<title>"Processed Food on the Urban Data Highway. Food Delivery Services as In_Visible Infrastructure in the Production of Urbanity" </title>

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<!— *Akteurinnen für urbanen Ungehorsam*

<p> Urban space has increasingly been infused with digital infrastructures, built upon algorithmic app architectures and shaped by information systems and collected data not everybody has access to.[1] One of these city-making platforms in Germany is the food delivery service Lieferando. Embodied by its riders, it visibly occupies the streets, influencing our everyday cityscape through bright orange uniforms, a mass of moving advertisement columns. What stays invisible, however, is an infrastructure of constantly processed information behind the platform, delivering app-generated user data and behavioral profiles that are not only used to make profitable predictions but that mainly serve the private interests of a few CEOs and shareholders (Shaw/Graham 2017; Zuboff 2018). In this contribution, we will discuss how this information asymmetry – upheld by the 'reign' of the Lieferando algorithm that structures gig work[2] processes but also our 'taste' of the city – literally 'cycles' around the consumer's awareness: hidden behind the brightly colored

1 A big and heartfelt thank you especially to our interview partners and all the people who supported us in the creation of this work.

2 Gig work within the so-called *gig economy* characterizes a digital and platform-based form of employment. It is mostly temporary, often unstable (or flexible, depending on perspective), and very precarious since the working conditions do not offer social or any kind of security to the employee (Woodcock/Graham 2019).

riders, Lieferando continuously tries to digitally delegate and produce – and reproduce – urbanity in a profit-oriented way. Thus, it eliminates social urban spaces of encounter, exchange, and participation. We will show how invisible information inequalities and 'data wealth' are monopolized and materialized within the city. Our findings are based on a six-month-long period, from October 2019 until February 2020 (right before the Covid-19 pandemic hit Germany), of ethnographic research on in_visibilities of gig work as a new urban infrastructure. Wondering how platforms influence urban everyday life, our research collective conducted six qualitative interviews with two male riders, two members of a city-based workers' council, a gastronome working with the Lieferando app, and a frequent client. Adding to the interviewees' insights are participatory observations and mappings that ask: in what way do delivery services contribute to the capitalization of urban space (production)?

Emerging from the interviews with Lieferando riders is a visible "human pipeline" (Tonkiss 2015: 388): a cycling assembly line mostly consisting of the seemingly "disposable" (Doherty 2017: 192) and ever interchangeable bodies of riders forming the corporation's last mile. As an infrastructural platform, Lieferando not only invisibly takes over urban operations and services, but, as Jathan Sadowski (2020: 450) describes, is also "remaking cities in [its] own image". Its app interfaces are functioning as urban digital gatekeepers by black boxing accessibility of and participation in data. Therefore, the platform increasingly shapes our perception and guides our way through digital urban realms on its own terms. Although Lieferando's mechanisms of invisibility mask the true purpose of its infrastructure, moments of visible crisis unveil resistive potential. Repurposing the invisibility of digitality for their own cause, rider coalitions build similar information infrastructures, exchanging practices of resistance and knowledge to overcome the everyday control of their work by *algocracy* (Ivanova et al. 2018). "The normally invisible quality of working infrastructure becomes visible when it breaks" (Star 1999: 382), Susan Leigh Star notes. This moment of an emergent breakdown of usually automated, mediating, circulating, and connecting elements of the ordering platform becomes apparent in crisis: cold food on our doorsteps, a rider's dead cellphone battery, bodily injuries, failing employment rights of the gig workers, and, at last, protesting bodies on the street. By standing up and being seen, rider coalitions point to the failure of a food delivery infrastructure that attends to the needs of a few while costing many a stable job, corporal capital, and personal data.

We argue that these urgent matters, the emergent emergencies of a glitch or error in invisible data infrastructures, are a (often literally) painful but necessary moment of crisis to resist the urban rule of digital platforms. The following analysis, first, shows the authority of the Lieferando app, controlling the riders' every move. Despite being alienated, at the mercy of the algorithm, and only temporarily employed, riders nevertheless manage to escape their incapacitation. Through collective coalitions and protests, they expose critical platform structures and their material impact on an 'urban stage': the streets. Second, by revealing the slow decline of heterogeneous spaces of urban encounter, taken over by home delivery services, our research indicates a change in urban (social) architectures. Reinforcing the vanishing opportunities to meet over food, Covid-19, in addition, has made city life a matter of keeping our distance. As a catalyst of crises, the virus makes visible hidden control mechanisms, oppressing algorithms, and powerful opacities, thus temporarily uncovering repressive structures everybody needs to know about: to be able to resist them and to turn the emergency into an emergent infrastructure for all.

 Lieferando is part of the Dutch company Just Eat Takeaway.com Central Core B.V. This company provides a digital, internet-based platform on which restaurants can offer their dishes for delivery and through which customers – who like to eat freshly prepared food at home – can order these dishes online (Lieferando 2021). At the moment, Lieferando has a monopoly-like position in many German cities, supplying just-in-time deliveries in the sector of ready meals (Manager Magazin 2021). The delivery staff, mostly riders, are employed by Lieferando (except for the restaurants that have their own delivery fleet) and embody the human link between the customer and the serving restaurant as a mediating infrastructure. The economic model of the company is based on the use of two apps: the orange-colored Lieferando app for customers, and a turquoise-colored app called Scoober for riders, which distributes and organizes work-related information. As one member of a workers' council describes in an interview, both apps allow the company to accumulate data and make behavioral predictions about their users. It is

not apparent to these users which cell phone data and information are extracted, stored, and further used by Lieferando during use of the app and beyond. The general terms, conditions, and the employment contracts do not provide any insight into the algorithms underlying the apps. It is also not easy to obtain information from the company on their structure or how personal data is used. For end users and riders, the principle and data extraction behind the platform services remains intentionally invisible and inaccessible, forming a hidden data and information infrastructure. Their unawareness of the prevailing knowledge and information asymmetry thereby further stabilizes and reproduces the freedom of action of informational capitalists, in this case that of the Lieferando company (Zuboff 2018).

Customers are uninformed about these market mechanisms and often prioritize their own comfort by conveniently ordering online. Moreover, the app-based management of gig work gives riders the feeling of being able to act individually and flexibly on the job. Contrary to this feeling, however, the riders are only able to act within the limited range of action of the app architecture and algorithmic structures, which continuously learn by using artificial intelligence. "You go in a war [sic] with the app, with the system", a Lieferando rider explains during one of our interviews (2020). The riders do not seem to have any agency facing algocracy in their everyday work life, since the algorithmic design takes control over every decision every step of the way (Ivanova et al. 2018). They have no influence on which orders they receive and do not know how they are allocated. Also, the delivery routes that the app suggests to the riders can only be changed by use of their own local knowledge and outsmarting the app. Despite their right to co-determination, the categorization of the data and the design of the algorithm remains largely invisible to institutions such as the many workers' councils, which are a result of ongoing organized union-building processes throughout cities in Germany (interview with workers' council of Lieferando). Being at the mercy of the "app as a boss" (Ivanova et al. 2018: 1), riders are under the control of and seen by the company merely as data resources and material for digital production processes (Zuboff 2018). In its deliberately non-transparent and controlling logic, this seems to primarily serve "informational elites" (Shaw/Graham 2017: 913), as Joe Shaw and Mark Graham suggest in their thoughts on a digital right to the city.

This surveillance capitalist system[3] only becomes visible to end users and riders in a crisis – that is, when the app fails, the delivery is too late, or the rider is injured. To us, the failure of the invisible digital data infrastructure seems a necessary moment of crisis. It is only in these moments that an incapacitating control and information asymmetry (that uses unawareness and invisibility) is uncovered and becomes visible (Star 1999). Thus, we argue, only these (critical) moments enable the use, knowledge about, and empowerment of – and against – this infrastructure. Its crisis becomes the decisive moment of participatory appropriation and/or resistance.

Our research has shown that the faulty, controlling, and failing features of the app lead to dissatisfaction among riders and result in self-sustaining avoidance tactics. Riders develop 'coping' strategies as well as resistant everyday practices to temporarily escape the control of the algorithm. They establish external chats, for example, in which they exchange knowledge, networks, and common tactics in solidarity. Furthermore, they use their personally acquired urban situated knowledge to deliver orders faster as well as navigate through the city efficiently but safely. Here, the street is an assembly line as well as a platform for solidarity and contact: it is the place where the riders meet and recognize each other by their uniforms. Consequently, glitches in the algorithm and automated organization of work are used strategically or are even consciously created by the riders in order to momentarily overcome the reign of the app. Institutions such as labor unions try to make the company's handling of their data more visible to riders and use it as a means of pressure for changes. This hacking of the invisible trackers, viruses, and cookies is necessary in order to expose repressive mechanisms, to oppose them, and to be able to use and resist them (Akteurinnen für urbanen Ungehorsam 2021). Furthermore, this self-created *counter-visibility* also allows riders to gain public recognition, attention, and, hopefully and ultimately, a fair reward for their work since being a delivery rider is a job opportunity that is often the only way to pursue legal employment for, e.g., migrant workers in Germany. Hence, digitization also opens up opportunities that are not available otherwise in our societal structures. </p>

3 A concept and term coined by Shoshana Zuboff, who defines it as a market-based, capitalist system that collects personal data by technical means. Resulting from the behavioral information captured, predictions are made about (future) individual behavior, which are used to generate profits (Zuboff 2018).

<p> Although the riders remain invisible behind algorithms and numbers within the company, they become brightly visible in the cityscape. At the same time, the colorfully dressed riders also lose visibility in urban space due to them being part of everyday life and routines – they increasingly melt into the scenery. It is only through breakdowns and failing standards and norms – that are inscribed into infrastructures – that the abstract data flows managing the riders become exposed, critically questioned, and made visible in resistant practices (Tonkiss 2015). Therefore, the question arises: what does the delivery of food at any time to any place do to our understanding of the city? More precisely, as we asked ourselves during our research, to what extent does Lieferando influence urban heterogeneity, the coming together of the most diverse people in dense urban space? By collecting data, Lieferando is able to influence which restaurants are at the top of the selections offered in the app, which places are being represented, and which meals are thus available. Can these processes influence the taste of the city's inhabitants over time?

In this article, we want to discuss the impact of food platforms in different ways. Initially, the infrastructure Lieferando materializes through the bodies of the riders, who form the visible pipeline of the platform. Due to the remarkable color of their uniforms, the riders are clearly assigned a specific role in urban space. On the one hand, their bodies are advertising columns for the company, as a member of the workers' council stated; on the other hand, they are ignored as invisible deliverers. Their movements through urban space are related to their tasks as employees. Due to the many interfaces between the human body and urban infrastructure – such as the street – the city and the body can only be understood as an interrelated unity (Schroer/Wilde 2017). Processes and practices shape the materiality of the urban: new behavior can produce changes in the road network, floor plans, and so on. *Materiality*, thus, should be understood not only as a surface but also as the process of materialization that, over time, sets boundaries and definitions (Butler 2015). Food delivery functions like a technical infrastructure while, at the same time, the individual bodies of the riders are exposed to the boundaries and divisions of the urban space. They form new dispositions within it.

Furthermore, food delivery services change the (social and material) urban architecture within cities. Lieferando replaces the need to cook at home.

Cooking is outsourced to a restaurant and customers are no longer required to go to this restaurant, because the rider brings the food to their doorstep instead. This could lead to developments of greater outsourcing of self-catering or maybe even changes in apartment floor plans, such as smaller or kitchenless apartments. First and foremost, it leads to changes in the floor plans of restaurants. A gastronome told us in an interview that only small changes have been made since their restaurant started working with Lieferando. However, if a restaurant really wants to profit from cooperating with Lieferando, it needs to reorganize. The sales of a restaurant depend on the location. This will change, though, if more and more food is ordered online. A restaurant would then no longer need a representative space, e.g., a sitting area.

On the opposite end, and during another interview, a customer talked about experiencing delivery restaurants as *non-places*. Non-places are defined here as places that do not seem to actually exist, because the customer never sees them, except in the form of a digital menu. Additionally, the ordered food is eaten in the customer's own home. There, they can escape from the outside world and make themselves comfortable, just as they like it. *Social cocooning*, a complete retreat into privacy, describes the activity of ordering food as a free time activity well (Duden 2020). Even though the trend of cocooning may primarily serve the desire to isolate oneself, it nevertheless seems to create a need for social interaction at a digital meeting place, such as sharing ordered food on social media. This symbolizes a transfer of urban meeting places to the virtual world. Both the rider's and the customer's body then become the interface between physical meeting places as well as the virtual realm, and thus also the location of border dissolution (Schroer/Wilde 2017). The individual actors are connected to each other through the digital infrastructure. They are not in personal contact with each other; there is always an instance in between that is algorithmically disciplining and controlling their agency. The one-sided digital monitoring of the riders' routes and processes illustrates – and, at the same time, materializes – these unequal relationships between the actors.

A lot has changed during the pandemic. Quarantine has become the new cocooning and, during lockdowns and in times of physical distancing, restaurants seem to rely more on online platforms and delivering food. Food delivery services may even help people who cannot leave the house. Nevertheless, there is a delivery monopoly on who delivers food and collects the data on the taste of the city. How did the circumstances change in light of a global pandemic? </p>

<div class=Covid-19 as a catalyst: When one crisis hits another >

<p> During the pandemic, the growth of delivery services has multiplied (Dhillon/Wu 2021). Unfortunately, though, this seems to happen at the expense of social life, encounters, and the working conditions of those who deliver. As a consequence of local lockdowns and contact regulations, social cocooning, as already mentioned, has now become a must. In times of physical distancing, we are limiting our mobility and demanding the same from others in return. The access and use of mobility have shifted. Delivery platform services have become connectors to the 'out there'. Nowadays, the 'luxury service' of ordering food at any place at any time online has unfolded into a system-relevant infrastructure in Germany, so classified by the Federal Employment Agency (Bundesagentur für Arbeit 2020). Thus, food delivery riders belong to the so-called 'heroes' of the pandemic. A key question remains: who takes care of those who are taking care?

Currently, food delivery services seem to be more than a delivery infrastructure: they even have the intention to be a *caring* infrastructure. However, riders do not 'sacrifice' themselves voluntarily (and heroically); it is their job to deliver food – a job their existence depends on. Only rarely do they have the choice not to expose themselves to the virus. Rather, they are at a higher risk due to encounters with different households. The question, in fact, is more about staying or quitting; or being fired. Miserable working conditions and constant time pressure go along with the fear of being infected and being unable to work (Robinson et al. 2020). Riders report that there are hardly any opportunities to wash their hands on the routes or that they are not able to keep a proper distance in stairwells (Altenried/Niebler/Wallis 2020). Also, solidarity among the riders, e.g., sharing knowledge in public space, is denied by the current regulations of having to maintain a physical distance. Even pre-Covid-19, the platform's business model was based on systematically avoiding taking responsibility for its employees. Usually, companies have to provide for permanent workers – even in cases of crises such as the pandemic. In practice, working *contactlessly* refers less to the frequency of contact between riders and restaurant staff or consumers and more to the already limited social contact between the company and its employees. What about showing solidarity through tips? Tips have declined. Adding to the fear of direct contact, customers have also been faced with reduced working hours (Macho 2020). Less

orders also means less tips and thus less additional income to compensate for low wages.

Although Lieferando has established an online tipping feature, voices are being raised that this money has never reached the riders because of technical issues (Movassat 2020). Getting food means ordering online, watching the rider come closer on a map. Today, it also means a delivery from a masked and 'faceless' person. While the customer expects a quick and perfect delivery, the algorithm – together with the pandemic – has consumed the personal interaction even more. Additionally, the restaurant's visibility is shifting from the public space to the enhanced visibility of digital platforms, shaped by their own rules. The restaurant as a salesroom, as a place of encounter, no longer plays a role in the process. Will gastronomic structures be changed permanently after the pandemic?

Several restaurants have long resisted the delivery monopoly. In times of the pandemic, platform cooperation might be a last resort for their business to survive, even if that means being confronted with non-transparent cost structures, one-sided decision-making power, and uncertain future prospects. The knowledge of this inequality seems to – literally – be a price they have to pay in order to serve the basic need for existential visibility and digital presence.

While restaurants have to find new solutions to be seen, other actors are becoming more visible. In addition to monitoring behavioral performances of riders, the stay-at-home customers are also tracked. Through ordering food via the app, the customers themselves are the *deliverers* of data. Who is at home where, and how many people are located in which district? Food delivery reveals more than just food preferences; it is also a 'behavioral data supply chain'. The pandemic paves the way even more for what Shoshana Zuboff calls a new phase of capitalism: "surveillance capitalism" (Zuboff 2018).

It is important to emphasize that the source for the critical conditions described above is not just the infrastructure itself. In pandemic times such as these, delivery services help us to ensure that as few people as possible leave the house, thereby supporting the containment of the virus. However, we are confronted with the institutionalization of a questionable network of surveillance (capitalism) that comes with this delivery infrastructure, whose invisible data collection, monopolies, and privileges we need to pay attention to. Contrary to the processes observed, the appeal should be to use the current crisis as a 'window of opportunity': as an aim to address the lack of alternative supply services in order to find, develop, and support new possibilities. </p>

<div class=Conclusion – How (not) to run a city like Lieferando[4]>

<p> To 'deliver' ourselves (and our cities) to tech-solutionist, platform-urbanist infrastructures cannot be – quite literally – the end of the road. As shown, the protesting bodies, creating a counter-visibility on the streets, reveal a system that neither cares for their workers nor their city. The lasting effects of the pandemic and its amplification of already existing inequalities remind us to question what and who stays in_visible and un_heard, and to uncover power structures hidden behind the surface of apps that not only run services but, increasingly, city streets (Sadowski 2020). "City-making is always […] an enactment of city-knowing – which cannot be reduced to computation" (Mattern 2017) or profit-oriented interests, Shannon Mattern stresses. In light of urban knowledge and collective experiences decreasingly being able to shape and decide upon the design of public spaces, urban researchers and planners have the responsibility to reflect on and call for regulating monopolistic, one-sided, and digitally automated urban production processes. The commodification of the social and the quantitatively predictable optimization of city spaces do not even come close to the complexity of lived urban practices. Moreover, it is necessary to not leave the production of urbanity to algorithms, automations, and artificial intelligence. Rather, we have to get involved, gain insight on how our cities are controlled, and who currently controls them – namely, anti-democratic, private platforms dividing us into "'informational' classes" (Shaw/Graham 2017: 913), ruled by segregating and invisible "informational elites" (ibid.). This is not a rejection of digitalization – on the contrary. However, "[w]e need to shift our gaze and look at data in context, at the lifecycle of urban information, distributed within a varied ecology of urban sites and subjects who interact with it in multiple ways" (Mattern 2017).

Whether we see riders 'hacking' and appropriating the invisible informational infrastructure that feeds on their (personal) data to visibly demand their right to fair working conditions, as seen in the first segment of this chapter; whether, secondly, we notice the materiality of places of urban encounters, such as restaurants, vanishing but gaining visibility through pandemic discourses on their importance; or whether we witness now 'systemically relevant' platforms profiting and taking over the production of cities while exposing their riders to health risks, as shown in the last section: all of

4 A reference to Graham et al.'s (2019) scenarios on "How to Run a City like Amazon".

these issues call on us urbanists to question digital in_visibilities, data privileges, and information architectures that shape the city of concrete, code, and content. </p>

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