors as originators of experimentation and innovation (Sengers *et al.* 2019, Kivimaa and Rogge 2022), our findings illustrate that public authorities and civil servants can play 'important roles in moving society in a more sustainable direction [...] going against institutional norms and legal frameworks' (Hysing *et al.* 2016, p. 536). Our findings confirm that authorities' determination to stand by their decision despite initial resistance is key for successful mobility experiments (Wentland and Jung 2021).

Ultimately, in both cities, the sidestepping of formal procedures of consultation and contestation allowed authorities to overcome political blockades that had prevented them from implementing existing laws that demanded the extension of cycling infrastructure. The question arises in how far usual procedures bear the risk of giving overproportional power to groups with considerable economic and political capital defending interests that counteract those of the majority.

In sum, we conclude that the potential of mobility experiments to leverage crises such as the COVID-19 pandemic for sustainability transitions must be assessed in the context of on-going societal and political dynamics and configurations. Such an assessment of the transformative potential of mobility experiments in a crisis context also needs to carefully consider their democratic implications. Ambiguities around their democratic implications, such as those documented in our study, require nuanced perspectives on procedural legitimacy that account for the diverse experiences of various actors: Though authorities sidestepped formal procedures to push through projects, the latter corresponded to infrastructure that was demanded and legitimised by existing laws. Thereby, authorities accelerated the implementation of their sustainability agenda. Questions remain regarding the quality of the infrastructure and its potential to contribute to concerted transition efforts.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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