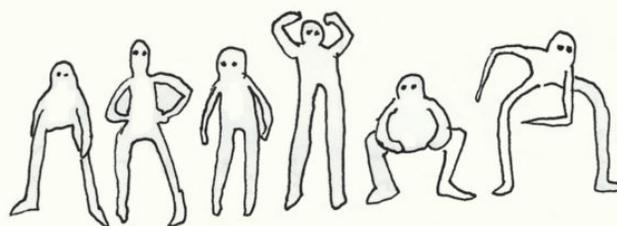


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Feminist Hackerspace as a Place of Infrastructure Production

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Work in a (feminist) hackerspace relies on the circulation of knowledge and availability of hardware. In contemporary maker scene, the majority of these resources is created in male-dominated circles and handed over to female identified makers to act upon and appropriate. Attempts to reconcile the disbalance in gender participation with pink-colored microcontrollers only reinforced existing gender and cultural stereotypes. Instead of adding to the growing voice of critique of exclusionist and inclusionist practices, we take a critical stand towards feminist hacking practice itself: we look at what is produced by feminist hackerspaces. Using standpoint theory to analyze the experience of working with one particular self-organized group of feminist artists and developers, this paper looks at practice in feminist hackerspaces as a way to create and share essential infrastructure with female or transgender identified makers. We analyze patterns of mutual self-help through sharing and learning, and their role in creating feminist infrastructure.



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Illustration 1: Mutual Self Help, by Stefanie Wuschitz

Introduction

Engineering and hacking technology is often associated with being masculine. This view continues to apply in maker culture and is a continuous impediment in recognition of feminist hacking contribution to technology. Hacker and maker practices that are most commonly seen in maker and hackerspaces include programming, tinkering, soldering, building electric circuits, building PCB prototypes for interactive devices—all skills that have since the 1960s been culturally coded as masculine skills (Abbate, 2012). Instead of claiming that we need feminist hackerspaces as safe spaces from male-centered forms of hacking, in this paper we look more specifically at what is produced in feminist hacking activity. Our account of feminist hacking activities is set in Mz* Baltazar's Laboratory, based in Vienna, Austria as well as in extensive review of current literature (most prominently Toupin, 2014; Fox, Ulgado, & Rosner, 2015; Toombs, Bardzell, & Bardzell, 2015). We are aware that feminist hacking activities might be quite different in a different geographical and cultural contexts.

A collaborative practice of sharing space and tools can develop friendly conditions for feminist hackers. Not through the production of feminine-connoted, girly looking high-tech tools—*pink hardware* such as Lilypad Arduino or Sakura Board (Holbert, 2016)—but as an infrastructure facilitating immediate reaction to the mechanisms of exclusion.

The dynamic of a feminist hackerspace is shaped by agents struggling against sexual discrimination in their daily life and in reproductive work (Butler, 2005; Cox & Federici, 1976). Decades of feminist struggle and grassroots women's activism have not been fully successful in emancipating female labor and reproductive rights, but were on the other hand, instrumental in the repeated call for more cooperative forms of life and institutionalization of struggle (Federici, 2012). Or, as Sara Ahmed (2017) put it, "feminism is what we need to handle the consequences of being feminist," pointing to the recursive character of feminist struggle on one hand, and its collaborative character that surpasses involvement from solely female identified persons on the other.

Rooted in the cyber feminists' strategy to explore and domesticate computers and use computers as political tools for feminist activism, the context of the feminist hackerspace also celebrates achievements of female identified makers^[1] with regard to ICT (Sørensen, Faulkner, & Rommes, 2011). There is, as in traditional hackerspaces, an emphasis on technical work and collaboration among participants (Maxigas, 2012), in this case among female socialized persons (women and trans females, as well as non-binary persons). This includes 'hacking' (Stallman, 2002; Coleman, 2013), the (mis-)use, reverse engineering and adaptation of technology. Demystifying and altering technological production circles in a feminist hackerspace initiates and fosters a unique, fearless relation to technology. On the other hand, it establishes strong ties between an individual agent and a collective. Relations formed among members offer a certain help in (re)orientation (Ahmed, 2006). Within the collective the individual overcomes hesitations, self-censorship and the limitations of gender normed behavior. This process renders common gender gaps either irrelevant or porous and therefore easier to transcend.

We rely partially on feminist standpoint theory as a critical strategy of 'studying up' (Harding, 1987), to produce alternative points of departure, in order to gain insights and situated knowledge from our very limited perspective as involved agents. We build on Judith Butler's (2006) understanding of gender performance and apply it to physical computing and software development, specially DIY practice (Phelan, 1993). Aside from Judith Butler's powerful work and Donna Haraway's (1988; 1991) insights into instability of scientific knowledge, we draw from existing research in feminist hackerspaces by Sophie Toupin (2013; 2014), Fox et al. (2015; Fox, 2015) and Toombs et al. (2015). Our aim is to demonstrate how feminist hackerspaces shape both the access to interactive technologies and their cultural coding. We identify this with an infrastructure for gender performance.

Issues of Feminist Hackerspaces in Contemporary Scholarship

Making Tech is Not Only for Men, is It?

Design and development of technology continues to take place in androcentric environments of engineering companies and university research groups. While gender bias is not the only reason why computing systems are rarely developed by members of the communities they serve (Fiesler, Morrison, & Bruckman, 2016), the number of female socialized persons who actively shape development of technology is under 30% (women* working in science and engineering jobs) or under 12% (women* in leadership positions) (Beede et al., 2011; Forrest, 2014). In the long run, female identified technologists are written out of history (Reagle & Rhue, 2011; Lam et al., 2011; Forte et al., 2012). For example ENIAC programmer Jennings Bartik or NASA mathematician Katherine Johnson are rarely mentioned in schoolbooks, their important contributions to computer science and engineering largely unrecognized. Walter Isaacson's *The Innovators* (2014) and Margot Lee Shetterly's (2016) *Hidden Figures* are recent attempts to remedy this that reached popular culture. It adds to the problem that many female identified technologists devalue their own expertise and qualifications (Newman, Tarasiewicz, Wagner, & Wuschitz, 2016). They also tend to demure their skills in applications, which often also results in lower salaries for equal labor (National Science Board, 2016).

Intersectional discrimination is beyond the scope of this paper, but we can briefly call to mind that voices of women* of color are oppressed and exploited on multiple ('intersectional') levels in the hardware industry. Much more than people passing as white and female, people marked as black and female are deprived from acknowledgement and appropriate financial compensation for their labour (Mohanty, 2003)

Feminist Hackerspaces In Theory And Practice

Feminist hackerspaces have emerged as a response to this gender bias. Their voice is not uniform (Toupin, 2014) and they address issues using different strategies. They have, however, become more and more visible in the academic field. Current scholarship of feminist hackerspaces (Fox, et al., 2015; Lindtner, Bardzell, & Bardzell, 2016; Holbert, 2016; Toombs, Bardzell, & Bardzell, 2014; Toupin, 2014) focuses on

questions of accessibility, collaboration and organisation strategies and approach to sharing. This work is often ethnographic, studying a number of—mainly US based—feminist hackerspaces and interviewing their participants and organizers.

At times, researchers took a more action-research approach, giving workshops on site in order to directly engage with the organization and speculate on the types of things that might inform and generate ideas for the participating members (Fox, 2015). Fox describes work that particularly looks at *infrastructuring* of design decisions: recognizing how “highlighting the sociotechnical assemblages underlining our design projects could offer possibilities for rethinking technology design” (Fox, 2015, p. 342). For example, the perspective of open source hardware in combination with a feminist approach brought about new workshop designs, in which taking apart hardware in a group is followed by deconstructing gender roles related to aggression and femininity. And resulted in collaborative design processes to build interactive installations from that knowledge.

These research efforts established a solid ground for our fieldwork and for extending scientific analysis. We would now like to take this research on the phenomenon of feminist hackerspaces a step further to look at what is actually produced in feminist hacking activity.

Infrastructure as a Technical, Social and Cultural Facility

Engineers design infrastructures to remain in the background and enable seamless functioning of systems they are engineered for. Suzan Leigh Star (1999) observes that systems become infrastructure when they work sufficiently well so that we stop noticing them. Star brings out the example of piping and staircases, both of which we use without particular awareness, until the piping breaks or the stairs become a problem to mobility. Piping is infrastructural to people whose homes and offices it supplies with fresh water. At the same time, to a plumber, piping is work, it is a problem to solve. Discussing infrastructures demands the extra effort of taking a distance from something we are half-consciously engaged with on an everyday basis. Writer Paul Graham Raven proposed *infrastructure fiction*^[2] as a form of discourse that takes this critical distance to systems and services that underlie our everyday interaction with the environment and with each other.

Visibility, or the lack thereof, is a common theme in infrastructural research. Adam Rothstein (2015) wrote about the privilege to experience our infrastructure in first person. Infrastructure, for him, implied anything from container shipping lines to telecommunication traffic. These infrastructures were designed to be visible only to the ones who maintained them.

Lucy Suchman (1995) suggested to put more effort into conceptualizing the intimate relations between work, representations, and the politics of organizations. Similar to the technical infrastructures, the better the work is done, the less visible it is. She encouraged a design practice in which representations of work are taken as part of the fabric of meanings out of which all working practices are made. We follow her call to carefully investigate infrastructure as production sites of meaning and become more sensitive towards the construction of power through its representation.

Fox et al. (2015) have explored the cultural aspect of infrastructures as an intangible set of rules which affect design decisions (Fox, 2015). They found that in the encounter between feminism and technology, design: “*must confront the variety of feminisms at play.*”

Identifying a Feminist Infrastructure

Our research investigates how feminist hacking practice at Mz* Baltazar’s Lab creates and shares essential infrastructure to female identified makers. We use the word infrastructure intentionally to denote an underlying set of facilities, tools and relationships that the feminist practice relies on. Ethnographic research in infrastructures looks at how technical and administrative systems operating in the background influence the active experience of the world (Lampland & Star, 2009; Star, 1999). We apply this perspective to the organization of feminist hackerspaces. The labor that goes into the organization of a feminist hackerspace does not recede from view here, but we focus primarily on the gender performance that is enabled within a feminist hackerspace.

In feminist hacker communities, a separatist attitude is cultivated—comparable to the second-wave feminists who celebrated female difference through women-only spaces (Rendell, Penner, & Borden, 2000). Yet, the key difference is in the connection between agents, which is fostered through a tool rather than an aim. Looking at this key difference from Butler’s perspective, the tools of a traditional hackerspace are culturally read as requisites to performing masculinity. We will describe in more detail

how feminist hackerspaces become infrastructures that enable an autonomous gender performance.



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Illustration 2: Feminist Hackers, by Stefanie Wuschitz

Lived Experience of the Feminist Hackerspace

Through the experience of organising and contributing to Mz* Maltazar's feminist hackerspace, this paper unpacks the pre-conditions to feminist DIY maker practice. We regard this hackerspace and the network of its users as an infrastructure that facilitates and conducts additive processes of empowerment and emancipation from passive consumers of technology to active and critical participants in its appropriation.

We also draw from a larger study conducted by one of the authors in hackerspaces in Asia, the United States and Europe through in-depth interviews with female identified and transgender artists and hackers.

We use standpoint theory to ground our methodological approach. Feminist scholars advocated taking women's lived experiences as the beginning of scientific enquiry. In

her articulation of ‘situated knowledge’, Donna Haraway proposed a bottom up research approach. It requires from the researcher to become an interactive agent in the field. Empowerment can emerge only through political processes informed by situated knowledge (Harding, 2004).

Mz* Baltazar’s Laboratory: The Case of a Feminist Hackerspace

Our observations are based on a research of a group of feminist artists, developers and designers who run a self-organized, shared space, intended exclusively for people who pass as female or transgender persons. The organization that defines itself as feminist hackerspace, not only provides open source tools and equipment to all participants, but also encourages members to perform gender in a new, unexpected way, break with technology related stereotypes and unlearn trained feelings of deficiency. Technical skills such as soldering and writing simple code for specific projects, or taking apart hardware tools is taught at one or two day workshops. Skills and knowledge sharing also focuses on questions of sustainability and fair sourcing of materials, when generating electrical power and building one’s own hardware and electronic components.

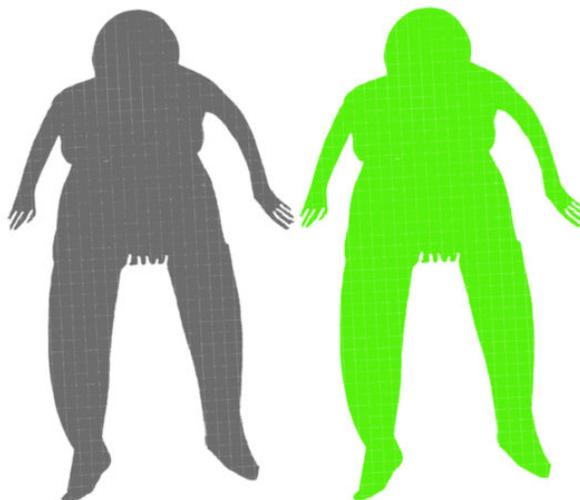


(https://adanewmedia.org/wp-content/uploads/2018/05/image_3.jpg)

Illustration 3: Feminist Hackers Make Noise, by Stefanie Wuschitz

Participants come from various educational and professional backgrounds. Through communication on the mailing list, workshops, performances, exhibitions and events, Mz* Baltazar aims to connect different groups of people living in the surrounding area (e.g., refugees, unemployed, artists, single-mothers, community radio activists, etc.).

The resulting organization is not merely a shared living room which shelters from the weather and from harassment by young male geeks. It is also not simply a collection of soldering irons, LEDs and Arduinos that a feminist hackerspace offers to feminist makers. Its particular structure and setting creates and preserves material and immaterial output. Knowledge sharing work slowly adds up, producing documentation, manuals and instruction sheets. Custom hardware tools and objects are designed and assembled. Equally important to this material production is the experience, gestures, norms and values created in this environment. It amplifies critical thinking and encourages to take risks, but above all fosters the bending of normalized gender performance.



(https://adanewmedia.org/wp-content/uploads/2018/05/image_4.jpg)

Illustration 4: Self Crafting, by Stefanie Wuschitz

Relationships Formed Through Feminist Hacking

The laboratory style of decision-making, co-hacking and caring (Toombs, et al., 2015) opens opportunities for complex relationships to forge. These do not replicate relationships formed in hackerspaces in general, although the focus on technology is very strong. In feminist hackerspaces, participants do not limit their mutual support to technical skills, but help each other in finding jobs, apartments, making deadlines or exhibiting artwork.

Transforming and Inventing Through Feminist Hacking

When members of the Mz* Baltazar's Laboratory organized a one week workshop, it usually started with breaking apart hardware. Disassembling an electronic device on purpose not only breaks the hardware, but also breaks with feminine gender scripts (Derieg, 2007), the norm on how to perform femininity (not be 'aggressive' and to not avidly 'destroy'). This collective transgression of gender norms decreases the fear of opening a device, but also gives participants a taste of how it feels to break gender norms in general.

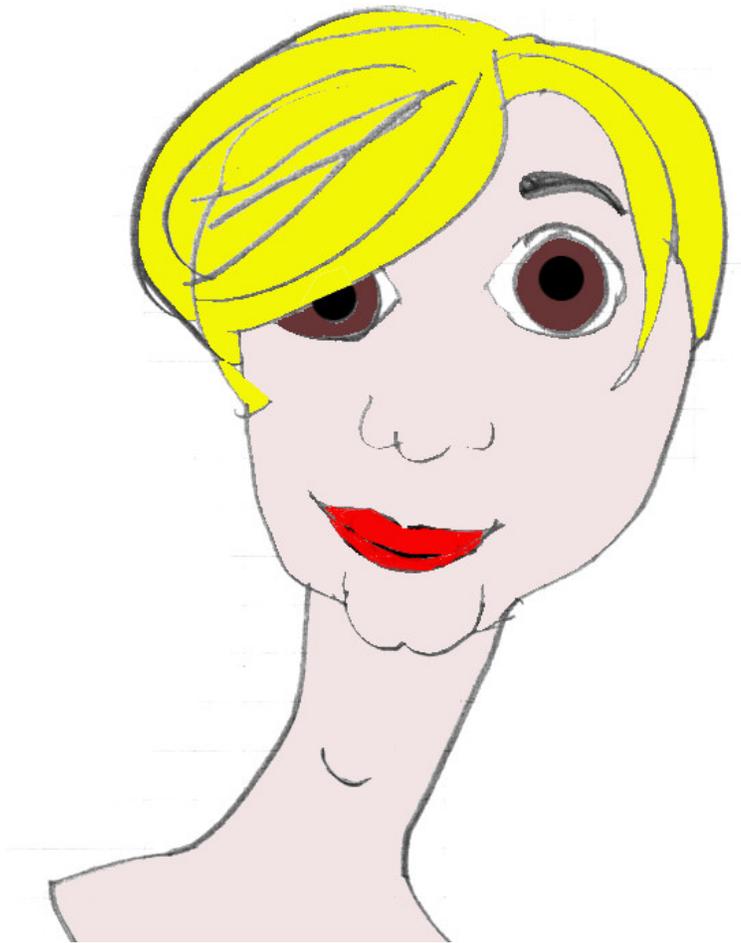
A site-specific culture evolves over time. Should we consider these immaterial products as innovative and what would be our criteria to do so? It was often mentioned in the past years how Western-centric, post-colonial perspective fails to recognize innovation in engineering solutions that take place in developing countries (Avle & Lindtner, 2016; Dourish & Mainwaring, 2012). However, we identify similar problems in Western-based hackerspaces dedicated to underrepresented groups, such as female identified makers. Innovation which does not compete with solutionist, optimization oriented agents fails to make an impression. To counter this, we are diving deeper into the dynamics within a feminist hackerspace and address the immaterial innovation that is being accomplished here.

Gender in Feminist Hackerspace Infrastructure

What makes the process of feminist hacking different from hacking in a traditional hackerspace? We could compare the presence of female-identified makers in a male-dominated hackerspace to the appearance of drag queens in public. In the same ambivalent way as drag queens question the connection between femininity and beauty (wearing makeup or a robe) (hooks, 1992; Butler, 1997), female makers question the connection between masculinity and technology (soldering, coding, welding).

Female makers in a hackerspace who are performing technological tasks, look like they

try to compete with male identified participants in appearing masculine, in performing masculinity. Although it is simply the development of technology that is being performed. Hereby female identified makers in a hackerspace become as visible and 'marked' as a drag queen in public.



(https://adanewmedia.org/wp-content/uploads/2018/05/image_5.jpg)

Illustration 5: A Room for Femininity Performance, by Stefanie Wuschitz

Conversely, in a space shared with female identified makers, the development of technology is not seen as masculinity performance anymore. Making technology here is really just making technology. A group of persons performing their self-determined subject position, 'reverses' the coded power of visible and invisible markings (Phelan, 1993). All pass as unmarked, become invisible. At this point we want to re-introduce Star's (1999) argument that well functioning infrastructure is invisible. We raise the

question: in which kind of infrastructure do female identified makers become invisible?

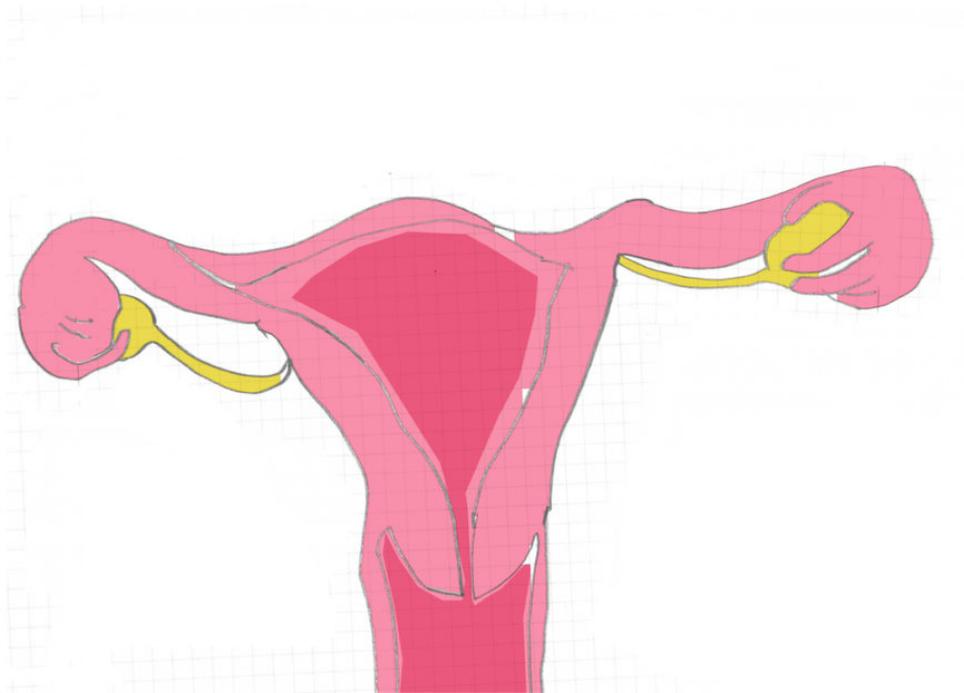
What is Produced in Feminist Hacking?

People performing technology and femininity at a traditional hackerspace are visible, meaning they are discriminated, stereotyped, marked. The infrastructure of a feminist hackerspace renders gender unmarked.

Feminist hacking activity generates alternate, autonomous, fluent forms of gender performance. If people in a shared space perceive themselves as similar to each other (e.g., white, male, educated) their subject position is stable, unchallenged. Their access to the shared space and practice is stable as well. These are three stable factors that ground, but also limit the lab participants of a traditional hackerspace. Feminist hackerspaces in contrast, rely on no stable subject position, no stable gender performance. Tech practice in a feminist hackerspace tends to be fluid. While participants of traditional hackerspaces replicate commercial technological developments in their practice (e.g., building drones, making Arduino cars, 3D printing plastic gadgets), participants of feminist hackerspaces pay more attention to stable interpersonal relationships. This anchor needs to compensate for the ephemeral condition of gender and tech practice. The activities and facilities of the feminist hackerspace we observed for this research are offering a stable factor to trust in, an infrastructure for gender performance.

Feminist hacking makes more visible the multitude of perspectives that can and should be addressed by technology, which are currently not. When a community of such people is gathered around in a hackerspace, these different perspectives and narratives (speculative designs) begin to accumulate. With the infrastructure in place, participants in a feminist hackerspace can attend to implicitly misogynist technologies and to discrimination that is inscribed in the measures of the “normal” in assistive technologies and services. Medical pace makers make an interesting example of a device that needs attention in this context. Karen Sandler, an attorney and executive director of the Software Freedom Conservancy pointed out how they are calibrated to a male standard user.[3] People who do not fit into this profile, for example pregnant women, will receive electro shocks by pace makers. Algorithms based on mathematical models that are not considering women and transgender people’s needs, will limit, if not harm them. It is therefore urgently necessary to foster infrastructures that amplify

the voices of people ignored by mainstream software development companies. Knowledge and energy accumulated in a feminist hackerspace can ideally encourage them to develop open technology themselves that considers their individual situations.



(https://adanewmedia.org/wp-content/uploads/2018/05/image_6.jpg)

Illustration 6: My Body My Choice, by Stefanie Wuschitz

When a feminist hackerspace is functional it fosters the bending or breaking of normalized gender performance. We propose that we will comprehend their dynamic better if we look at feminist hackerspaces as an innovative infrastructure. If the infrastructure works well, the spectrum of possible technology practices and outputs widens. Feminist hackerspaces therefore create essential infrastructures to enable unorthodox and creative technological practices and out of the box thinking. The separatist infrastructure of a feminist hackerspace compensates destabilizing factors such as the member's fluent gender performance, fluent subject positions and fluent tech practices. This way the feminist hackerspace we worked with is producing material, but even more so immaterial outputs. In the future we plan to analyze which other forms of subversive output participants of feminist hackerspaces have contributed to their community.

Conclusions

We contribute to formulating the feminist hackerspace agenda(s) by stepping away from its existential questions and instead look at the actual practice. We identify a form of subversion of gender norms provided in the process of hacking in feminist hackerspaces.

We analyzed one feminist hackerspace as socially and culturally coded construction, produced by strongly engaged agents. The infrastructure generated through the activity in this feminist hackerspace is fragile, because it is grounded only in a shared space, but valuable for its participants, because it offers a unique opportunity to challenge cultural norms of gender performance. Here, female identified makers pass as unmarked and become invisible, hence, can explore technology without gender discrimination.

In a different geo-political context, e.g., on Java, Indonesia, running a similar space might be more of a challenge for the collective. Maintaining an activist or counter-cultural infrastructure sometimes faces resistance from the surrounding neighborhood and even on a state level. For example, during the lady fast 2016 in Yogyakarta, participants were targets of police violence.^[4]

The infrastructure of the observed feminist hackerspace is functioning smoothly, if we rate it through Star's (1999) criteria (of a functioning infrastructure becoming invisible). This invisible infrastructure allows new gender performances (Butler) to emerge and it enables participants to follow activities they would otherwise fear to render them too masculine to pass as female (otherwise sanctioned through stigmatization outside the feminist hackerspace, as drag queens would outside a drag ball).

We propose to consider work that takes place in the hackerspace as an accumulation of feminist perspectives. It's a narrative that grows through people joining it and disobeying to normative gender performance, encouraged through the narrative of the space (the Turkish girl talking about sexuality). Speculating together about what a feminist hackerspace could be like is a way of worldmaking. Feminist storytelling is actually a feminist imagining, feminist imaginary (Anderson, 2006). The re-appropriation of practices that are culturally coded as performance of masculinity is an essential achievement of a feminist infrastructure. Just like a drag queen doesn't have to justify wearing makeup on a drag ball, a female identified maker does not have to justify her affinity to soldering, coding or welding in a feminist hackerspace. Drag ball is not a tool, it's an imaginary; it is a shared narrative that is generated in this context.

Notes

[1] With female identified makers we try to describe persons who pass as female in public, as argued in (Phelan, 1993)

[2] To read more about Raven's take on infrastructure fiction, see the post he wrote about it on Superflux: <http://superflux.in/index.php/introduction-infrastructure-fiction-guest-post-paul-graham-raven/> (<http://superflux.in/index.php/introduction-infrastructure-fiction-guest-post-paul-graham-raven/>)

[3] Documentation of Sandler's experience is available on Software Freedom Conservancy website <https://sfconservancy.org/blog/2017/apr/06/hack-proof/> (<https://sfconservancy.org/blog/2017/apr/06/hack-proof/>)

[4] To read more on this event, read an article on *BBC Indonesia*, 2016. *Polisi dan ormas bubarkan acara Lady Fast di Yogyakarta*, http://www.bbc.com/indonesia/berita_indonesia/2016/04/160403_indonesia_diskusi_perempuan_bul (http://www.bbc.com/indonesia/berita_indonesia/2016/04/160403_indonesia_diskusi_perempuan_bubar_oramas)

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◀ FEMINISM ◀ FEMINIST HACKERSPACE ◀ GENDER HACKING ◀ INFRASTRUCTURE
◀ MAKER CULTURE ◀ PEER REVIEWED

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