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We build this city on rocks and (feminist) code: hacking corporate computational designs of cities to come

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ABSTRACT

Cities have long become interspaces, entangled in materialities and virtual worlds. However, as urban automation advances in cities increasingly made 'smarter', everyday processes are often controlled by oppressive standards hardcoded into technologies. Publicly neutralized as 'objective', corporately owned algorithmic architectures now function as urban gatekeepers. They determine social participation, possibilities of space appropriation on- and offline, and access to (social) infrastructures. Following five months of qualitative research on hacking and other tech-practices by German-speaking cyberfeminist collectives in 2021, my paper portrays their refusal of black-boxed, profitable, and biased technologies of classification. I argue that feminist hackspaces are important urban co-creators in digitized cities to come. They offer infrastructures to increase access to interfaces, (cyber-)spaces, and decision-making processes by sharing their tech-knowledge and tools. Their activism demonstrates how (urban) hacking is a crucial practice to break with non-democratically controlled digitalization processes: in favour of a city for all.

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Introduction

Three metres above ground, the 'Baumschiff' (German for 'tree shuttle')—former home of the feminist hacking collective Heart of Code in Berlin—has landed. If we peer into the back-end of Berlin's neighbourhood Kreuzberg, sneak into one of its backyards, and climb up the latter to this mixture of Do-It-Yourself tree-house and space shuttle, we end up in a feminist hackspace.[1] In its middle is a table, an old, jacked-up door. On it are all sorts of hardware. Laptops hum quietly. On the shelves are electrical stuff, ramen noodles, tampons and pregnancy tests. Tinsel, stars, and a waving cat decorate the room, and there is a 3D-printer in the corner.

Feminist hackspaces like the Baumschiff are workshops where technological tools and knowledge is shared collectively—by and for non-cis-male identifying persons only. Countering still very cis-male-dominated conceptions of technology in mainstream narratives, they offer infrastructures to critically grapple with patriarchal tech-paternalism (Sollfrank 2018). Here, members of the hackspaces can learn programming languages and take hardware apart. Operating systems, social orders and binary gender hierarchies are culturally and technologically broken with, recoded and hacked. Feminist hackspaces build communities of care, solidarity and critical empowerment in order to undercut tech's 'old boys'

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club' with an intersectional and technologically oriented understanding of cyberfeminism.

Located in mostly urban environments that have in recent years been dominated by digitalization processes run by private corporations, hackspaces like the Heart of Code were the starting point for my digital ethnographic endeavour, asking: Why are collective, communal cyberfeminist practices of hacking crucial for countering the top-down smart city strategies of today? What can be learnt from their understanding of technologies in the negotiation of urban spaces (to come)?

To this day, it remains a question of power who is granted the right to visibly take up and claim urban space—both physically and virtually. A societal and literal 'room of one's own'[2] is still not a given for people who define as other than cis-male (Woolf 2002; Laugwitz 2014). As research shows, it is not only floor plans and cityscapes in which gendered bodies hardly find unconfined spaces or representation (Kern 2020). Discursive and online realms often turn out to be equally restrictive, patriarchally dominated and misogynic (Russell 2020). Additionally, as the urban automation of administrations, flows as well as spatial control advance in cities that are increasingly made 'smarter', everyday processes are more and more controlled by privatized algorithmic architectures of oppression (Noble 2018). Still repeatedly neutralized as 'objective' in public discourse, machine learning processes used in e.g. facial recognition software often function as urban gatekeepers (*Coded Bias 2020*). They decide who is allowed to occupy public space, and thereby determine social participation, as critical scholars of algorithmic systems Ruha Benjamin, Safiya Umoja Noble, Joy Buolamwimi and Timnit Gebru as well as countless others have pointed out in recent years (Benjamin 2019; Noble 2018; Buolamwini and Gebru 2018).

The digital has clear impact on lived life and spaces beyond the screen. In the Netherlands, for example, access to infrastructure and welfare state benefits has become subject to the judgment of algorithmic controlled classifications since 2017—to the disadvantage of applicants categorized as female, mothers, or/and without a Dutch citizenship (Constantaras et al. 2023). In cities like London, police surveillance systems using facial recognition prevent especially Black and people of colour from freely using public spaces due to regular misidentifications as criminal suspects (*Coded Bias 2020*). Similarly, unregulated anti-feminist hate speech online interferes with as women, lesbians, inter, non-binary, trans and agender identifying people's (hereafter shortened with the German acronym FLINTA) ability to appropriate virtual, but also physical space.[3] Patriarchal and often additionally racist practices are consequently reproduced, standardized and materially coded into cities (to come) (Elwood 2021).

Heterogenous feminist hackspaces publicly oppose these (hetero-)normatively programmed technologies, especially in the context of their own spatial embeddedness: the city. Following five months of digital ethnographic research on cyberfeminist collectives and their resistive practices in Germany and Austria in 2021, my contribution askes: How can smart cities become technologically, culturally, and spatially hacked toward representing more diverse realities?

Historically, and following Donna Haraway's 'A Cyborg Manifesto', cyberfeminism is a line of thinking going back to the 1980s, but is also deeply intertwined with (earlier) afrofuturistic thinking (Haraway 2016; Russell 2020). In this article, I use this concept as an umbrella term for all tech-oriented, digital-affine, and hacking-based feminisms (Sollfrank 2018). Hackfeminism is a related neologism I came up with to refer to especially collective feminist hacking practices.

United by the feeling of being marginalized, not represented, and discriminated in the technocapitalist city and its technologies, hackfeminist movement have built their own counter-

infrastructures. In addition to the traditional understanding of hacking as playful, creative, mostly unwanted and often illegal intrusion into technological systems, hackfeminists see it as a collaborative 'world-making' practice and political strategy (Coleman 2014; Sollfrank 2018). On the one hand the making-visible of everyday hidden mechanisms of power, hacking is, on the on the other hand, performed as collective and processual production of other, more just (virtual) spaces.

In contrast to urban designs today which are still very much rooted in the physical, my following analysis shows how feminist hackspaces already critically consider spaces as entanglement between the digital and the built. By carefully curating rooms of their own, they attempt to increase access to interfaces and decision-making processes in cities. Sharing tech-knowledge through open source solutions and educative illustrations are important tools to enable otherwise digitized future spaces. Their activism demonstrates how (urban) hacking is a crucial practice to break with non-democratically controlled digitalization processes. Playing with uncertainties, incalculable openness, and scope for design of possible futures within software and urban spaces makes hackfeminists essential actors in imagining cities to come.

Urban design disciplines, I argue, can learn a lot from the community-based, informal but accessible way of how hackfeminist collectives approach the integration and negotiation of technologies in urban environments. Leaning on the critical hacking scholarship of Cornelia Sollfrank, Stefanie Wuschitz and Sophie Toupin as well as my own fieldwork I show how hackfeminists' everyday space-making practices are inescapably (and unapologetically) meshing the binaries between genders as well as the physical and the digital (Sollfrank 2018; Wuschitz 2014; Toupin 2018). Interstitial spaces, which Fran Tonkiss calls 'urban cracks', such as the *Baumschiff* or marginalized edges of the neoliberally planned city, further enable hackspaces to occupy space at the fringes of political agendas (Tonkiss 2013, 317). Here, practices such as learning how to code or educating on tech literacy empower members' spatial participation in designated hackspaces and the city itself.

In the following, my paper analyzes the increasing digitalization of urban processes. With the urban theoretical thinking of Shannon Mattern as well as Joe Shaw and Mark Graham's idea of a 'right to the digital city' I outline the issues of who is represented within computational logics of the smart city (Mattern 2021; Shaw and Graham 2017). Who gets coded out of training sets and consequently (public) spaces, as the works of Noble, Buolamwini and Gebru ask (Noble 2018; Buolamwini and Gebru 2018)? I demonstrate how feminist hackspaces and their resistive practices contest these forms of intertwined algorithmic and analog oppressions. Building rooms of their own allows them to establish alternative infrastructures of tech literacy, (gender) hacking and reclaim representation in technical systems *and* the city. Although they take on a very ambivalent role in gentrification processes, as I show following Sophia Maalsen's conceptualization of urban hacks, hackfeminists' understanding of hacking as a cultural technique allows them to refuse pre-programmed patriarchal orders (Maalsen 2022). By publicly enabling the appropriation of technologies and spaces, I conclude that hackfeminists set an important example for urban design disciplines on how a digital right to the city can be performed.

403 Access forbidden: smart city for whom?

Increasingly, our everyday life is infused with ubiquitous technological applications, algorithmic architectures and automated processes —'nothing is outside *datafication*' (D'Ignazio and Klein 2020, 13 emphasis in original). Digitality has become an inseparable continuation

and extension of life away from the keyboard, with the virtual and the material ever emmeshed (Russell 2020; Kitchin and Dodge 2011; Zook and Graham 2018).[4] Today, we live in a constant spatial continuum between the digital and off 'land,'[5] are interfaces ourselves, always interacting.[6] As Nathan Jurgeson stresses, '[t]he clear distinction between the on and offline, between human and technology, is queered beyond tenability' (Jurgenson 2012).

Urban spaces have long been cybercities as well. Here, what Mattern describes as the 'poetic, embodied, indigenous, uncertain, beautiful things that really make a city' collide with administrative ambitions that aim to calculate —and computationally control—its lived complexity (Marx and Mattern 2021). In urban space, tech solutions by private companies and bottom-up processes to collectively design digitization live side by side. Algorithmic and analog architectures are entangled and built into an interspace skyline. While one is made of code and the other of concrete, Legacy Russell understands both types of architecture as similarly 'fixed and impermanent' (Marx and Russell 2021). To her, they are built systems that help their inhabitants to navigate, orientate, explore worlds.

Furthermore, seemingly smarter city systems of urban digitization agendas—the attempt to programme urban phenomena—promise optimized processes and endless convenience to the 'consumer citizen' of the digital age (Powell 2021, 21). In times of a multiplicity of (global) crises, models such as the technocapitalist smart city offer 'innovative' technofixes. They are supposed to control and 'cure' the alleged chaos of the urban (Mattern 2021).

Yet not everybody is represented within these techno-imaginaries of seamless interconnected spaces and algorithmically predicted futures (McKittrick 2021). As many critical tech scholars have shown in recent years, the smart cities' technological infrastructures build on code and content which is often outdated, biased, and discriminating based on gender, race, class and ability (Elwood 2021; Noble 2018; Buolamwini and Gebru 2018). For Noble, complex decision-making processes of machine learning systems reproduce and reinforce especially the worldview of their creators in technical form—for capitalist means (Noble 2018). Algorithmic architectures require human decisions and programmed orders on what is classified as problem to be solved or optimized by machines. Since it is predominately white, cis-male developers who —literally!—codify which empirical values are inscribed into algorithms and neural networks, technologies are based on and represent their political motivation. In increasingly automated city environments, these ideals are now additionally translated into automated, black-boxed urban digital designs like connected sidewalks, cities run like platforms and solutionist approaches to tackle climate catastrophe (Mattern 2021). They are perpetuated—and capitalized!—under the guise of 'neutral', 'inevitable' hardware and software within urban space.

As a result, marginalized perspectives are not only 'excoded' from machine learning systems and their training sets (Buolamwini 2021; Buolamwini and Gebru 2018). As shown in the following, they are also excluded from urban planning, infrastructures, and participating in an increasingly informational city space. On the one hand, Black and Indigenous—especially women-identifying or queer—people of colour's and other marginalized groups' needs are underrepresented, often (made) invisible in urban designs (*Coded Bias 2020*). On the other hand, they deal with technological 'hypervisibility' (Marx and Russell 2021). The inconsideration of lived experiences by people identifying as other than cis-male and white makes them invisible (in data) and visible (as missing data) at the same time. Being computationally and culturally classified as illegible by code entrenched in white supremacist norms thus makes especially gendered, racialized and disabled bodies (deliberately) more visible

and policed, with deadly consequences (Marx and Russell 2021; McKittrick 2021; Benjamin 2019). Facial recognition software, as mentioned above, is increasingly used to monitor public services and spaces globally; consequently, authority outsourced to automated infrastructures gets to decide who 'belongs' in the city and who is categorized as threat (*Coded Bias 2020*; Constantaras et al. 2023).

This 'algorithmic oppression', as Noble calls it, and racist, sexist, excluding discriminations by design in *algorithmic* architectures are continued and reinforced in *urban* architectures, and vice versa (Noble 2018, 4). The rarely publicly questioned hype around these biased automated spaces hence raise important questions for the shaping of future cities. To what extent can models like those of a smart city do justice to the lived space and diverse realities of life in the city through optimization and efficient computation? And who owns the city at a time when digital urban transformation processes are built in dependence on and led by corporations and private interests providing technologies and smart services?

Smart city by whom?

The publicly upheld image of 'untouchable', 'inexplicable' digitality has the (intended) side-effect of seeming indisputable as well as inaccessible to most (Hicks 2021). Asymmetries of knowledge and centralization of power, upheld by the opacity of algorithms, are therefore an essential part of digital mechanisms of (spatial) control. In contrast to the cyberfeminist ideal of the Internet as a virtual, public, and political space, digital infrastructures and platforms are for the most part privatized and patented. Their use is subject to the mostly non-transparent, black-boxed terms of leading tech giants who hold dominion over these spaces, representations, and computational processes—also in cities (think of the smart city project plans in cooperation with Google Alphabet's Sidewalk Labs, Cisco, etc.) (see Mattern 2021). However, this often monopolistic control over (in)visibilities—supported by the mystification of modes of operation, their privatization, and a white-male-dominated knowledge culture that acts as gatekeeper to tech literacy[7]—is accepted as the norm and rarely contested (Benjamin 2019). It is presented as 'progressive,' not political.

Critical tech scholars and activist initiatives have long warned about the decision-making power of non-democratically elected corporations whose capital, monopoly, and global reach of technical systems have gained significant political influence (see Algorithmic Justice League 2022; Data for Black Lives 2022; Hicks 2021). One of these often bottom-up actors are feminist hacking collectives. For decades, they have been calling for governmental regulations to oversee corporate ventures. Hackfeminists as well as researchers, like the Internet geographers Shaw and Graham, advocate that in an invisibly and informationally produced city, the right to the city, today, has to necessarily encompass a 'right to information' (Shaw and Graham 2017, 918). In their considerations for an 'informational right to the city' Shaw and Graham warn that social and spatial inequalities are reproduced and translated in the process of an urbanization of information. Who gets to know about, be represented, and visible—on- and offline—in these urban operation systems (in e.g. administrations, distribution of social services, platforms etc.) is up to the (largely privatized) control of a few '"informational" classes' (Shaw and Graham 2017, 913). In the future technocapitalist city, Shaw and Graham predict, tech giants will non-transparently and inaccessibly gatekeep participation in urban society. Thus, '*an informational right to the city depends upon the ability to enunciate dissent within this regime*' (Shaw and Graham 2017, 914, emphasis in original).

By providing (semi-)public access to tech literacy feminist hackspaces can be understood as defending this idea. Enabling FLINTA to

articulate, exercise, and claim their right to digitized space they create possibilities to stand up to the pre-programming of society by technocapitalist monopolists. As Sollfrank shows, hackspaces aim to make digitalization processes comprehensible, appropriable, and information available (Sollfrank 2018). In carefully curated urban backends hackfeminists create their own spatial infrastructure, which empowers the *technological* hacking of hardware with tools and *cultural* hacking practices tackling social structures of oppression (Toupin 2013); always led by the question: who are these technology (of cities) for?

Sharing the feeling of not being represented, stigmatized and/or discriminated within technical as well as spatial systems, hackfeminist movements, I argue with Toupin, have built important counter-spaces in the technocapitalist city: to exchange discrimination-sensitive knowledge, skills, and (political) hacking approaches to technology (Toupin 2018). The works of Wuschitz and Sollfrank also demonstrates that taking up room, exercising the right to space is more than establishing an alternative spatial and care-ful infrastructure to the reign of technocapitalism (Wuschitz 2014; Sollfrank 2018). Making visible and dismantling power mechanisms hardcoded into technologies, first, enables understanding their functionality. Learning how to read (and hack) their code allows to, secondly, (spatially) partake in and change who is in the room and represented within (urban) informational infrastructures. Hence, feminist hackspaces empower participation, in technical systems, knowledge, and—through comprehending technology as structural power and tool—in the world itself.

Smart city, hacked

Following Shaw and Graham's analysis, (feminist) hacking is crucial to extend the right to the city in an increasingly informational urban space (Shaw and Graham 2017). To hackfeminist collectives in Europe and Northern America, hacking is a resistant practice, a refusal and tool to survive in a technocapitalist, patriarchal world (Toupin 2018). Adding to Gabriella Coleman's classical definition of a hack as 'a clever technical solution arrived at through non-obvious means,' feminist hacking combines the technological tinkering with hard- and software with 'wetware' (Coleman 2014, 245; Wajcman 2004, 77): the working around, disrupting or even breaking with bodily, cultural, and gendered (operating) systems of power (Sollfrank 2018). Performatively and playfully, feminist hacks penetrate oppressing power structures to make visible their sociocultural origin, functionality, and errors—and ultimately deconstruct them.

This has consequences on the urban as well. Maalsen points out that the hack 'opens up new ways of thinking with and through the [computational] city' (Maalsen 2022, 455). To her, the hack has the potential to disrupt systems while offering creative work-arounds and even otherwise possibilities; both online, offline, and in-between. Within the urban, 'the hack signals spaces of possibility, is generative and foregrounds the possible city' (Maalsen 2022, 463).

Where people, especially in cities, get organized to escape the surveilling gaze of predictability and control, the urban hack thus reveals itself as a platform of resistance between virtual refusal and pointing to cracks within the socio-urban system (Elwood 2021). With a rejection of pre-programmed futures, feminist hacking practices make use of the only calculation that is unpredictable in automated processes: that of the error. A glitch reveals the previously unthought-of, the surprising; a turning point into the unknown (Russell 2020). Its inconsistency and always ominous, inevitable presence open up possibilities to subvert the prevailing mechanisms of control. For every bug fix—no matter how preventive—only implements new glitches within the code protocol that refuses any prognosis. For Russell, errors imply

movement, which 'makes an error difficult to see but its interference ever present' (Russell 2020, 74).

Maalsen, however, warns about the ambiguity of hacking and glitching. While using errors for hacking to point to, e.g. spatial inequalities and voids of representation within software and spaces, this making-visible can also be instrumentalized and initiate repair, instead of change (Maalsen 2022). 'A hack could, for example, help to strengthen the status quo by showing where the system is vulnerable', and just reinstate the prior norm without addressing the deeper issue (Maalsen 2022, 458).

Nevertheless, for both Maalsen and Russell, the computer virus symbolizes a vehicle of resistance (Russell 2020). As a collapse that forces standardized circuits to stop, it enables the break with a broken system. Consequently, the error becomes the point of entry to hack and can be a strategy of (re)appropriation and change by unveiling the encoded norms of informational infrastructures.

You've successfully entered the smart city: hacking as space-making

In the current context of COVID-19 analyses, discussions of concepts such as 'resilient' and 'sustainable' cities have gained importance again (Mattern 2021). Techo-solutionist approaches (re-)appeared on urban governing agendas, seemingly making the efficiency and convenience of models such as the smart city appealing in times of crises and uncertainty. Constantly being confronted with often dystopian urban designs and discourses, however, I felt the need to search for more bottom-up—and hopeful!—approaches to digitizing urban spaces.

Even though a technofeminist perspective on cities remains marginal in Germany, 'there is a strong aspiration to imagine new digital urbanism possibilities representing those who refuse to be excluded from the "backend" of smart cities projects and avoid being kept "dumb",' as Niloufar Vadiati points out (Vadiati 2022, 5; Bauriedl and Strüver 2018). Digital activism can be found among network policy advocates, tech journalism - or within (feminist) hacking collectives and spaces. In 2021, over a period of five months, I thus interviewed members from five different feminist hackspaces in Germany and Austria to find out more about their hacking practices in relation to digital urban space. Three of the hackspaces are portrayed here in more detail.

Semi-structured interviews, mental maps of the hackfeminists, and digital participatory observations in public online formats by and with members of the collectives are the basis of this work. While the number of feminist hackspaces and local groups in German-speaking countries is growing, I mostly chose hackspaces which were already very established, had initiated a network of subgroups, and/or are part of a public discourse about digitalization at events and conferences. FrauenNonBinaryTransInter und ComputerKram Köln (f.u.c.k. cologne) is the only subgroup in this mix, but was chosen because it was the only collective consciously promoting their urban environment.

Due to contact restrictions and closed off hackspaces during the second lockdown in Germany until June 2021, my ethnographic research was mainly conducted from 'behind the screen'. Although I was not able to personally explore the hackspaces embeddedness within their home city, the interviewees kept emphasizing the importance of the collectives' techno-urban context in our conversations. Albeit subliminally, the city was named as an important factor for their existence since it brought together a diverse group of interested hackfeminists, possibilities to take up space, even if they are contested, and public infrastructures. Strolling and scrolling through virtual worlds and chats on digital dérives further allowed me to link online (h)activism to urban political or neighbourhood initiatives by the collectives; and

cross-dressing avatars to illustrative manuals to hack stereotypes.

On the one hand, contact restrictions forced me to explore these practices from a distance, through often dreamy narratives from members, mental maps, and online observations. On the other hand, my new found 'cyber mobility' made it possible to interview spaces from Berlin to Vienna in the same day. Unfortunately, the hackspaces' material embeddedness into their heterogenous urban environments stayed mostly invisible and there is, therefore, much to add to the microscopic, Eurocentric perspective portrayed in this article.

Nonetheless, my research made clear that the influence of technologies—as code and content, culturally, and in crises—has long expanded from screens to streets. Approaches to hack corporate computational designs in cities (to come) has diversified accordingly. As I will outline in the following, feminist hacking practices interact with and workaround the digitally gatekept city on various levels. First, they appropriate computational city infrastructures *technologically* by rewriting software programmes or using open-source solutions that refuse commercial services. Second, they *culturally* break with programmed binaries, in code and society. Third, hackfeminist collectives *spatiotemporally* fight singular visions of capitalist futures—towards a right to future tense, and a common city space that will represent all.

Hacking software and city-ware

Cologne, Germany, 2021: Meet f.u.c.k. cologne, a small feminist hacking collective founded in 2018. Sharing their facilities with an open coworking space, the KalkSpace, they are located on the 'right side' of the Rhine, an often-stigmatized neighbourhood neglected from urban infrastructures. Through regular meetings and online formats on subjects like open software, but also self-employment and reproductive health, they open up their conversations to the public. Being aware of their urban context, they aim to extent their understanding of hacking from tinkering with hardware and encryption to encouraging participation in (online) urban events and informational infrastructures (e.g. libraries).

Countering the sudden 'Zoom-Boom' of the COVID-19-pandemic in 2020, for example, the hackfeminists of f.u.c.k. cologne set up a BigBlueButton server for their neighbourhood and other groups nearby. BigBlueButton is an open-source web-conferencing tool based on open software and specifically designed for educational purposes (BigBlueButton 2022). Along with information material about privacy and data abuse as well as community outreach initiatives, this software and server infrastructure was made openly accessible to and usable by all without having to share personal data with tech corporations like Zoom. Moreover, offering a public alternative infrastructure to the city's quickly set-up tech-fixes powered by private companies raised awareness for and ideally encouraged to participate in the choosing and shaping of everyday technological use. As one of the members explains,

> tech is never apolitical. [It is important to reflect] that we're not only consumers of software, but can actively participate and understand that we're able to co-create software. [To realize and be able to share that], for me, is an incredibly political act.[8]

Through consciously intervening and initiating a more generally accessible public discourse about technologies, f.u.c.k. cologne—in a broader sense—also hacks the *urban* code (see Figure 1). Gaining even more importance in the digitalized urban life during the pandemic, they undercut the municipal, makeshift commercial software communication infrastructures with freely provided open-source solutions as well as workshops on encryption.

For the interviewed hackfeminists, enacting a digital right to the city starts with building algorithmic architectures based on collectivized software models. 'Generally, open source software, for me, has a lot to do with democratic

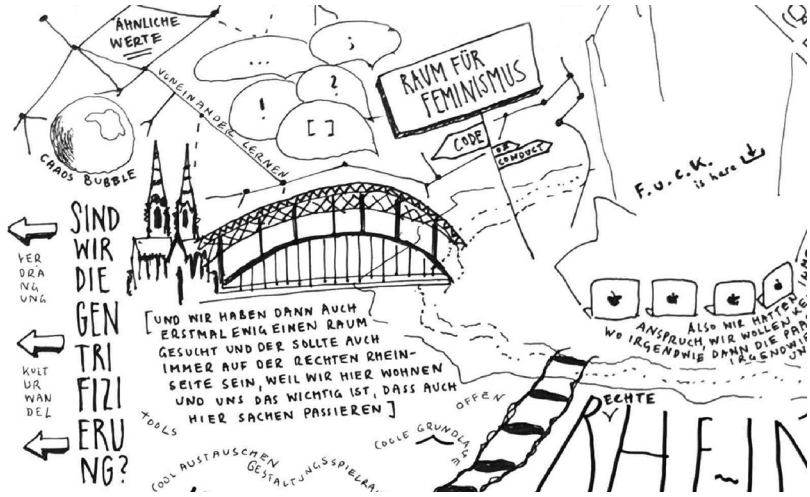

Figure 1. Mapping of interview with f.u.c.k. cologne (by author). It features citations reflecting the collective's decision to move their hackspace to a marginalized neighbourhood and how they contribute to gentrification processes.

principles', one of the members stresses. By facilitating technological literacy and know-how, they provide residents with access to (digital) urban participation, but also enable them to appropriate and technically recode these infrastructures.

Following Swati Chattopadhyay, the process of recoding not only changes access; it can 'mean recognizing a vulnerable/amenable point of entry that would give a foothold to further appropriation of urban space' (Chattopadhyay 2021, 239). f.u.c.k. cologne takes on technical systems that are existential, but fragile in their spontaneous establishment through the pandemic. As one of the interviewees criticizes, instead of inviting to collaboratively create computational infrastructures as an urban community, there are 'vacancies' in provided public-but-private services. She wishes for the city to 'not only supply services, but understand it [the digitization] as more of an interactive process, especially when dealing with [the implementing] of software.' Filling these vacancies by providing skills and tools, the hackfeminists hack, i.e. temporarily change, the (urban) code for the purpose of better access. Present glitches therefore allow those to participate in dreaming other technologies for whom the mechanisms never worked or have not worked for a long time. Hacking, here, becomes a political empowerment strategy through collective action towards democratic participation in a city for all and by all.

Hacking bits, bytes and bodies

The cyberfeminists at the Viennese hackspace Mz* Baltazar's Laboratory, Austria, similarly tackle hardcoded societal biases in city space and software. Founded in 2008, the collective combines hackfeminism with a critical artistic approach. Its gallery space in a working-class neighbourhood in Austria's capital is a workshop for deconstructing and building hardware and electronics as well as breaking with gender stereotypes through illustrations and manuals. It is also a platform for exhibitions which often would not find representation elsewhere. Mz* Baltazar's Laboratory symbolizes a 'safer space' away from discriminatory public design, misogynic experiences on the street and on social media feeds. As one of the co-founders emphasizes, safer spaces are environments 'in which you don't get sanctified for playing and breaking with gender roles and you don't have

to give a damn.' Hacking, for the collective, means providing that space and breaking with binary code as much as dualistic gender conceptions (Sollfrank 2018). '[H]acking the "code" of gender, making binaries blurry' has revolutionary potential, as Russell emphasizes (Russell 2020, 25). For the collective, this means creating 'counter-images' (see Figure 2) to stereotypes or playing with the volatility and nonconformity of virtual 'gender crossing'. By temporarily becoming avatars or other online identities hack feminists can leave bodily and gender biases of the physical world behind.

Playing with alternative bodies (as avatars or anonymously) provides room for self-reflection, spaces for experimentation, and exploring identities in the digital as well as in the actual hackspace. Moreover, this is an important counter-strategy to defy experiences of violence on- and offline. Hackfeminist communities offer the opportunity to share experiences and are important safer spaces for like-minded people, even if gender swapping can be abused online (Wajcman 2004). Thus, they establish room for alternative rules and norms.

This 'body hacking' and healing makes personal, performed, and interspatial gender identities consciously un-programmable and illegible to the cis-male-white technical prototype (Russell 2020; Toupin 2018). The fluidity and spectrum of gender performances as well as the social constitution of corporeality—but especially its physical/virtual visualization—is a hack that subverts the forcible elimination of bodies that do not conform to the idea of the techno-cultural norm. Alas, as Russell notes, this comes at a price:

> in the world we live in today, a body that refuses binary is one that is regularly reminded that, standing in-between, it is at threat of ceasing to exist in its failure to be recognized and categorized by the normative hegemony of the mainstream. (Russell 2020, 67)

Again, bodies that (intersectionally) alter from the societal 'default' become in- and hyper-visible at the same time.

As a techno-artistic gallery and workshop, equipped with a huge showcase, the interface to the street, Mz* Baltazar's Laboratory is constantly confronted with this (in)visibility. Within the right-wing political climate of their urban neighbourhood, the hackspace's public display of a spectrum of techno-gender role models revokes conflicts and makes them hyper-visible and vulnerable at times. Trying to cut communal funding is the district's regular attempt to undermine the collective and excode them from cityscape. To hack the district's nationalistic, racist, and conservative values and neighbourhood politics, Mz* Baltazar's Laboratory, however, loudly contradicts their binary, heteronormative ideas of gender with counter-images and exhibitions that say 'there is much more you can be and do', as the collective puts it.

For Mz* Baltazar's Laboratory, nonconforming (body) illustrations (see Figure 2) within its counter-space have become a 'survival strategy'. The jointly developed visual language and forms of rebellious resistance, publicly camouflaged by the label 'avant-garde art', enable the hackspace to set a sign against oppression for others as well. In this way, the political order of the neighbourhood is subverted, sometimes even exposed in the space's showcase. Hence, Mz* Baltazar's Laboratory is an important political actor: the collective publicly refuses social, cultural, and technological norms programmed into the urban code. While engaging in a world-building that emphasizes the very material, bodily consequences of digital traces, they also show how seemingly 'analog' agendas find their way into technological features trying to politically police cyber and city spaces to come.

Control + f_eminist future

By breaking with traditions, discriminatory norms, and stereotypes hackfeminist practices embody and embrace a kind of uncertainty which makes them illegible to any algorithmic

Figure 2. Part of 'And this is how you become a feminist hacker' (Wuschitz 2019).

future predictions. Rather, the hackfeminist spaces I interviewed form temporary spaces of constant transition. They not only critically question the dominating patriarchal and technocapitalist system around them, but strive to change it. 'In a perfect world,' the co-founder of the Berlin collective explains, 'we wouldn't need the Heart of Code'. Their carefully curated—literal—code of conduct, the sensitivity towards gender and intersectional discriminations in tech and beyond, would be a societal standard. For her, hackspaces are versions of futures lived out today, and should eventually become obsolete.

The Heart of Code was founded in 2015 and has around 15 active members coming together to tinker, rant, and work on hacking projects on a regular basis. Having to leave the *Baumschiff*, the collective since resides in the Künstlerhaus Bethanien, an international cultural centre in Berlin. For them, learning programming languages together, writing code, and educating about technology means getting the tools to sustainably build a better world.

When asked about their own 'cyber utopias,' neither the Heart of Code nor all the other interviewed hackfeminists answered with wild fantasies and Science Fiction scenarios. Instead, our conversations constantly returned to the wish to create digital commons. The desire of feminist hackspaces is to counter the notion of commercially developed technologies built on certainty and predictability with collaborative, constantly changing, and diverse imaginaries of futures. Who decides what and how about tomorrow's possibilities should be democratically negotiated and private influences regulated accordingly (Hicks 2021).

In addition, according to all of the interview partners, the preemptive, cis-male-dominated

future formulations of homogeneous developers should be replaced by heterogeneous (tech) designs that are by and for diverse people and needs. For the Heart of Code, '"[technology] for all" means taking its classed, gendered, environmental, future, and generational consequences into consideration.' The collective understands technology as an essential tool for (urban) participation. For it to work, however, transparency about functionality, collective decision-making responsibility as well as policies and laws are required. The 'one-fits-all'-model desperately needs an update representing diverse needs, which should frequently be renegotiated and translated into pluralistic tech-designs.

Ins[ert]: towards a right to representation in the smart city?

Occupying the ever intertwined cyber and city space means demanding a right to the city, participation and, above all, to representation—also for the technologies that shape, govern, and interact with it. Creating feminist hackspaces, these 'mini-utopias', as one of the interviewed hackfeminists called them, is ultimately a spatialization of protest against a techno-capitalist form of domination that does not sufficiently or at all consider the needs of FLINTA.

Hackfeminist collectives have recognized that being present, visible, and represented in spaces is crucial to participating in its forming; even if it is 'only' as a protesting counter-public, signalling that this socio-urban and digital space belongs to them as well. From unmaintained voids in the neoliberal city (from tree shuttles in backyards, political backends and afterthoughts) and often disregarded by urban designers and governments they build resistive rooms of their own. Here, strangers meet—and collaborate—for a short period of time; differences are temporarily united. In this interspace, urbanity emerges in its most promising unpredictability.

Gentrify-hacking!?

Building community from 'urban cracks' up makes members experience and practice a right to (urban) space, also beyond designated hackspaces (Tonkiss 2013, 317). This encourages people to appropriate—hack!—material and virtual space according to their own needs. Thus, feminist hackspaces challenge the designs of often homogenous, white, and privileged tech developers, but urban planners as well. A just city for all, which is always open to collective negotiation, does not only emerge from the in-between; it has to leave room for critical counter-designs as well.

However, feminist hackspaces not only seek out places in the urban in-between; they are also displaced there. Feminist hacking collectives take on a very conflicted role in urban gentrification processes. On the one hand, they themselves are affected by displacement processes. They are no longer able to afford the rising rents in central locations and—like f.u.c.k. cologne—are forced to move to urban outskirts. On the other hand, they themselves contribute to urban upgrading processes through their creativity. Hacking here becomes a cultural commodity that has tremendous political branding potential in the creative city, and increases the economic value of spaces.

While openly criticizing these ideals, feminist hackspaces also profit from the European neoliberal urbanism and austerity politics of the past decades. Decreasing welfare services provided by the state, the privatization of infrastructures as well as the abandonment of spaces have offered bottom-up initiatives, like hackspaces, spatial cracks to be filled according to their needs and visions. To some degree, their work plays into the neoliberal mindset of individualization, apparent flexibility, and personal responsibility (Maalsen 2022). Hackspaces fill the infrastructural and knowledge gaps with unpaid work and tech expertise after which it can be commercialized by the city as unique selling point. As Tonkiss points out, 'at worst,

"crack" urbanism acts as the leading edge for the wedge of speculative development. Perhaps the most ambivalent form of urban failure [glitch], after all, is to be the victim of your own success' (Tonkiss 2013, 318).

Hacking as practice and hacking the urban (code) can be very ambivalent, Maalsen stresses as well. While the hack has the potential to initiate irritations and interruptions, 'it is often limited in its enactment of broader change' (Maalsen 2022, 454). By successfully occupying (temporary) urban margins, hackspaces therefore contribute to an amplified gentrification process, too. In recent years, often more male-dominated hackspaces, like the famous c-base, and a growing start-up culture made Berlin a popular location for headquarters of big tech firms such as Google or Amazon, attracting a global tech elite and making housing increasingly unaffordable (Gürgen 2020). For (feminist) hackspaces like the Heart of Code, this means 'that sometimes we get pulled in different directions: we get requests like that from the [Google] Campus, asking us if we need office spaces, even though we were involved in the protests against them.' Feminist hackspaces consequently struggle between staying true to their own, often anti-capitalist, critical ideology and fuelling the political commercialization of creative tech.

Conclusion: we build this city on rocks and (feminist) code

In the face of a dystopic seeming urban future in which the smart city would be hyper-scheduled, commercially foreclosed, and shaped by exclusionary notions of efficiency, I argue that it is the responsibility of (us) (urban) designers and researchers to learn from feminist hackspaces, their communities, and practices. We are obliged to pay close attention to as well as create spaces of possibility instead of predictions for the city of tomorrow. However, mostly due to a lack of accessible tech literacy in our disciplines and beyond, this discourse is mostly held by a few (see, for example, Vadiati 2022; Bündnis digitale Stadt Berlin 2023; Bauriedl and Strüver 2018). Nevertheless, a public questioning of technologies that surround us every day could permanently change user behaviour and might make it more unpredictable to any machine learning and marketing processes (Hicks 2021).

Hackfeminists practices can show us what an informational right to the computational city would look like. As demonstrated in this paper, feminist collectives, first, hack the definition of algorithmic architectures as merely machinic processes by pointing to their societal, cultural, and spatial power. Undercutting discriminatory binaries in code and content, feminist collectives expand hacking to bodies, playfully glitching through classifications, categorizations, and conceptions—either through becoming an avatar or living out a spectrum of gender identities within their spaces.

Although they struggle with their own homogeneity within their still white-dominated hackspaces, the collectives, secondly, try to fight intersectional discriminations toward more equal technological, societal, and urban design. They show that widely sharing tech knowledge translates into being able to make computational spaces commonly legible, accessible, and ultimately hackable. I argue that this makes them important urban co-creators. Feminist hackspaces' caring infrastructures increase access to interfaces, (cyber-)spaces, and decision-making processes and are crucial in shaping the digitized cities to come. This empowers a wider range of people to not only claim spaces, but make visible the demand for pluralistic future visions and a right to participate in the negotiation of computational cities (to come).

Filling the gaps of neoliberal informational infrastructures by providing access to tech literacy, however, puts hackspaces in an ambivalent position. While they critically point to the opacity of digital agendas, lack of infrastructures as well as widely accessible tech-knowledge, they similarly repair these cracks by providing tools

and skills to (re)code society and space. This makes feminist hackspaces unintentional co-promoters of gentrification processes. Their creative capital is embraced by the city and sold out to attract more capital and make profit off of urban space.

Most importantly, though, hackspaces offer significant possibilities of sociospatial, material, and bodily representation for women, lesbians, inter, non-binary, trans, and agender identifying people's often marginalized perspectives. They are (semi-)open spaces to live otherwise worlds in the *now* already—in opposition to any oppressive everyday, machine learning and algorithmic architectures. Hacking as (cultural) technology and as subversion of patriarchal orders thus embodies in radical presence a possible tomorrow. A future full of unanticipated uncertainties and the courage to 'do things differently', as one of the interviewed feminist hackers describes; full of heterogeneous hopes in seemingly hopeless times.

Notes

1. If not marked otherwise, these and following observations result from my own fieldwork and material.
2. With her demand for a metaphorical and actual 'Room of One's Own', Virginia Woolf argues that being able to take up space for people marginalized within a patriarchal society (in her case: women) is crucial for becoming independent, to be able to think, and ultimately overcome power structures that oppress them (Woolf 2002). Already a 100 years ago, she recognized the importance of space and the social implications inscribed into built architectures. I argue with Laugwitz that feminist hackspaces are a continuation of Woolf's idea, giving space to people identifying other than cis-male where they can make room, establish their own rules, and curate access (Laugwitz 2014).
3. In German, the acronym FLINTA translates to people who identify as Frauen, Lesben, inter, non-binär, trans und agender.
4. For a more detailed review in relation to urban space see Vadiati (2022).
5. The land is nodding to material spaces and geographies.
6. Paradoxically, it still seems impossible to initiate the overcoming of binary (spatial) thinking without naming—and often reproducing—various dichotomies like virtual/material, digital/physical.
7. Today, processes of digitalization are inevitable, but not everybody has equal access to informational infrastructures. Tech literacy and especially decision-making power are (still) often exclusive to the privileged and tech elites, Benjamin explains (Benjamin 2019). Ironically, only having the most access to tech knowledge and being able to develop and decide upon technologies allows the luxury to digitally detox. People pride themselves for disconnecting today as much as ten years ago, when Jurgeson made his observations on an analogously led life as 'more authentic' and 'real' (Jurgenson 2012). However, this is only possible to the few privileged who can afford to stay offline and whose everyday work does not depend on being digitally available. This emphasizes the inherently classist hegemony encoded into technology.
8. All of the following interview quotes are translated from German into English by the author.

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