Do-It-Together: Feminist Reconfigurations of Hacking In Montreal

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Abstract

Do-it-together: Feminist Reconfigurations of Hacking in Montreal

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Technological practitioners and observers often depict hacking cultures as fast-evolving spaces for social, political, technological and cultural innovation. While interest in hackerspaces is growing in terms of technological innovation, limited attention has been paid to building inclusive collective real-world spaces for hacking. This dissertation addresses this lacuna in two ways: First, this study looks into the forms of inclusion and exclusion found in traditional hacking spaces, exploring in detail the invisible boundaries formed in and around such spaces. Second, this study foregrounds feminist hacker practices and the alternatives they offer to such limited traditional hacking spaces. It argues that traditional hackerspaces, while empowering a few, encourage segregation within the hacker movement and enforce unwritten norms that relegate a large number of hackers (female, queer, transgender) to the margins or even the outside. To this end, this thesis examines two case studies in the city of Montreal: Foulab, a traditional hackerspace, and Femhack, a feminist hacker collective. As a hacker, a feminist and a researcher, I chose to study these communities through an Ethnographic Action Research Methodology, a methodology which helped me to document, contextualize and analyze the local expressions of the hacker movement, while theorizing its real and potential approaches to space, community-building, and learning through technology. By using the advantage of my insider position, this research assesses the democratic limits and possibilities of hackerspaces in Montreal and beyond. It offers four takeaways: 1) The traditional hackerspace model reproduces patriarchal structures that create barriers for women and other minorities, due to an overemphasis on technology and individual achievement. 2) Feminist hackerspaces welcome participants and are actively inviting, not just welcoming in theory. Choosing to invite marginalized hackers in is more powerful than just "leaving the door open" for them. 3) Broadening the definition of hacking to include areas in which men are not already the default experts, creates a more just, diverse, and equitable hacker field of expertise, thus breaking hierarchies and power relationships in this technological field. 4) Feminist pedagogies stressing on collaborative learning and applying in the hacker practice open the barriers set in traditional hackerspaces, creating spaces respectful of participants' differences and needs. In a nutshell, I suggest that the ideals and practices of the feminist hackerspaces examined in this thesis could be the beginning of a movement from a DIY (do-it-yourself) toward a DIT (do-it-together) hacking culture focused on more connected local communities, encouraging sustained engagement and more inclusive participation in the hacker movement.

Acknowledgements and Dedication

I have many people and spaces to thank for the completion of this thesis. My initial and my current supervisors, Prof. Leslie Regan-Shade and Prof. Kim Sawchuk, for the inspiration to start and finish this exciting journey.

I am grateful to my research participants for all the ongoing discussions, for your generosity and honesty during the interviews. I appreciate your understanding of my difficult position and continuous support throughout the data gathering process and its analysis. Some of you read through these pages and helped make this thesis more diverse and colorful with your thoughts and ideas. I am thankful, as well, to all the hacker friends who did not make it to this thesis, but equally inspired me, frustrated me, and sometimes made me want a better hacking life.

I want to thank some of the early readers of this manuscript, many of whom gave me invaluable advice on how to proceed, by clarifying which parts were valuable to them. Many of those are members of the Bits-Bots-Bytes reading group led by Gabriella Coleman from McGill University. In particular, I want to mention colleagues and friends such as Alex Megelas, Alex Sheldon, Maxigas, Ellen Foster, Fenwick McKelvey, Elena Razlogova, Alessandro Delfanti, Stephane Couture, Sophie Toupin, Steffanie Schirmer, Anne Goldenberg, Evan Light, and of course Biella Coleman for your continuous support and interest in my thesis topic. Thanks to my proofreaders Reny Ivanova and Aaron Ricker, who were my second pair of eyes right up until the last moment.

Thank you, mom, for asking me almost every week for many years, where I was at with the thesis. It was hard to say sometimes, but now she can finally be proud and relieved that she doesn't have to ask this question again. Thanks to my partner, Ahmad, hacker, Ph.D. himself, and tech activist, for the unconditional continuous support regarding both the subject and the process. Thank you to my kids Boriana, Eli and Mina who were my inspiration for seeking a better world of hacking, which, I believe, they will also belong to one day.

This thesis was written in more than 10 countries, and an equal number of hacker events and hackerspaces, in the mountains, seaside, and cottages. Among them were San Francisco, Valencia,

Berlin, several New York (H.O.P.E.), Chaos Computer Camp 2015 and 2019 (Germany), OHM 2013 (Netherlands), Hacklab - Toronto, Foulab, Kostenetz, La Belle Verte, The Bulbes, San Diego, libraries in Barcelona, Paris, Sofia, Canmore, Calgary University, the Concordia thesis boost events, Hacker summer school (Germany), and the Summer Research Writing Residence, which I did not leave for almost two years (Thanks, Marc!), and many others. Special mention goes to Chalet Beaumont in Val David, to which I owe many pages of this manuscript.

I want to dedicate this thesis to my grandfather Prof. Ivan Goranov, who passed away a day before my thesis defence, the only member of the family who worked to obtain a Ph.D., and who never asked me any completion-related questions. I feel proud to have had him in my life for 42 years, and now in my heart forever! We climbed so many mountains together!

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Introduction

The communities, jargon, ethics and philosophy referred to collectively as *hacker culture* have roots reaching back to the activities of the hackers at the Massachusetts Institute of Technology (MIT) in the 1950s and 1960s, and the rise of the computer sharing culture in California in the 1970s. The term *hacking* often carries a criminal connotation due to the phenomenon of the security hackers devoted to defeating cybersecurity measures, from Chelsea Manning to recent concerns about meddling in computerized voting stations. However, hacking is not necessarily illegal: it often simply describes a hands-on and democratizing approach to technology and computers in particular.

Hackers assert that the inner workings of technology need to be opened up by users for repair, refinement, learning, and play, a philosophy, shared or borrowed with the Free and Open Source Software movement. The philosophy of the Free Software movement promotes software rights in terms of the freedom to read, modify, use and share the source code (the human-readable code of the software) of computer programs. These four freedoms are the base of every software licensed under the special copyright license system called GNU (General Public License or simply GPL[1]), which guarantees these freedoms to users. To provide a short background, in 1984 the programmer, hacker and employee of MIT's AI Laboratory Richard Stallman (known widely by his initials *rms*), launched the GNU Project, which was the first operating system, consisting entirely of free software, and along with it the Free Software movement. Stallman's emphasis on the political aspect of software freedom is stressed through the slogan "Free as in speech, not as in Beer," which underlines the principle that the freedom involved here relates to moral philosophy and human rights, and not simply to a product gratuity. When hackers began to connect through BBSs[2] in the 1980s, this *hacker ethic* was further developed, allowing for the

[1] https://www.gnu.org/licenses/gpl-3.0.en.html

[2] BBS (Bulletin Board System) is a chat-board on a server that allows users to connect and leave messages to each other, upload and download files or reading news. For more information, see: https://en.wikipedia.org/wiki/Bulletin_board_system and https://www.techopedia.com/definition/2481/bulletin-board-system-bbs

definition of a fertile and imaginary playground for computer users who embrace the ideals of sharing, openness, decentralization, free access, world improvement and the hands-on imperative (Coleman, *Coding Freedom*). *If you can't open it, you don't own it* is one of the guiding principles of this free movement, in the words of the Hacker's Manifesto dating from 1986.[3]

In subsequent decades, hackers have formed local communities in the real world (i.e., not only online), each with its own varying practices, ethics, jargon, and community rules. They have organized to create and support physical workshop spaces known under different names such as hackerspaces, makerspaces, hacklabs, fablabs and more. Now numbered in the thousands, these physical hubs of hacking activity continue to proliferate across North America, Latin America, Europe and a significant part of Asia, offering access to creative, inexpensive and well-supported machinery and tools for building, experimenting with and learning about technological artefacts. According to Sarah Davies, as of 2016 there were over 1200 such spaces in existence (Davies 3). Hackerspaces often develop codes of conduct or bylaws[4], rent or squat in physical locations, and introduce membership fees for their regular participants. This type of *innovative hub* was previously available only to experts working in large corporations and university labs. Today these spaces and their facilities are increasingly accessible to a broader public, including individuals from a variety of backgrounds (Williams et al.).

While hackerspaces provide fantastic opportunities for many people interested in hacking everyday technologies, not everyone can benefit fully from such spaces. One social and political dimension of hackerspaces needing attention here is "space" itself. Although such spaces take their inspiration from hacker principles such as free access and openness for all, their real-world demographics indicate the continued presence of systemic social and gender exclusion. Regardless of their location and despite their principles of openness, hackerspaces, in general, have had a hard time attracting and/or retaining individuals such

[3] http://www.mithral.com/~beberg/manifesto.html

[4] Listed on http://hackerspaces.org

as women, people of color, gender nonconformists - in other words, minority individuals in the field of technologies today. In her research on gender and hacking, British STS scholar Alison Adam stresses that a vast majority of hackers remain predominantly young, white, highly educated males from middle-class families; women and other hackers remain a minority (Adam, "Hacking into Hacking" 3). Moreover, Adam, quoting Cornelia Sollfrank's earlier publication, maintains that "[of] all the technological spheres, hacking contains [the] fewest women" (Sollfrank; Adam, "Hacking into Hacking" 6). This relatively exclusive situation on the ground is not aligned with the hacker ideals of access and openness mentioned above.

Around 2005, hackers began responding in earnest to these limitations of traditional hackerspaces by opening more and more intentional community spaces accessible to marginalized hackers and their practices. New communities such as feminist hackerspaces, queer hacker groups and feminist gatherings affiliated with larger hacker conferences (e.g. the Chaos Communication Congress[5]) started becoming more visible and attracting more interest (see *Chapter 1* for more detailed information on feminist hackerspaces history and principles). Like traditional hackerspaces, these spaces provide a place to meet and exchange ideas about technology and its creative uses, learn new skills and find like-minded people. As the Feminist Hackerspaces Zine[6] notes, feminist hackerspaces are spaces where "women and other marginalized people should be welcomed to perform technical practice without being subjected to discrimination or abuse" (Burek 3; Fox et al.). In this sense, feminist hackerspaces, while supporting many of the hacker values related to freedom in matters of technology and the right to access and share knowledge, also address questions related to anti-oppression, autonomy, personal experience with technology and

[5] Chaos Communication Congress is an annual hacker conference taking place every year since 1984, typically in Hamburg, Germany. Created by the Chaos Computer Club (CCC, https://www.ccc.de/en/), the Congress is one of the largest hacker gatherings. It had over 15000 participants in 2017. For more information see https://en.wikipedia.org/wiki/Chaos_Communication_Congress and https://events.ccc.de/congress/2017.

[6] By The Feminist Hackerspaces Zine I mean a feminist hackerspaces guide based on Fox, Ulgaro and Rosner's article "Feminist Hackerspaces: Hacking Culture, Not Devices." The Zine, produced by Burek, was available online (in PDF format) for a couple of years, and explained in detail what feminist hackerspaces represent, the philosophy behind them, and how to build one's own. During my reference verification in 2019, I noticed that it has been removed from its original online location.

identity work. Many such spaces support the ideal of intersectional feminism: a way to respect the intersections between race, class and gender among members as opposed to burying them under an ostensibly one-size-fits-all discourse of freedom (more on this topic will be covered in both *Chapter 1* and *Chapter 6*). In this way, feminist hackerspaces have become known as environments open to approaching hacking practice with a stress on a multiplicity of skills, feminist activism, and support for a variety of identities.

I argue in this thesis that as this variety of hackerspaces has emerged, characterized by various specific geographic, political or thematic needs, and by various levels of commitment to formalized locales and organizational structures (Levy), a need and an opportunity has arisen to embrace new, more accessible, diversified and connected hacking practices. Such a process involves transforming the hacker movement from within, forcing it to open up and reformat the widely shared understandings of hackers and hacking. This transformation would notably include a move away from individualistic and even competitive hacking rules such as RTFM (*Read the Fucking Manual* before wasting other people's time with your questions[7]), toward a new vision of cooperative learning and sharing. I suggest, in brief, that the ideals and practices of the feminist hackerspaces examined in this thesis could be the beginning of a departure from a DIY (do-it-yourself) culture toward a DIT (do-it-together) hacking movement creating connected and complicit communities rather than isolated hacker groups. To this end, this thesis documents, contextualizes, and analyzes the hacking practices of two Montreal hacker communities: Foulab (the first formally established Montreal hackerspace) and Femhack (a Montreal-based emerging feminist hacker collective). It provides an overview of the social structure and hacker practices of those spaces and looks in detail at their organizational principles and discourses, to identify the reasons and consequences of social and gendered divisions linked to broader hacker practice.

In pursuing these goals, this study contributes to building a critical theory on hacking and its spaces through a technofeminist lens (Wajcman, *TechnoFeminism*; MacKenzie and Wajcman, *The Social Shaping of Technology*; Wajcman, "Feminist Theories of

[7] For more information, see https://xkcd.com/293/

Technology"; Gajjala, "Feminism, Labour and Digital Media: The Digital Housewife"; Faulkner; Suchman; Young) and putting it into dialogue with feminist theories of space (Massey, "Politics of Spatiality"; Lefebvre and Enders; Longhurst). It contributes to a broader feminist theory of technology by exposing the gendered dynamics in hacker communities and at the same time offering new definitions and alternative ways of thinking about both hacking and its associated "movement" as it is known today. In examining the nexus between gender and space as categories for inclusion as well as exclusion, this dissertation assesses the democratic limits and possibilities of hackerspaces in the context of Montreal. The intersections thus traced between feminism, hacking, and activism are a local contribution to broader feminist critiques of gender and technoscience, which consider technology not only in its production, design or usage but as a holistic, participatory approach that take into account the intersectional interplay of relations of power at work within these spaces. Most immediately, this study adds needed nuance to the entanglements of gender, space and technology offering a feminist perspective on hacking by way of concrete examples.

The repeated reference to the physical hacking environments examined in the thesis as *spaces* is deliberate and significant. My research pays special attention to the notion of *space* and the impact that different ideas and experiences of space have on hacking practices and collaborative expressions. It explores specific physical spaces of hacking and specific processes of formal and informal organization around spaces of hacking, in order to elucidate the boundaries created in traditional hackerspaces and the alternatives offered by feminist hacking. For these reasons, drawing on the writings of Doreen Massey, this study looks closely at *space* as a set of relationships between particular hackers, expressing and informing their ways of organizing and learning vis-à-vis technology. I write from the perspective of a person actively engaged in hacking in these spaces (see the section below on *My Role in This Research*). I analyze, in an ethnographic and participatory way, the significance of space as a set of relationships, the internal policies of building boundaries, and gender dynamics. By conceptualizing spaces of hacking through a critical feminist analysis, this thesis highlights inclusive practices that invites people from the margins of the hacker movement to join in.

By examining the controlling structures and philosophies of hacking venues in Montreal, my study sheds light on the community rules (both the explicit and the unwritten) aimed at respecting members and their principles, which, while successfully attracting specific individuals, may have the unintended consequence of dissuading many others from participating: traditional hackerspaces, while empowering some, nevertheless may lead to situations of segregation within the hacker movement and reinforce social norms that keep a significant number of hackers (the majority of them women) feeling unaccepted in the end. My study concludes that a movement dedicated to opening up technological ownership and creativity radically can only benefit from opening up toa diversity of spaces unified around the ideal of freedom vis-à-vis technology, including free space for more people willing to hack and to explore.

In summary, this thesis documents and analyzes the diverse processes of hacking, providing a detailed description of two Montreal hacker communities: Foulab and Femhack. It contributes to building critical understandings of hacking and hackerspaces, and to the broader project of thinking critically about technology using a feminist lens. It discusses common boundaries, redefinitions of hacking, as well as the hacking of learning practices happening in these spaces, paying particular attention to the notion of space and the impact of spatial realities on hacking practices and collaborative expressions. The ethnographically based action research methodology in two case studies allows this study to document and to theorize these communities while participating in them.

Research Questions

This dissertation examines the spaces, communities and the learning practices of two Montreal-based hackerspaces in two steps. The first step looks into the forms of inclusion and exclusion found in traditional spaces of hacking, exploring in detail the invisible boundaries formed within and around such spaces. The second step focuses on feminist hacker practices, intending to identify alternatives to the limitations found in the traditional hacking spaces in Montreal. In this sense, this thesis responds to the following research questions:

1. What visible and invisible boundaries of inclusion and exclusion exist in traditional[8] hackerspaces? In other words, why do traditional hackerspaces, while attracting specific individuals, dissuade many others from participating, whether intentionally or not?
2. What are the lessons to be learned from feminist hackers' strategies for creating inclusive spaces, pushing the definition of hacking and using feminist pedagogies to interact with technology?

What do feminist hackerspaces offer to those who feel marginalized by the traditional hacker movement, to make them feel welcome? What does a feminist hacker perspective stand for and consist of? To this end, my study documents and theorizes the ways in which a gradual process of opening up the spaces, boundaries and policies of hacking is transforming the hacker movement into a more diversified and inclusive environment for experimenting with technology and learning through hacking. It identifies the promise this gradual transformation offers in building a more inclusive hacking community.

Based on the research questions above, this study engages in four thematic areas of analysis. These are as follows:

1. **Hacking the boundaries.** This thematic looks studies how the boundaries of exclusion are created and sustained, and in which ways they make it a struggle for some participants to belong in traditional hackerspaces.
2. **Hacking *hacking*.** The second thematic examines definitions of hacking in its traditional settings and in the context of feminist discourse. It provides a new perspective on the definition of *hacking* that is more inclusive to marginalized populations following the hacker ethic.
3. **Hacking the hacker communities.** Building a feminist hacker community represents some sort of a hacking of hacker communities. It is, in part, a way of following the hacker ethic in terms of its approach to technology, and in part a way

[8] The term *traditional* is only used her in the sense of distinguishing between old-established hackerspaces, usually members of hackerspaces.org community and running on rules and ethic from this community, too. These are the mainstream spaces as contrasted to the feminist ones, which are also part of this thesis.

of following a new direction in community building; one that supports a do-it-together approach rather than a do-it-yourself one.

4. **Hacking learning.** The last analytical theme builds upon the redefinition of hacking and the DIT approach to community, to describe a feminist hacking learning practice that is more inclusive, collective, and empowering.

Why Montreal?

Montreal is recognized globally as one of the most technologically and culturally diversified cities in North America[9]. The city is known for attracting media artists, gaming industries, techno-geek start-ups, and more, and is also considered as one of the most culturally and ethnically diverse urban environments in Canada[10]. In this gathering place of people of all kinds, communities are diversified and speak a mixture of languages to boot (see, for example, the description of FemHack included in the chapters below). Along with New York City and Berlin, Montreal has become in recent years a focal point not only for hacker practice and meetups but for hacker research. Spaces of Hacking, a conference in Montreal organized in 2012 by Gabriella Coleman of McGill University, brought in researchers from different disciplines to discuss hacking from varying theoretical points of view[11]. Academics, practitioners and hackers spoke about their different views on hacking

[9] While I did not find a published paper to cite for this statement, it is no news that Montreal has become in the past the hub of game developer companies, a home for many infosec and other hacker startups; Recently, Google, Facebook and Microsoft all opened offices in Montreal. And even more, Montreal is preparing to become the Artificial Intelligence (AI) hub in North America. In a conversation with the film Director of HAK_MTL (July 2019), he confirmed that Montreal is a great place for hackers to find jobs, not only in the private sector but also in the government, providing an example of a large government funding and tax aid provided that benefit the technological corporations establishing in Montreal. Just a few examples from the media: the World Economic Forum has listed the first 25 high-tech cities, Montreal is 18th http://www.planetweb.ca/news/3-canadian-cities-among-25-high-tech-cities-world/. Another one: https://montrealgazette.com/business/how-montreal-aims-to-become-a-world-centre-of-artificial-intelligence,

[10] Stats Canada considers there are 30% visible Minorities in Montreal (2017). For more detail, see for example: https://en.wikipedia.org/wiki/Demographics_of_Montreal or https://www.cbc.ca/news/canada/montreal/ethnic-visible-minorities-want-montreal-mayoral-candidates-to-address-diversity-1.4379795 or https://www.asanet.org/news-events/footnotes/apr-may-jun-2017/features/montreals-distinctive-cultural-diversity

[11] A little bit later, the McGill department formed a reading group related to hacker research, called BBB - Bits-bots-bytes, which still exists today and gathers (usually monthly) to discuss various topics related to the study of hacking.

as a practice and on hackerspaces. Some brought in the idea of hackerspaces and hacklabs. Others presented on university labs, bio-labs, and art-tech labs[12]. The event demonstrated that the impact of hacking practice is not limited to computer networks and hardware systems: hacking affects the real lives of people and communities. As Coleman put it in a blog post dispelling the conventional image of the solitary hacker, "hackers congregate and meet face to face, often, and everyday[13]" (Coleman, "Hacking Spaces, the Spaces of Hacking")

According to local hackers, Montreal hacker communities started forming back in the 1990s, when more and more local events related to exploring and learning through technology started taking place in Montreal. In the early 2000s, hacker meetings (such as mtl2600[14]) began happening both in online forms and in person, in shopping malls, bars, people's basements, homes, and offices. Many of these meetings offered physical meetups for existing online communities, incorporating the face-to-face exchange of information, ideas, and sharing of skills into their gatherings. As time went by and interest grew, more hands-on events were organized, such as training sessions, workshops, presentations, demos, free software installation festivals, and hackathons. Prominent examples of this phenomenon include Les ateliers populaires du libre (APL), Montreal All-Girl Hack Nights, Montreal Girl Geeks [Dinner] – MGG(D)[15], Montreal Robotics Hackathon[16], JustHack - A Hackathon for Social Change[17], TA3M - Montreal[18], Python Montreal[19],

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[12] E.g., Flux media – a bio-lab at Concordia University.

[13] Blog post: "Hacking the Spaces, Spaces of Hacking." https://gabriellacoleman.org/blog/?p=1117

[14] mtl2600, https://www.mtl2600.org/

[15] Montreal Girl Geek meetups, http://montrealgirlgeeks.com

[16] Montreal Robotics Hackathon, https://mcgillrobotics.com/robohacks/

[17] JustHack, https://justhackmtl.devpost.com/

[18] Techno-Activism Third Mondays (TA3M) is an informal meetup designed to connect software creators and activists who are interested in censorship, surveillance, and open technology.

[19] Montreal Python is a growing community holding regular meetups including women-only events, http://montrealpython.org

HackFest[20], NorthSec[21], and Recon[22]. Hacking initiatives of this kind continue to multiply, even though long-term, not-for-profit learning environments featuring hacker ethics and practices seem hard to sustain.

As interest in real-world collaborative work grew among hackers, so did the felt need for physical communal spaces. Groups were changing their meeting places frequently in the absence of any one specific location that suited their requirements. At hacker gatherings, discussions expressed this necessity for permanent spaces providing free or inexpensive resources such as machines, tools, and spare parts. A vision was also expressed that such places require an environment that is experiment-friendly, offers Internet connectivity, and allows enough open space to set up equipment and DIY facilities, as well as room for gatherings of different sizes. Despite the vast diversity of hacker collaborations, existing spaces often failed to meet the needs of all users. Some were not set up to be shared when necessary; others served nomadic groups without the means to rent their own spaces in the long term.

When a city like Montreal is felt to be missing the kinds of spaces just described, citizens tend to self-organize, in universities, in work-related spaces, and private spaces. In this ambiance, studying hacker communities like Foulab and Femhack becomes an authentic journey. In terms of all the above-mentioned activities, two spaces have been present for years now on the hacker scene and managed to maintain members, interest, and practices related to their respective communities. These two spaces therefore offer excellent opportunities to examine the contexts and consequences of such developments. Both groups offer, in their own way, a free walk-in, experiment-friendly, and non-institutionalized (non-structured) environment to repair and reuse old equipment or to learn

[20] HackFest is another security conference held in Montreal since 2009, https://hackfest.ca

[21] Northsec is one of the biggest applied security conferences worldwide, held in Montreal annually since 2013, https://nsec.io/

[22] Recon is a reverse engineering conference hosted annually in Montreal since 2005, https://recon.cx/

and socialize with mixed groups while hacking. They aim to provide spaces where access to high-tech hardware and tools - including the opportunity to experiment with software and electronics - is something accessible to everyone, not a luxury, all within Montreal's dynamic social context of lively diversity. For these reasons, Foulab and FemHack offer natural laboratories for observing intersections between DIY attempts to democratize technology in physical spaces on the one hand, and social dynamics of inclusion and exclusion on the other.

My Role in This Research

My background includes 18 years of hacker practice. I have founded, participated, and enjoyed several different types of hacking communities and organized a large number of hacker events, from install-fests and hackathons to hacker conferences, workshops, training, hacker weekends, and hackathons. I really enjoy hacking both on my own and in a group. I have convinced hundreds of people (the majority of them women and radical activists with little technical knowledge) about the benefits of using Free and Open Source Software (FOSS) and helped dozens to install and use it. I like to code, tinker around technology, fix things, and learn new skills for the sake of learning. Most of all I wish to transfer that knowledge to others, including the next and previous generations and open-minded people without extensive technical skills.

Due to my background as an international feminist technical trainer, technology deployer, academic and "free geek," I have been often considered *the hacker* among the feminists, and *the feminist* among the hackers. While participating in the feminist movement and the technology freedom movement I have found that these two struggles which seem so different are also very similar. I have often met with women who are hackers at heart and hackers who are feminists at heart. Certain aspects of technology freedom, such as the right to explore and the right to use technology to express creativity and vision, or to protect personal information, seem to me to complement the feminist struggle clearly and profoundly. Feminist values like equality, respect of difference, the need to decolonize academia and a commitment to the equal right to participate in decision-making are very similar to the values of technology freedom activists (including, for example, technological

choice, usage, and production). Not all activists will necessarily agree, of course, but I see and support in feminism and hacking many commonalities.

The roots of this thesis date to about ten years ago, when I became involved in the communities mentioned above on a regular basis. While attracted to the energy of this culture, I nevertheless perceived the presence of invisible boundaries subtly excluding some of the women and other people around me who were unsuccessfully trying to join the hacker movement. I was dismayed to see many of them leave despite their sincere interest in technology design and usage as well as in practices of hacking. The boundaries I perceived got me thinking about the exclusive dimensions of space in hacking environments, which were seemingly invisible to many of the insiders of these ostensibly free and open spaces. I read many publications related to hackerspaces and hacking and gained an understanding of the issues related to the status quo of these spaces. I started looking at the internal conflicts between the hacking participants around me, some of whom wanted to discuss problems like the absence of women in these spaces, or the way that space could present boundaries for them, despite the ostensible friendliness of their members.

As a result of the experiences just outlined, I worked hard to co-found a feminist hackerspace, Femhack, designed according to feminist values, needs and understandings. I have facilitated and led workshops, each of them adapted to the needs of its participants, with the hope that more convivial spaces, better practices, better ways of hacking are possible. I was busy documenting the scene around me, but also making tea, fixing bugs and scheduling future workshops. I was happy that there was an actual physical space I could design while also taking part in it. I was delighted that this space was not pre-designed, not prescribed and not managed by the rules of others. I was happy that the participants in the meetings and training sessions left empowered, enthusiastic and with more insight into how technologies work. To me, fostering this understanding is a form of freedom from the tyranny of technological promises within a capitalist society that urges one to consume the new, rather than to reuse and recycle..

I relate this personal experience to clarify where this thesis can make a unique contribution. It documents and analyzes more than eight years of feminist hacking practices, spaces and experiences, led by women for women. Using a feminist approach, I have looked into the dynamics of how haceker spaces are organized, analyzing the invisible boundaries of ostensibly open spaces, and answering questions asked by many hackers: Why are there not more people joining the community? Why are there so many spaces consisting of predominantly male, white people? This thesis provides some answers to those questions and others. Readers are offered an insider vision of hacking, written by one of the co-founders of Femhack. I present these findings as a hacker, a feminist and a social science researcher who has been struggling for the cause of feminism in technoscience for over a decade now.

Since 2006, when I began my graduate academic career, I have explored controversies in DIY and Free Software communities, with reference to gender issues, software contributions, contested infrastructures, emerging communities, and feminist critiques of technology. In the course of writing this thesis, I realized that the term DIY ("do-it-yourself"), is quite limited in terms of the reality of the hacker movement globally. There are, of course, many hackers and crafters who enjoy their DIY space and time; however, there are many more who are looking for a community, to connect and to hack in groups, to discuss their hacks, and above all to transfer their knowledge. As the numerous online forums full of solutions to tech problems show, many hackers enjoy solving problems *together*. The goal is not merely to fix a machine. It involves the building of common, shared knowledge based on playing with the machine and the processes. I have for this reason tried to stress the importance of a DIT, Do-It Together, hacking practice as a way of expressing the values at the core of the Montreal feminist hacker community. This approach advocates democratizing knowledge not only by increasing the number of individuals owning and using technologies. It advocates for the need to build a community around hacker practices. A DIT approach to hacking creates a space for social actors who do not accept the socio-economic prescription to be passive users of technology and creates instead shared agency in its use.

According to the theory of socio-technical dynamics, people change technology, but technology also changes people, since we are all intertwined in shared knowledge and experience (MacKenzie and Wajcman, *The Social Shaping of Technology*). In feminist visions of this dynamic, socio-technical expertise and change are made to empower rather than to repress, to liberate rather than to colonize, to provide equal status to all human beings rather than to reinforce patriarchal norms. These are the issues that I want to bring forward in this thesis, as I trace how local spaces of hacking can transform and become more inclusive, and more diversified in terms of recognizing which knowledge is "real hacking" and whose participation counts.

Thesis Structure by Chapter

This dissertation is divided into seven chapters. The first, called *Hacker Cultures and Feminist Hacker Countercultures: Unpacking the Notions*, introduces hacking and hackerspace culture, ethics, and philosophy (with attention to both traditional and feminist hackerspaces), including a a short history. The second chapter, *Theorizing Space, Feminism and Communities in Technology*, presents the conceptual framework of my study. It introduces the critical concept of "space" as theorized in feminist, geographic, and transformative settings. It also provides an overview of feminist theories of technology from its origins in the 1970s to today, focusing on the *technofeminist* positioning of women and minorities with respect to technology, outlining the meaning and relevance here of the concept of "popular technology." These theoretical and conceptual foundations ground the critical considerations of hacking found in the analytic chapters that follow. Chapter three is dedicated to clarifying the *methodological considerations* related to this dissertation. Put very briefly, the ethnographic-action research method is applied in two case studies through feminist research practice. The chapter describes my methodological approach and my reasons for choosing it, along with the details of the research itself: the two selected case studies, the interviews, the role of participants and researcher, and the analysis procedure. Chapter four is dedicated to the first case study, the Montreal hackerspace Foulab. It is divided into three sections. The first presents an ethnographic space analysis using the interpretive prism of the combined theories of space described in chapter two. The second

section talks about the boundaries surrounding an "open" space like Foulab, with theoretical reference to feminist critiques of technology (and "technofeminism" in particular). The third section shows how a feminist community reacting to these boundaries was formed around feminist hacker practices in Foulab. Chapter five provides my second case study, the feminist hacker collective Femhack. This chapter is divided into five sections. The first describes a public event organized by Femhack in 2012, and examines the ways in which space is organized and used by feminist hackers in Montreal. The second section situates these developments within a summary of the history of Femhack over time. The final three other parts of the chapter to offer my analysis of interview findings in relation to three significant analytical areas. The first analytical section explores the demographics and identities of the feminist hacker participants, and offers a redefinition of hacking better suited to the reported experiences, ideals, and practices of these feminist hackers. The second analytic section offers my ethnographic space analysis of Femhack, which is recounted through a chronology of the most significant events in its history. The final analytical section provides an analysis of the feminist pedagogical and emancipatory practices of hacking exemplified and promoted by Femhack. The last chapter of the dissertation, *Do-It-Together in Montreal: Lessons Learned in Building a Feminist Hacker Community*, offers four practical takeaways from this dissertation, with regard to the current status of hacker communtities in Montreal, their continued study, and their hopes for the future.

Chapter 1

Hacker Cultures and Feminist Hacker Countercultures: Unpacking the Notions

Definitions of Hacking

The meaning of the term *hacking* is complex and contested. It is often used strictly to describe malicious users of computers and the Internet, but as the *New Hacker's Dictionary* (Raymond and Steele) explains, its meaning is neither necessarily negative nor simple. In one famous online piece, "How to Become a Hacker," Eric Raymond makes a distinction, for example, between people who build things (*hackers*) and people who destroy things (*crackers*) (Raymond). The constructive, positive connotation of the former term can be seen in the online dictionary of the computer programming slang called *The Jargon File*: "[A hacker is a] person who enjoys exploring the details of programmable systems and how to stretch their capabilities, as opposed to most users, who prefer to learn only the minimum necessary."[23] Additionally, The Internet Users' Glossary usefully elaborates the definition of a hacker as "a person who delights in having an intimate understanding of the internal workings of a system, computers and computer networks in particular."[24] In an article for the *Atlantic* called "The Anthropology of Hacking," Gabriella Coleman acknowledges the destructive or negative meaning of the term, while subordinating it to the kinds of constructive or positive meanings just described: hackers are "obsessed creatures, motivated by the deep pleasures of hacking, learning, sharing, and for some, transgressing" (Coleman, "Anthropology of Hackers").

In his thesis *Critical Theory on the Frontiers of Hacking* (2011), Swedish scholar Johan Söderberg, provides a critique of *insider* definitions of hacking (like the one offered in the

[23] The Jargon File's definition of hacker: https://userswww.pd.infn.it/~gravino/computing/hacker.html

[24] The Internet Users' Glossary definition of hacker: https://tools.ietf.org/html/rfc1392

Jargon file), in which hackers define themselves in a way that is too technical and programming-centered, excluding *other* practices and interested parties associated with the opening up and exploration of technology. Söderberg argues against the characterization of the hacker culture as a "youth subculture" (Thomas xi, 73, 141) which imposes its own limits on belonging and on the evolution of the movement. For Söderberg, the first hackers of the 1980's can no longer identify as *youth*: "This is not simply because of their age, but also because hacking itself has had its 'golden age' and the current generation is moving away from it" (Söderberg, *Critical Theory on the Fronteers of Hacking* 24). Söderberg's more open-ended definition of hackers and hacking stresses inclusion, and evokes an evolving, diverse shared culture:

> With this term [hacker], I am referring to a loose constellation of people who share similar ideas and values, ultimately anchored in certain kinds of technical practices. These technical practices must in one way or another relate to the infrastructures of information processing. Despite being heterogeneous and perpetually changing, the shared identity of hackers is verified in that they from time to time can act as a concerted, political force. In other words, they constitute a 'recursive public'. This public is recursive in the sense that it tends to act in response to threats to the infrastructure upon which it depends (Söderberg, *Critical Theory on the Fronteers of Hacking* 26).

Building on the work of Coleman and Söderberg (and others), I approach hacking in this study as a political movement in which Free and Open Source Software hacker values have been extended to include the broader *free culture* movement, including Open Access and the Creative Commons. The concept of hacking is expanded to describe activities related to creating, repairing and experimenting with technology. Hacking is not just a way to tweak computer technology. It is also a deliberately loose, shared movement capable of evolving and changing. Both points are important for the purposes of my study. In this thesis, hacking accordingly includes the hobbyist activities of technologically apt individuals who enjoy pushing the boundaries of technologies, systems or processes, with the aim of subverting these technologies to transcending their limits. Hackers thus represent people who value principles of freedom, access and citizen-control over what Ursula Franklin calls "prescriptive technologies" (Franklin 10).

The absence of universally accepted and inclusive definitions for words like *hacking* and *hacker* is significant for my study in that it leaves room for the act of hacking to evolve over time, as observers and hackers themselves work to define it. This thesis argues that since hacking can be associated with creative technological interventions performed in nonconformist ways, then hacking can take on many different forms, shapes, and definitions, including the new forms that embody Söderberg's stress on inclusion over exclusion. This is where the contribution of my project lies: although pioneering writers have provided rich resources for understanding mainstream hacker culture, they have not provided a thorough critique of the boundaries of inclusion and exclusion found at work in local hacking communities. I argue in fact that these boundaries are in part a result of the limiting definitions of *hacking* and *hacker* that serve traditional visions of a movement founded years ago, in a way seen as not open to revision. The representation of hacker culture as promoting free and collaborative technology as a viable alternative to copyright and its legal backbone is further explored in *Perspectives of Free and Open Source Software*, by academic and activist Lawrence Lessig (Lessig et al.) and others.

Common Aspects of Hacker Culture

According to the leading anthropological scholar interested in hacker culture and practice, Gabriella Coleman, hacker culture is one of the most influential social movements in recent years (Coleman, *Anonymous* 488). Hacking culture's perceived potential in providing fast-evolving spaces for social, political, technological and cultural innovation has led a growing number of scholars to become interested in its detailed characteristics (Kelty; Coleman and Golub; Coleman, *Coding Freedom*; Coleman, "Hacker Politics and Publics"; Jordan) and hackerspace practices (Maxigas; Moilanen; Williams et al.; Davies). Their interests vary from historical, anthropological, sociological and political to technological ones, including open hardware development, innovation (Kera; Seo-Zindy and Heeks; Lindtner and Li), peer production (Kostakis et al.), and even craft and craftiness (Rosner and Fox; Coleman, *Coding Freedom*).

In *Coding Freedom: The Ethics and Aesthetics of Hacking*, Coleman offers a rigorous analysis of hacker culture and practice. As noted above, the definition of hacking is

complex and contested, and Coleman notes that hackers themselves are "notoriously sectarian," constantly debating the meanings of *hacking*, *hack* and *hacker* (Coleman, *Coding Freedom* 17). In this sense, the study of hacking represents a diverse field concerned with various hacking styles and subcultures. For this reason, authors such as Coleman, Golub, and others often prefer speaking about the *spirit of hacking*, rather than trying to establish a definition of what hacking represents (or not). "That's hacking to me," as one hacker put it: "to transcend custom and to engage in creativity for its own sake, but also to create objective effects" (Hitt and Tough 47).

As Coleman and Golub explore the practical diversity of hacking, they invite readers to understand the ethical diversity of hackers, a variety expressed in "multiple overlapping genres that converge with broader prevailing and cultural processes, such as those of liberalism" (Coleman and Golub 267). They argue, in short, that there is no single hacker ethic and no overall unity in hacker practices. Just to the contrary, there is a vast diversity of ethical practices. As one hacker interviewed for the *Harper's Magazine* article "Is Computer Hacking A Crime?" declares, "There's no one hacker ethic. Everybody has his own" (Hitt and Tough 48).

Although the hacker culture cannot be unified under a universal definition or a body of set principles, there is nevertheless a significant kind of consensus discernible in hacker ethics, practically speaking. In the book *Coding Freedom - the Ethics and Aesthetics of Hacking* Coleman names several common principles shared among hackers. In the first place, Coleman suggests that hackers tend to value liberal principles related to freedom, including, in particular, open access to computers, the privacy of information, and the decentralization of power (Coleman, *Coding Freedom* 17). These values of freedom grew, Coleman writes, into a philosophy and a broader movement not limited to the university setting of the world's first hackers. A second trait common to today's hackers is an adoration for the digital and physical inner workings of computers, and the pleasure some gain in the "unauthorized access to [such] technologies, though the degree of illegality greatly varies" (ibid.). Coleman specifies in this context that hackers can be programmers, security experts, hardware builders, system administrators and so on. As already mentioned above, the pleasure hackers find in bypassing built-in limits or proprietary rules need not

be an expression of isolated criminality. The third shared hacker trait is the possession of superpower-like skills in computing, which Coleman refers to as the movement's "specialized and esoteric technical arts" (ibid.). For these reasons, Coleman concludes, "hacking, in its different forms and dimensions, embodies an aesthetic where craft and craftiness tightly converge" (ibid.). In the end, hacking involves a good dose of fun and pleasure while hackers enjoy technology to the extent of *inhabiting* it as an experience and a way of life. This aspect appears in another publication by Coleman: "Geeks and hackers build and configure technology at work and for fun, communicate and collaborate copiously with one another using these technologies, and, most significantly, derive and express deep pleasure and forms of value by inhabiting technology" (Coleman, "Hacker Politics and Publics" 512).

One common aspect of hackers and their ethic is their liberal vision about freedom. As Canadian communication scholar Dale Bradley argues in "The Divergent Anarcho-utopian Discourses of the Open Source Software Movement," this aspect of *freedom* came after the Stallman's introduction of the GNU project and the Free software (F/OSS) movement. For Bradley, this was a turning point where hackers started self-identifying with aspects of freedom, bringing the software freedoms and the way of developing it into an individual, meritocratic, liberal one. He says: "they began to create and vigorously defend the loosely formulated anarcho-utopian discourse of the hacker ethic" (Bradley). Coleman's analysis of freedom in hacking mentions that in the hacker philosophy and ethic, freedom is mostly understood in terms of expression, learning, or modification (Coleman, *Coding Freedom* 164). She mentions in her book *Coding Freedom: The Ethics and Aesthetics of Hacking that* "freedom is understood foremost to be about personal control and autonomous production, and decidedly not about commodity consumption or 'possessive individualism.'"

In *Decoding Liberation,* Samir Chopra and Scott Dexter discuss in detail the connection between hacker culture and the Free/Open Software (F/OSS) movement. In their analysis, free software is *liberative.* They say, "In a world that is increasingly encoded, our free software carries much potential for liberation. Granted, claims about technology and freedom are nothing new; much of the early hype about the Internet was rhetoric of this

kind. But what is important about the recurrence of such hyperbolic enthusiasm is that it is clearly articulated evidence of a desire for technology to live up to its potential as a liberatory force" (Chopra and Dexter xvi). There is, in other words, a whole movement claiming that technology (and mastering it) will set the world free.

Further on in their book, Chopra and Dexter trace the parallels between hacker culture and F/OSS explicitly, stating that hacker ethics provide a basis for free software culture, namely the resistance to the domination of technical standards by centralized authorities, the meritocratic nature of technical competence, and the strong protection of the freedom of information, as well as an adoration for computing (Chopra and Dexter 8). In other words, the free software movement and hacker culture have this in common: they strive to retake control over technology and to preserve the user's autonomy (ibid.).

In *Coding Freedom,* Coleman analyses the notion of freedom as it relates to hacker culture. She states that freedom among hackers is based on a culturally familiar vision of free speech and rights, and involves hacking a particular brand of liberalism back into the constitutional ideas of the North American culture. Coleman describes hacker culture as a movement collectively committed to producing such *freedom* (3). Hacker culture stresses and depends upon principles of free access, free speech and transparency, equal opportunity, and meritocracy (3). In a way closely resembling the F/OSS culture of software developers, then, the distinguishing principles of today's hackers are founded upon ideals of *self-fulfilment, self-discovery,* and *self-improvement* - strong principles, in other words, of individualism (Coleman, *Coding Freedom* 14).

To conclude, until sometime between 1995 and 2000, hackers were commonly perceived as young men in search of knowledge, with a "pathological addiction to the internet" (Coleman and Golub 256). More in-depth studies have offered a corrective response to negative stereotypes of hackers as malicious users of the internet, and highlighted hacker principles and ethics as part of a struggle against capitalism and modernity (Söderberg, *Hacking Capitalism: The Free and Open Source Software Movement*). The result, according to Coleman and Golub, is a literature limited by a binary opposition, wherein hackers are depicted either as dark and malicious creatures or as fascinating computer

experts capable of tweaking technology in almost inhuman ways (Coleman and Golub). The case studies I have conducted and offered in this thesis contribute to correcting this dichotomy in the literature on hacking. In my study, hackers are documented and discussed as fully complex people working, playing, and socializing in the grey areas of real life, embodying all the promises and problems of human life. I do not approach hackers as either heroes or villains. Instead, I examine particular hacker practices and ideals in Montreal to identify their potential and their limits when it comes to positive social change, including efforts to make hacking communities themselves less exclusive, encouraging them to live up to their lofty ideals.

Hackerspaces and Inclusion/Exclusion

During the 1990s and 2000s, a phenomenon emerged (mostly but not solely) in the Western world. Seemingly as a continuation of the DIY movement, the constitution of so-called *hackerspaces* — physical, community-based centers or craft workshops—were formed to give people with common interests, usually in technology, science and digital or electronic art, a place to meet and socialize with like-minded people, to share knowledge, and to collaborate on projects. Williams, Gibb and Weekly define hackerspaces as "communities of smart and dedicated individuals" that make complex engineering projects easy and inexpensive (Williams et al. 16). Many of these spaces provide members, local communities and individuals with full access to a wood shop, working tables, high-speed Internet, electronic spare parts and machines such as DIY 3D printers and laser cutters (Williams et al. 18). Hackerspaces often function as centers for peer learning and knowledge-sharing through different social activities, embracing a critical approach to mainstream science and social norms. Amongst research conducted which proposes a nuanced portrayal of hackers, Robertson proposes that hackerspaces are significant for the extent to which they facilitate a clear opposition to the predominant social discourse around consumerism: "They transform the passive consumptive habits of society into an active, critical interaction with consumer products. Hackerspaces foster a culture which is constantly discovering something new" (Robertson 6).

Like hacking itself, hackerspaces, sometimes also referred to as hacklabs, makerspaces or fablabs have evolved over time. One notable early hackerspace that appeared in 1995 at the Chaos Computer Club (CCC) event in Germany, had the goal of providing a "community-oriented space, sustainably funded by members, that supports creation and exploration" (Williams et al. 18). C-base, the first attempt at a permanent hackerspace, was founded shortly afterwards in Berlin in 1995.[25] Today, there are a few thousand hackerspaces around the world, and this number is constantly rising.[26] In 2012, Maxigas marveled in this context at the "height of popularity of hackerspaces," whose mission is the "liberation of technological knowledge" (Maxigas). According to this anthropologist, there have been three waves in the development of hackerspaces: The first one served a relatively small group of pioneers in the 1990s. The second wave incorporated those who started popularizing such spaces among hackers, and who gained recognition from governments. The third wave, as Maxigas points out, is the one in which hackerspaces have grown exponentially and developed into "a movement of some sort" (Maxigas). Hackerspaces represent, on the one hand, local entities with close ties to their geographies and their members' values. On the other, they are connected together in a global movement that unites their disparate urban spaces. These growing networks compete and cooperate regionally to organize shared events, purchase and share equipment and skills, and exchange information in regional maker fairs and local meetings. In this sense, hackerspaces underline a felt need among hackers to meet and exchange face-to-face.

Before I go any further, I wish to provide a really short distinction of the terminology around different spaces of hacking. For example, according to Sarah R. Davies in her recent book *Hackerspaces: Making the Maker Movement,* the hackerspaces seem to be more computer-hacking centered (Davies 31) in their development of a hacker ethic. In Europe, hackerspaces carry more of a political mission and stress on collective action; in North America, they are more centered into the technological tinkering. According to Davies, makerspaces have less of a clear origin and story than the hackerspaces, offer more

[25] For more information, see their website https://c-base.org/ or the Wikipedia description https://en.wikipedia.org/wiki/C-base.

[26] According to their listing on the hackerspaces networking website https://hackerspaces.org.

generalized interests and are centered in a more commercial and less political setting of crafting and making (34-35). They typically offer more professional equipment. For Davies and Maxigas, the hacklabs, existing mostly in Europe, represent more politicized versions of hackerspaces and have different origins (Davies 35–36; Maxigas). In the end, fablabs represent similar workshops, open to the public and offering uses of tools and equipment, only more education-related and associated to universities and other educational institutions (Davies 36–37). Many of these names are interchangeable, but others have political or cultural differences that find it unacceptable to be called otherwise.

Recent hackerspace research seeks to understand hacking and hacker practice environments as they operate (and spread) all over the world. Maxigas has asked if hacklabs and hackerspaces are in fact synonymous, and explored their political potential (Maxigas). His main inquiry is how hackerspaces might be able to escape the capitalist social apparatus in which they arose, and how this historical embeddedness conditions their potential. Maxigas's anthropological approach stresses that different hackerspaces have different ideologies and historical roots, and criticizes previous research on hackerspaces as being too centred on innovation and organizational development, leading to a lack of attention to the political dimensions of the hackerspace phenomenon (ibid.).

While hackerspaces are often thought to represent a "digital revolution of fabrication" (Gershenfeld; qtd. in Moilanen 96), the community remains in practice relatively homogeneous and elitist, comprised of the few who take part. Margolis and Fisher have written in this context that there there exists a "geek mythology" associated with the programming culture of the West (See Margolis and Fisher, *Unlocking the Clubhouse: Women in Computing*; Margolis and Fisher, "Geek Mythology and Attracting Undergraduate Women to Computer Science"). This phenomenon makes hackerspaces appear to be exclusive "clubhouses" practically inaccessible to female participants and other minorities. As Ella Riley-Adams writes "[a]s with many extensions of startup culture – like open seating plans and kombucha on tap – most hackerspaces tend to be full of dudes, or more specifically, white dudes" (Riley-Adams). Sophie Toupin similarly notes that despite the fact that the ideal of the hackerspace model is openness, a lot of marginalized and minority groups such as "women, queers, [and] people of colour" remain under-

represented in traditional hackerspaces (Toupin). Maxigas agrees that Computer Chaos Club hacker culture is "still overwhelmingly male-oriented" despite becoming more welcoming to women and sexual minorities in the recent decade, concluding that the situation points to an unfortunate "reversal of an exceptionally inclusive social and spatial arrangement" (Maxigas). Dunbar-Hester acknowledges that in the technical circles of the open source community, "some people have historically been more equal than others," when it comes to technological development. This author, who has ethnographically researched a number of hacker communities around North America, confirms that the field of electronics and computing is composed of "white, elite, masculine domains." (Dunbar-Hester, "If 'Diversity' Is the Answer, What Is the Question?: Understanding Diversity Advocacy in Voluntaristic Technology Projects" 92–93)

For the reasons just outlined, Johannes Grenzfurthner and Frank Apunkt Schneider from Monchrom[27] have posed deep questions about the future of these movements. These hackers and authors define hackerspaces as "countercultural community places" in which participants meet and act as a group, not just as individuals. They insist on the vision of hackerspaces as representing non-repressive spaces serving hackers to pass the time in an enjoyable way (Grenzfurthner and Schneider). However, the demography of hackerspaces is often limited by the stereotyped image of the male hacker with his own jargon, dress code, and behaviour.

> We need to understand that the hackerspaces of today are under the 'benevolent' control of a certain group of mostly white and male techno handicraft working nerds. And they shape a practice of their own, which destines most of the hackerspaces today... As such, we find today's hackerspaces excluding a lot of ethnic and social groups that don't seem to fit in or maybe feel so and are scared by the white male nerd dominance (Grenzfurthner and Schneider).

From this point of view, the future of hackerspaces needs to incorporate marginalized groups into hacker practice, politics, and decision-making, in an exercise of openness and freedom worthy of "the intention of the first hackerspaces in countercultural history"

[27] Monochrom is an art-technology-philosophy group, founded in 1993, with its main seat in Vienna and Zeta Draconis. For more information, visit www.monochrom.at/english/

(ibid.). As the next section makes clear, this positive, inclusive development involves addressing the historical relationship between gender and hacking.

In the analysis of hackerspaces so far, there is a sense of fascination and a tendency toward mere description rather than toward critical analysis related to space, gender, etc. Feminist hackerspaces analysis is useful here in that it can provide a more critical approach to hackerspace practice, shifting attention to include the less visible communities of feminist hackerspaces and their descriptions and positions with regard to technology. As mentioned above, some studies have mentioned the "elitist" character of the relationships within hackerspaces, but they did not look into those issues in depth. Many studies take for granted the "demographic phenomenon" and the "alarming statistics" of predominantly male spaces of hacking, without analyzing the norms, values, and constitution of space boundaries that help to shape human relationships. Such studies participate in a discourse centered on inviting more women into technological fields. Such literature does not analyze the gatekeeping boundaries of hackerspaces, categorize them, or explain how they happen and why they may become discriminatory.

Gender, Feminism and Hacking

"Hacking has traditionally been a man's world. But women are quietly breaking into the hacker subculture, a loose group of computer enthusiasts who meet in online chat rooms and at real-life conventions." (Segan)

Hacking communities resemble most high-tech environments, including computer science and engineering, in that women are a minority. In 2005, in a book called *Gender, Ethics and Information Technology,* British scholar Alison Adam dedicates a chapter to hacker culture in relation to the gender imbalance in technology. The chapter, named *Hacking into Hacking: Gender and the Hacker Phenomenon*, offers one of the first overviews of women's participation in hacker communities and philosophies (Adam, "Hacking into Hacking" 128). Adam's work supports the claim that the field of hacking contains the fewest women, in terms of technological environments. In her view, gender is one of the most contentious issues facing the movement; there is no proper dialogue about getting

more women into hacking (as is often the case with technical fields in general), nor is there a promise of high remuneration for their skills (as is the case with the IT industry of computers and engineering). According to Adam's pioneering reading, purely statistical research on the number of women in the community is not enough. On the contrary, constantly publishing low statistics on women in hi-tech environments could just support the idea that women are less suited to technological work than men. Moreover, Adam thinks it is possible that there are more female hackers than anyone suspects, who choose to remain invisible for different reasons, including a lack of motivation to expose their gender due to the tendency for the contributions of women in technical fields to be suppressed, neglected, or wrongly attributed to men. Adam insists that there are numerous aspects of hacker ethics and principles that complement the philosophies and values of many women. Equality, freedom of information, access to technology and tools, sustainability and a limited disposability for gadgets (and objects in general) are among those principles. In addition, learning, teaching and sharing experience are important values for women, including especially those who educate children.

While Adam's research on the absence of women in hacking tends to be limited to women only, and is written from an outsider's point of view, there are a few common points between hacking and other IT fields that she points out and that deserve attention. According to Adam, more analysis of the discriminatory character of hacker values and philosophies according to gender in practice is needed. Key areas include the ideals of meritocracy as egalitarianism, the freedom of information ethic, and the hacker work ethic. Adam's critique addresses these subtopics in the following ways.

Meritocracy as egalitarianism. Adam addresses, in her critique, the well-known principle that "[h]ackers should be judged by their hacking, not bogus criteria such as degrees, age, race or position" (Levy 43). This ostensibly egalitarian point of view does not acknowledge differences among people based on their levels of involvement or the specifics of their age, race, diplomas, workplace, physical conditions, or perceived special knowledge. Unfortunately, this principle, which places the emphasis on those who are seen as contributing the most, is not very beneficial for women. According to Brazilian scholar Graciela Selaimen (Selaimen), within hacker communities such as the Free Software

development groups, meritocracy represents an important principle for inclusion. She says, "If women weren't included, it was because they hadn't contributed enough – so, why should they deserve any recognition?" (ibid.). As Adam points out, equating egalitarianism with meritocracy ignores practical differences among members in terms of their realistic opportunities to contribute. It is not feasible, for example, for many women with children to stay late at night due to family obligations; likewise, people with disabilities are often deterred from frequenting a particular space because there may be stairs that render the lab inaccessible. Ignoring such practical realities in the name of an ideal equality of opportunity minimizes the contribution and thereby the status of some. Therefore, while egalitarian ideals are promoted, there is in practice no corresponding egalitarianism concerning who is who in the hacker movement.

The freedom of information ethic. Adam states that while the notions of freedom of expression and speech may be supported in theory by essentially every hacker, regardless of gender, the activism of female (feminist) hackers may sometimes look different. For instance, some feminist hackers use their advanced IT skills to track down child pornography sites and report them to law enforcement (e.g., antichildporn.org and condemned.org), projects that some hackers might see as infringing upon the right of freedom of expression claimed by such sites (Adam, "Hacking into Hacking" 143). In this way, Adam indicates, feminist hackers (and women in particular) are more likely to be involved in hacktivism with a political or ethical goals, and their hacking might attract the disapproval of their peers by prioritizing their own values and social rights struggles over traditional hacker libertarian principles (ibid.). As Adam suggests, the work feminist and hacker activists consider important may not be what most hackers consider important.

The new work ethic. The third key area of contestation of the hacker ethic, according to Adam, is the way hacking is perceived by women and men. For example, the combination of leisure and learning activities within hackerspaces has essentially transformed the traditional notion of a "work ethic," giving rise to a new sort of hacker work ethic (Adam, "Hacking into Hacking" 144). This hacker ethic looks quite different from the Protestant or Marxist work ethic that views work as a moral duty, and play and leisure as the opposite of work. Time is no longer just money, and work is no longer just a moral duty, when work

is seen as compatible with leisure and playful activity. In other words, the hacker ethic takes a passionate, joyful and playful approach to work that is about much more than just making money, since non-monetary values such as freedom of expression are considered paramount (ibid.). The problem with this attractive ideal is that women often possess less free time than men for play and leisure activities (ibid.). According to Adam, this is why the hacker work ethic is in the end unachievable for many people (especially women), whose social duties and material conditions do not permit them to engage in the freedoms to which hackers aspire.

While there are statistically fewer female hackers, women are obviously interested and attracted by the same opportunities that attract men to hacking spaces: to make things (including the chance to repair, re-purpose, and adapt gadgets to their own needs), to meet and learn from other people, and to share their own experiences with others. For these reasons, Adam concludes her critique with a call for an alternative, feminist version of the hacker ethic—a "gender hacker ethic" that accommodates the values and lifestyles of female hackers, rather than constantly requiring them to try to fit in with an ethic and a philosophy not originally developed with them in mind (Adam, "Hacking into Hacking" 146). As the next section shows, such initiatives are both possible and desirable.

Feminist Hackerspaces - Sites of Hacker Counterculture

In recent years, a movement of non-conforming non-mainstream hackers and geeks has started, including in particular people with interests in feminist activism and social justice, to rethink the concept of openness at the core of the hackerspace project and to adapt it to the feminist struggle. There are spaces dedicated to women only, or aimed at trans-gender and queer individuals, and they have started to appear in response to the kinds of marginalization such people have experienced in traditional hackerspaces. Examples of such non-oppressive spaces include Miss Despoinas Critical Engineering Space in Tasmania[28] (created in 2008), Mz Baltazar's Laboratory in Vienna[29] (2008-2009),

[28] www.miss-hack.org/?about
[29] www.mzbaltazarslaboratory.org/

Liberating Ourselves Locally in Oakland[30] (2012), Mothership Hackermoms in Berkley[31] (2012), Seattle Attic in Seattle[32] (2013), Flux Lab in Portland[33] (2013), Double Union[34] in San Francisco (2013), Sudo Room[35] in Oakland, Spanning Tree[36] in Washington DC. The Hackermoms project, for example, encourages mothers with children to join in training sessions, offering either childcare support or child-friendly workshops.[37] In their description of their mandate, they state that "mothers need a creative outlet and safe environment of encouragement, stimulation, support and permission to explore new ideas" (Hackermoms). As such spaces become available, the assumption is that more women will become interested in joining hackerspaces because they will be able to enjoy the experience of learning, making, and sharing like the hackers and makers they are - recognizing identities that change in the course of life and include motherhood.

Like traditional hackerspaces, feminist hackerspaces provide a place to meet and exchange ideas around technology and its creative uses, learn new skills, and find like-minded people. These spaces are mostly concentrated in North America and Europe, and while their histories and everyday agendas are often very different, they have a common goal of supporting (mostly) female and feminist hackers by dedicating a space to hacking without intimidation, gender discrimination, and oppression. As I have observed in my travels to hackerspaces over the past 12 years, feminist hackerspaces still place traditional hacker ethics at the core of their founding principles, such as freedom of technology and expression, and open access to information.

As hacker Liz Henry has pointed out in her influential article aptly titled *The Rise of Feminist Hackerspaces and How to Make Your Own*, the need for these spaces comes from people who are interested in hacking but struggle to find a place in traditional hackerspaces.

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[30] https://oaklandmakerspace.wordpress.com/
[31] https://hackermoms.org/
[32] https://wiki.hackerspaces.org/Seattle_Attic_Community_Workshop
[33] fluxlab.ca
[34] https://doubleunion.org/
[35] https://sudoroom.org/
[36] spanningtreedc.org/
[37] "Mothership HackerMoms is the first-ever women's creative life lab for mothers (broadly defined)." For more on Hackermoms see: https://hackermoms.org/

For them, the equipment and tools, the like-mindedness, and the knowledge-sharing practices in traditional hackerspaces could be useful if not for the socially restrictive aspects of such spaces (Henry). As Henry underlines, women often suffer from harassment and stereotyping in traditional hackerspaces, including sexist comments. Henry provides as an example the regularly expressed expectation that all women will know naturally about sewing and knitting, but will not know much about physics, electronics or programming (ibid.). Such alienating behavior can range all the way from patronizing attitudes to much harsher forms of sexual harassment and abuse.

> If we aren't at hackerspaces, it isn't because we don't make things, don't code, or aren't technical enough. It's because men act like the space is theirs. Women face harassment ranging from assault to much milder, but more constant, come-ons and innuendos. Our geek cred is constantly challenged or belittled (Henry).

Henry calls out one well-known space in particular by saying, "I went to Noisebridge…. Once" (ibid.). According to Henry, alienation is a common experience for women and minorities in hackerspaces. While there are reported issues with harassment and oppression, there are many more subtle problems that minority hackers face in such hackerspaces. As Henry points out, the creation of feminist hackerspaces has been motivated by the ways that visitors and female members have been treated in male-dominated hackerspaces, as intruders or amateurs. As *The Feminist Hackerspace Zine* puts it in defining their vision and their motto, "women and other marginalized people should be welcomed to perform technical practice without being subjected to discrimination or abuse" (Burek 3).

As noted already, feminist hackerspaces are closely related to wider DIY and hacker culture and philosophy in certain shared values regarding technology, including software and hardware freedom, network autonomy, and learning by doing. They are also set up in ways similar to traditional hackerspaces: space-centered activities, machinery and tools available to be shared, regular meetings, skill-sharing sessions, membership policies, etc. The significant differences are found in their demographics and their ways of organizing. This includes their tendency to stress the social aspects of any gathering rather than encouraging individualized hacking (a stress seen, for example, in their pro-social policies

of anti-discrimination and their hard lines against abusive behavior between members). With these distinguishing ideals in mind, members develop and apply anti-oppression, anti-patriarchal, and anti-discrimination rules with the goal of helping participants feel at ease while navigating the space. Much effort is made to make sure that every member feels welcome.. Some of the measures include strict codes of conduct, anti-harassment policies, protections for marginalized communities, and joint discussions on shared values about gender, identity, and inclusion (Haralanova and Toupin). In this way, feminist hackerspaces differ from traditional hackerspaces, which often espouse, as seen above, the ostensibly egalitarian goal of a *neutral* stance toward individual members and particular social issues, believing that social differences are irrelevant and can simply be ignored.

Space as a meeting place and a venue of technological tinkering and discovery has been of great importance to authors analyzing feminist hackerspaces. In "Hacking Culture, Not Devices: Access and Recognition in Feminist Hackerspaces," Fox, Ulgado and Folkner explain that feminist hackerspace members become more sensitive to the design and the condition of the space itself. They explain that this is due, in part, to the attribution of their discomfort in traditional hackerspaces to "defects" in the space as experienced (Fox et al. 59). Among the defects the authors mention are harassment, lack of defence in cases of harassment or argument, sexism and doubt about their hacking skills. Another space-related difference is found in the tools put in place and prioritized in feminist spaces of hacking. Fox et al. mention that while feminist hackerspaces often possess traditional tools such as soldering irons, electronics workbench, and video-making devices, there are also others which are less privileged in traditional hacking spaces. These include knitting or crocheting tools, button-making supplies, and sewing machines. In their journey through different hacking environments in San Francisco and Seattle, these authors have noticed that many of the feminist hackers in these spaces like to work on comfortable colorful furniture "under soft lightning" (62). They call it "the incorporation of domestic furniture and an aesthetic of coziness." Tea making is also part of the culture (or even full meals). In their piece they give an example of how the organization and design of a space may influence what happens in that space. In this case, hackerspace members thought the ceiling was too low so they changed it to provide natural light from above (ibid.). Another

characteristic of feminist hackerspaces stressed were widely-used codes of conduct aiming to "provide institutional safeguards against harassment and opportunities for those marginalized in high-tech contexts to feel supported" (60). These codes of conduct are created with the intention to "support open conversation about shared values and topics such as gender, identity, inequality, and inclusion while 'diverting' other kinds of social dynamics" (60-61). One final point made by Fox et al is that in feminist hackerspaces finding ways to cultivate companionship and cooperation were often even stressed above the mere skills obtained through the hacker practice: "We witnessed this kind of cooperation as a powerful yet silent alliance between members, foreshadowing the hacking practices that develop across these sites" (61). They appreciated the fact that participants thought of comfort and cooperation among the members as a matter of great importance, apart from individual hacking contributions and expertise. Their findings confirmed that a feminist hackerspace usually aims to be a "space where you can come into your own but also watch other people learn and grow" (Feminist Hacker Zine 6).

In this context, feminist hackerspaces differ from traditional hackerspaces in that the common everyday hacking activities of engaging in robotics, circuit building, soldering, application development, or programming are supplemented with more unusual practices that are supported by an expansion of the definition of hacking. Such practices differ according to the group's needs, but it is not uncommon to see knitting or sewing (including the production of wearable electronics), candle making, or food canning in feminist hackerspaces. As the Feminist Hacker Zine notes, "[i]n feminist spaces, hacking can also expand to include crafting, making, and political and identity work" (Burek 9). In this way, feminist hackerspaces contribute to the feminist technoscience project, expanding the hacker ideal of adapting computer technology and electronics to include almost any object that could be modified or re-purposed, and promoting almost any skill capable of subverting dominant consumerist and conformist ways of being in the world.

In conclusion, the emergence of feminist hackerspaces attempt to counter experiences of patriarchy (including sexual harassments and humiliation) and other forms of demonstrated oppression (including instances of racism or micro-aggressions against minorities) in traditional hackerspaces. It has also been an attempt to create spaces where feminist

hackers, makers and geeks are able to set the boundaries of their own space from the outset, enabling the development of new cultures more attuned to feminist and intersectional principles of acknowledging and challenging privileges, creating safe spaces for learning and sharing, putting together collective women's rights projects, etc.

The potential and the problems of such experimental hacking spaces form the focus of my ethnographic and analytical work offered in this study. Before proceeding to these case studies and conclusions on "feminist spaces," I will first outline my study's theoretical commitments to the terms that I use in this thesis, including feminism, technology, and space. This will also help clarify the method I have chosen to follow.

Chapter 2

Theorizing Space, Feminism and Communities in Technology

While visiting different spaces and venues of hacking, I have looked into issues of inclusion and exclusion on different levels. Gender division was one palpable factor, but it was not the only one. The environment, personal relations among the members or between members and visitors, and the way that hacking was perceived represented other factors in the building of boundaries.. For example, less technically apt visitors, elderly visitors or people of color would report feeling uncomfortable into the space. This first theoretical section looks closely into the conceptualization of space, at the processes and dynamics taking place within them and at the relationships among the participants. I show why considering space and making it visible within a community setting is of such importance, and why more work on space needs to be done in spaces of hacking if hackers want to prioritize inclusion.

Along with theorizing space, this chapter considers the *technofeminist* perspective of technology. Technofeminism and other feminist theories of technology bring to light the inequalities that exist in the development and use of technologies, inequalities that are also reproduced in most hacker communities. If the status quo of hacker culture is exclusive to marginalized hackers, what are the feminist reconsiderations of hacking, in terms of hacker definition, space, and pedagogy through technology? What lessons do we learn while studying feminist hackers as they hack and organize their communities?

With reference to these complementary theoretical frameworks, I foreground the broader issue of inequality in technology, and return to the concept of *popular technology* of Virginia Eubanks (Eubanks) for bringing technology to users. Using *popular technology* and *technofeminism* lenses to look closer into technology tinkering and use can bring light to the phenomenon of hacker communities being limited by a deeply homogenized masculine techno-science field. These theoretical concepts together guide the present study

and provide a base for its conclusions, which aim at confirming, but also nuancing and complexifying the feminist critique of the field of techno-science, using the selected hackerspace communities as an example.

Theorizing Space in Dynamic, Transformative Communities

"The physical environment is perhaps the least understood and the most neglected."
(Banning and Canard; cited in Walls et al.)

Space has historically been a focus of the geographic disciplines, and therefore not caught much of the interest of social scientists. In recent years, however, a number of geographers have come to the idea that any given space is closely related to the communities populating it, to the processes that happen on the territory involved, and the importance and dynamics of the power relations involved. In order to look closely into the spaces where hacking takes place, to analyze the processes and dynamics taking place within them and the relationships among the participants, the present study therefore needs to take into account the relatively recent idea that understanding a given *space* involves understanding the communities and processes found within a given territory, including the importance and dynamics of the power relations involved. One distinguished academic who contributed to this notion of space is the British social scientist and feminist geographer Doreen Massey.

According to Massey, space is an essential dimension for the analysis of social relations and operative ideas of space have too rarely been examined in previous studies, being often taken for granted by researchers: "'Space' is one of those most obvious of things which is mobilised as a term in a thousand different contexts, but whose potential meanings are all too rarely explicated or addressed" (Massey, "Politics of Spatiality" 27). Massey suggests that a space is not a location, but a human-related process: a space is always "open, unfinished, [and] always becoming, in other words, is an essential prerequisite for history to be open; and thus [...], a prerequisite for the possibility of politics" (Massey, "Politics of Spatiality" 4).

Massey suggests that *space* is best understood in terms of a process deriving from the multiplicity of relations happening within a given region. Space is shaped in fundamental ways by the people and entities occupying these spaces, with their unique trajectories, coexistence and connections (or the lack thereof). In this sense, theorizing space is essential to researching communities and cultures - and it is for this reason that I have oriented my study to that of hackerspaces and not hacker culture. Analyzing hacker spaces, rather than hacker cultures, makes room for evidence that is otherwise hard to see, and helps reveal group dynamics in all their complexity. Space and politics become co-constructed notions, where space is not a *neutral* or *innocent* category when it comes to analyzing communities. Therefore, according to Massey, space should be accorded essential political importance, closely linked to geopolitics, and in her words, to feminist geopolitics.

This perspective raises obvious questions for the purposes of my study: How can we think about hackerspaces in terms of human relationships and social dynamics, rather than simple locations? How can this study perceive hackerspaces in terms of processes closely related to geopolitics and power? According to Massey, to think about space as a process creates two challenges. First, she argues that we often do not think about space at all; therefore, communities are often viewed in isolation from their space. Previous studies will rarely have examined space as the relations and interactions between people and the entities occupying those spaces with their unique trajectories, coexistence, and connection (or lack thereof). Second, thinking of space as a dynamic process always entails a degree of the unexpected, of the unpredictable, of *chaos*: space is never stable, but is rather constantly in a process of transformation and recreation. Space is perpetually in the process of becoming: "Space is not a 'flat' surface... because the social relations which create it are themselves dynamic by their very nature" (Massey, *Politics of Spatiality* 265). In this sense, researching communities needs to pass through the analysis of space, which, on its end, should be considered in its complexity, instability, and transformability.

Against the common idea of a given community's space as a mere container; we encounter here something visualized more as a circular process, wherein space is a prerequisite for social relations to happen, and at the same time the result of these same relations. Space is ever-changing, depending on the people inhabiting it and the relationships they build in

those spaces: “A new type of space emerges out of the relationship between people and the physical environment” (Menendez 226). Any need for a physical space implies not only the presence of people but also the physical resources they require and the internal dynamics of the space itself.

Massey is not alone in working to push the idea of space in such new directions. In the classic *Place and Placelessness (2008),* Edward Relph suggested that there is no unified existence or experience inherent in any given place; the experience of each person present is unique, depending on variables like gender, personal preferences, and other unique historical, social and cultural circumstances (Relph). French philosopher and sociologists Henry Lefebvre and Michael Enders offered similar reflections in 1976 on defining space. Assuming space as a container or a location for objects with unidirectional relationships occupying a passive role is mistaken, they argued, because it over-simplifies the relationships between the elements involved (Lefebvre and Enders 30–37). According to Lefebvre and Enders, space cannot be isolated from ideology or politics; on the contrary, space itself has always been “political and ideological” (Lefebvre and Enders 31). Space has only been so often taken for granted because it seems invisible and neutral - an empty container to be *filled up*. Against this over-simplified common-sense conception, Lefebvre and Enders agree with Massey that space is always being shaped and moulded by historical events whose traces are disappearing, by objects and elements co-existing in a given space, and by the political processes taking place in it. Unlike Massey, they use container-metaphors. Yet for Lefebvre and Enders, as for Massey, *space* is not empty at all: it is on the contrary by definition a dynamic field “literally filled with ideologies” (Lefebvre and Enders 31).

Therefore, studying communities or cultures necessarily includes making the space visible to better understand the constitution of these communities, as well as the processes and the relationships happening in them. It includes an understanding of the spaces they inhabit in terms of the relationships built, the dynamics of such spaces, the connections and viewpoints of different stakeholders seeing and living spatiality in different ways. If a space is understood not as a territory, but rather as a process, unpredictable and always changing, analyzing hackerspaces requires analyzing the relational transformations and trajectories

of the participants found in these spaces. In this case, for example, studying space through the geopolitical aspect mentioned above, can reveal much in terms of the boundaries built around hacker communities. This way of considering space will why considering DIT practices enables rather than disables learning, inclusion, and autonomy through hacking.

Space, Boundaries and the Construction of Difference

For Massey, conceptualizing space in terms of a multiplicity of relationships and viewpoints of different stakeholders - a *product of interrelations* - plays an important role in analyzing communities partly because "spatiality is itself one of the dimensions of the construction of difference" (Massey, "Politics of Spatiality" 3). By *difference*, Massey means the simultaneous existence of a multiplicity; each space contains coexisting differences - a coexistence of the different *trajectories* of people and objects. The very ability to see and recognize the importance of a multiplicity of viewpoints depends on the ability to recognize the dynamic, co-created nature of spatiality in the first place (ibid.). For this reason, space allows for the production of new social, economic, cultural, political relations, full of power relationships and containing internal structures of "domination and subordination" ("Politics of Spatiality" 8). In another one of her writings, *Space, Place, and Gender*, Massey imagines this aspect of space in terms of a social power-geometry:

> Moreover, and again as a result of the fact that it is conceptualized as created out of social relations, space is by its very nature full of power and symbolism, a complex web of relations of domination and subordination, of solidarity and co-operation. This aspect of space has been referred to elsewhere as a kind of "power-geometry" (*Politics of Spatiality* 265).

In this context, Massey criticizes the common geographer's practice of drawing boundaries, since boundaries created around a given space are such an easy way to construct an opposition between an *us* group and a *them* group. Massey suggests we visualize particular places not as areas delimited by boundaries around, but rather as "articulated moments in networks of social relations and understandings" (*Politics of Spatiality* 154). This perspective acknowledges that given places do not exist in isolation, but are linked to the outside world in a "wider geographical context." This way of imagining space also acknowledges that given places are not static; they are not things -

they are on the contrary dynamic entities, always relational, and best described as ever-changing processes.

Another feminist geographer, Linda McDowell, in her 1999 book *Gender, Place and Identity: Understanding Feminist Geographies,* provides an important contribution to the concept of gender, place/boundaries and the socio-spatial practices that help define places and spaces, with attention to power relations and intersections, fluidity, and agency.

> Places are made through power relations which construct the rules which define boundaries. The boundaries are both social and spatial - they define who belongs to a place and who may be excluded as well as the location or site of experience (McDowell 4).

From this point of view, the boundaries of a place are not necessarily about physical outer limits. Significant boundaries are defined through what Massey calls "corporeal practices" (actions), representations (such as newspapers), and the works of objects (walls and fences). The most important boundaries of space are dynamic, involving a series of overlapping relationships and understandings in a network of relations. In this sense, every space is a *meeting place* and an active "ongoing production" of boundaries involving human relationships (Massey, *For Space* 55). In this sense, it is not the local history that define the space, but the connectedness to the outside world.

In his 2012 essay "Spatial Divisions as Regional Assemblages," Allan Cochrane defines space in similar terms to those just pointed out, as a series of overlapping relationships and understandings juxtaposed to one another (Cochrane 90). For Cochrane, as for Massey, the boundaries that define particular spaces should be imagined as networks of social relations and understandings (Massey qtd in Cochrane 89), keeping in mind that a large portion of the relevant relationships, experiences and understandings involved transcend the particular moment and areas people are trying to define, for example as part of a street, a locality, or a region. In this sense, a designated space is related to the simultaneously designated *outside*, both physically and through the people who come and go, importing the limitations of their own relationships and experiences. In this sense, these people construct boundaries within the understandings they have about the world in its globality. This understanding of the relationship between the *inside* and the *outside* underlines the

social dimension of Massey's assertion that understanding a given space relationships and connections with the outside world can prove to be even more important than understanding its particular local history (Saldanha 46). In addition to this view on space as relationships and experiences, Silvia Federici, in her essay, "Feminism and the Politics of the Commons," affirms the internal rules of collective spaces that have been created in opposition to the neo-liberal efforts in order to relate all human, environmental and material resources towards a monetary profit, rules which she calls "the politics of the commons." According to Federici, while common space and wealth are created in such spaces, these collectives (though concerned with the preconditions of their existence) "escape the problem of defining rules of inclusion and exclusion" (Federici 287).

Space and Gender

Among the many complex relationships that shape space and are, in turn, shaped by space, the relationship between space and gender is particularly relevant for the ethnographic and analytic project I have described here. It is worth noting here, then, that Massey herself dedicates much of her writing to exploring how space and gender are co-constructed and influence each other. She has pointed, for example, to the way that geography is closely related to and influences the cultural creation of different ideas of gender (Massey, *Politics of Spatiality* 177). However, according to Massey, gender relations are not unified: quite to the contrary, they vary over spaces due to cultural differences and the influences of local cultures (178). These differences do not happen only among women and men, but among all people; and not only as gendered individuals, but also in the way in which they relate to particular circumstances or political struggles. Therefore, space and its social construction affect the ways people feel and move into a given space, creating gendered relations of power.

> The only point I want to make is that space and place, spaces and places, and our senses of them (and such related things as our degrees of mobility) are gendered through and through. Moreover they are gendered in a myriad different ways, which vary between cultures and over time. And this gendering of space and place both reflects and has effects back on the ways in which gender is constructed and understood in the societies in which we live (Massey, *Politics of Spatiality* 186).

From a similar point of view, it is important to notice that gender also affects people's experience of space (Harcourt et al. 159). The mutual co-construction of gender and space is not effected through the imposition of boundaries or the conflicting of identities; it is effected through their interrelations (Massey, *Politics of Spatiality* 7). Massey argues, for example, that the requirement for boundaries is part of the masculine culture and they are sought as a defensive mechanism for the counter-positioning of identities. In response to that, the feminist critique of Massey calls for abandoning those definitions of identity, since they are based on dominance (ibid.). Massey criticizes the feminist resistance to globalization for tending to discuss the micro level of this correlation linking to the oppression of women in different places. However, the macro level, the big picture is left *disembodied* and *non-gendered*, or spoken in abstractions (Massey, *Politics of Spatiality* 159). In *Geographies of Responsibility,* Massey studies the oppression mechanisms of the global and seeks to apply to local politics (Massey, "Geographies of Responsibility" 11). Harcourt et al. refer to the same issue in terms of patriarchy:

> Patriarchy varies from place to place depending on the power plays, but it is always present and, in using the term, we are underlying the constantly unequal relations of power between men and women as well as among women and among men (Harcourt et al. 162).

As Massey points out, space and place are not only crucial for the construction of gender relations, but also for struggles to change them (Massey, *Politics of Spatiality* 179). For Massey, spaces and places transmit explicit gendered messages, whether hidden (e.g. the way space is built, situated or set) or apparent (e.g. exclusion by violence). Massey gives the example of the limiting way women's spatial and identity mobility represents "crucial means of subordination." Moreover, Massey notices that those two types of limitation - mobility over space and identity limitation - have been "crucially related" (ibid.). From there comes the importance of understanding gender relations, to be able to analyze the structuring of spaces and places (ibid. 182). In this way, taking gender into account for analyzing spaces has produced a more nuanced evaluation of regional and national policies.

In the following pages I discuss the relevance of gender in engaging technology, confirming that due to gendered labour roles, and the "boundary between work and play"

are very different realities for men and women (Massey, *Space, Place and Gender* 190). From this point of view, the way that society is constructed in dichotomous thinking is related to the construction of the radical distinction between genders, which, in its turn, relates to the characteristics assigned to each of them, as well as to the maintenance of power relations between them. As Massey notices in the writings of Nancy Jay, "such a mode of constructing difference works to the advantage of certain (dominant) social groups," and "almost any ideology based on A/Not-A dichotomy is effective in resisting change" (Jay qtd by Massey, *Politics of Spatiality* 256). It seems important, Jay notes, for feminist theory to be systematic in recognizing *status-quo*-supporting dichotomies of this kind.

Feminist Theories of Technology

In this section, I introduce a feminist theories of technology, addressing, in particular, the unequal social position of women when it comes to the design, production, and use of technology. Hacking is not an exception but a telling example related to the works of ideology, culture, and lack of social tools to countering these effects. I argue below that the kinds of social exclusion reflected in this environment need to be understood in their social and historical contexts, and that gender-based exclusion needs to be approached as one of several related exclusive dynamics commonly found in traditional hacking environments.

This thesis thereby joins a broader techno-feminist critique by offering a consideration of feminism that does not simply refer to women's rights but offers a way of seeing the world by including more marginalized communities in the dialogue. It is hoped that the present research will help to sow the seeds for a more inclusive and politically well-rounded hacker ethic, which would be more relevant to marginalized hackers, and could be perceived as a valuable contribution to the hacker community in general. Finally, this study strives to break down the gendered views of technology: there is no need to sacrifice one's identity to affirm positions in technology in an empowered critical analysis of policy-making around technology.

Moving further into the feminist critique of technologies, we cannot ignore that gender inequalities influence and are influenced by other inequalities. For example, Granjon et al. assert that there is a noticeable difference between the appropriation of personal computing technology by men and women living as couples: men tend to use it much more, and this dissymmetry is typically reproduced in the appropriation of ICT displayed by the children of the household. This finding mirrors a traditional distribution of tasks, in which women are mostly relegated to traditional-knowledge tasks such as cooking, taking care of children, and managing the family in terms of sociability and accountability, while men are more often seen as responsible for dealing with a household's complex technological devices (Granjon et al. 53). For the purposes of this study, it is important to note that this intersection of disparate common social boundaries makes it necessary to consider the kinds of limiting boundaries that may appear within marginalized groups.

The Mutual Shaping of Gender and Technology

Since the field of research known as Science and Technology Studies (STS) began back in the 1970s, the question of inequalities related to gender and technology has been studied by several scholars (Cockburn; MacKenzie and Wajcman, *The Social Shaping of Technology*; Wajcman, *Feminism Confronts Technology*; Wajcman, *TechnoFeminism*; Wajcman, "Feminist Theories of Technology"). Despite the widespread use of Information and Communication Technologies (ICTs) in 20th-century Western citizens' personal and professional lives, there are still remarkable inequalities in the way computer technology is perceived and appropriated depending on gender. In her paper "Beyond Tools: Technology as a Feminist Agenda," Chat Garcia Ramilo describes the underrepresentation of women in the field of emerging computer technology in stark terms: "Women are absent. Alarmingly absent or pitifully lacking from all the processes and spaces that are constructing the frameworks, rules, structures, standards, and tool of the new technologies" (Ramilo 68). This gender gap is significant because active engagement with technology is, as also Virginia Eubanks points out, directly related in the modern world to social status and social involvement.

> The technology of everyday life, embedded in political, educational, bureaucratic, and social settings, actively shape our identities, our communities, our institutions, and our relationships. They affect how we relate to each other and how we understand ourselves. They teach us lessons about who we are and shape our political and cultural voices. They help distribute material and informational goods, but they also structure our social and political imaginaries, our sense of what is possible, acceptable, and just. (Eubanks 131)

The social impact of the gender gap in technology is a persistent problem since, in the context of the Western neo-liberal economy, where market values and private interests take centre stage, gender inequalities are consistently sidelined (Steger and Roy; Chakravartty and Sarikakis 159). Gender is perceived as a secondary factor rather than an organizing factor of society; it accordingly usually becomes an afterthought in the making of public policy (Chakravartty and Sarikakis). In the realm of new media technologies and practices, this ostensible irrelevance of gender means in practice that male interests continue to dominate patterns of design, production and appropriation. While tech developers seldom name masculinity explicitly as a predominant factor influencing their designs, for example, research has shown that masculine values are often implied in the design and construction of information and communications technologies (Wajcman, *TechnoFeminism* 56).

French sociologist in information and communication science Josiane Jouët's research on gender and technology indicates that the perceived masculinity of technology is expressed in a number of different ways: social stereotypes imposed in the domestic and professional use of the machines, male symbolic forms in the design and construction of technologies, association of masculinity with fashion trends in the science and technology field (Jouët). Jouët gives the example of the association of different types of technical artefacts with different genders: for example, technological objects painted white are common in home-making environments and in the business of mobile phones, since they are considered more feminine objects. On the other hand, technological objects like home video equipment, televisions, and portable computers are viewed as masculine and thus painted in dark hues like brown and black. These perceptions can be seen at work in the way people talk as well: ICTs are commonly talked about as machines designed, built, installed, configured and repaired by men, although they are widely used to some degree by both men and women

(Collet, *L'informatique a-t-Elle Un Sexe: Hackers, Mythes et Réalités* 20–21). In this social context, it is not surprising that in 2018 statistics, Canadian women represent only 18% of computer science students and less than 13% of computer engineers (Perreault).

In the previous section, I focussed on the relevance of the idea that space and gender are socially constructed, and, in fact, co-constructed. In turning to examine the relationships between technology and gender, it comes out that a similar phenomenon is at work. As Donald A. McKenzie and Judy Wajcman argued in their 1985 collection *The Social Shaping of Technology*, if gender is a social construct, and technology is socially shaped, then technology and gender must also be mutually shaped (MacKenzie and Wajcman, *The Social Shaping of Technology*). The implications of this conclusion have unfortunately been ignored in many discussions of ICTs, as Wajcman has since noted in her 2002 essay "Addressing Technological Change: The Challenge to Social Theory" (Wajcman, "Addressing Technological Change"), which underlines the lack of discussions on gender in common debates about ICTs. Josianne Jouët has expressed a similar regret that decades of gender analysis have failed to bring about a considerable change in the gendered nature of the perception and the appropriation of new technologies (Jouët).

The gendered nature of technology is not only expressed in its structure and appearance. Men and women also position themselves with respect to technology based on gendered assumptions about technology in society. Jouët argues, for example, that masculine identity is shaped and influenced by the use of technology, from the youngest age, noting that families invest on average four times more in technology aimed at boys than they do in technology aimed at girls. High technology is considered a male domain normally avoided by women. As Elisabeth K. Kelan reminds us, if biological male/female *sex* is "something we are," then masculine or feminine *gender* is "something we do" (Kelan 359). This is an important difference when considering technology and the shaping of gender. It is not biological difference that makes women and men appropriate ICTs in one way or another. Such differences between women and men are instead socially constructed through the influence of particular stereotypes and predispositions. McKenzie and Wajcman's idea of the co-construction of gender and technology can be seen at work here, in the creation and maintenance of this gender gap: it is a matter of nurture, not nature. As Kelan pointed out

in her 2007 study "Tools and Toys: Communicating Gendered Positions Towards Technology," the presence of women was not rare in the world of early computer programming. The author brings up the example of the invention and use of the first computer, the ENIAC, by professional female technologists. Ever since, however, computer programming has been slowly gendered as masculine in the West, as the computer's perceived importance grew, and as it became associated with social values like scientific rationality and masculinity in the eyes of professionals, hobbyists, and gamers (Kelan 361).

The consequences of the gendering of computer technology can be found everywhere. Kelan draws attention, for example, to the fact that men tend to describe technology as a toy, while women tend to describe technology as a tool (Kelan 376). Even outside work, then, technological objects are seen as more appropriate for men: for boys, such gadgets can be a hobby and a pleasure, while for girls they may be reduced to a burden and an obligation. Women tend in fact to downplay any technological competence they do have since such competence is commonly seen as unsuitable to enacting femininity (ibid.).

The gaps created and maintained in the co-construction of technology gender are of central importance for purposes of this study, since the fact that "technology is both a source and consequence of gender relations and vice versa" necessarily involves power relations (Wajcman, "Addressing Technological Change" 356). The traditional near-monopoly of men over technology provides them with an important source of power, and women's lack of technological skills becomes an element of their traditional perceived dependence on men. In this way, the social construction of technology (i.e. controlling ideas of its nature, its value, its proper use and users) plays an important role in the reproduction of patriarchal structures in the world (ibid.).

A Technofeminist Perspective

As the feminist critics of technology and the feminist hackerspace review covered above demonstrate, not everyone is willing to accept the way the traditional co-construction of technology and gender tends to exclude or otherwise marginalize women. Resistance to

limiting or excluding uses of technology can be seen in the development of the *technofeminist* theory and practice explained by British-Australian scholar Judy Wajcman. In support of the advancement of women's struggles in the techno-science field, feminist critics have argued against the perception of technology as having a natural biological affinity with men (Dagiral 195), and challenged the idea that ICTs represent simple tools to be accepted passively, to help with *feminine* everyday tasks at home and work (198). Building on the idea of the production and use of technology as political (Feenberg; Winner), and the insight that the design of technological artefacts has ideological dimensions, feminist researchers and activists have been working to create a more active role for women in the social conception and development of technology (Mackay and Gillespie).

Wajcman's influential book *Technofeminism* considers the field of technological design traditionally dominated by male ideologies and norms, and which depicts and mythologizes men as the heroes and the influencers of technology in modern life (Wajcman, *TechnoFeminism*). Wajcman identifies two significant consequences from that finding: First, women tend to choose (as seen already above) to avoid associating with technological fields. Second, women are further marginalized by the fact that the dominant view of technological design is an illusion focused on only the decision-maker and technological design levels of the field.

> Once the lens is widened to include routine technoscience, manufacturing operatives, marketing and sales personnel and the consumer and end-users of technology, women immediately come into view. More women are present further down you go from the design process (Wajcman, *TechnoFeminism* 45).

While this point is helpful in widening the focus of a feminist perspective on technological development, it is itself problematic since it demonstrates that the *hidden*, invisible contribution of women is also considered *low-tech*, however essential it may be for the production, promotion, and diffusion of technology. This area in which women participate more often is also the lowest-paid area.

Wajcman confirms the problem noted above of associating computer technology with a male-centered image of technology as both power and pleasure. Since the dominant image of an IT professional is the white, young, male geek who enjoys working long hours at the computer, women and others entering the domain may be seen as outsiders, or be required to sacrifice aspects of their own identity in order to meet this ideal (Wajcman, *TechnoFeminism* 112).

The technofeminist position outlined by Wajcman insists that women should be able to participate in technoscience on their terms, as neither subordinates to men nor surrogate men. Women therefore need to take an active part in developing and providing critical analysis of policy-making. Furthermore, they need to be involved at all levels, not simply as customers or relatively passive users. While this ideal is laudable, and informs the ethnography and analysis offered below, the picture it offers needs to be further refined here, since the social barriers excluding women from full participation in technology intersect and interact in practice with other powerful social barriers: the boundaries involved are what feminists call *intersectional*.

The Popular Technology

In her landmark 1990 book *The Real World of Technology*, Canadian techno-feminist and engineer Ursula Franklin addresses the tendency for technologies to be produced as externally planned, organized and controlled devices, where the workers producing them lack decision-making opportunities regarding their evolution. Working in the context of the United States twenty years later, Virginia Eubanks explains that the cooperative vision of solving social problems has shifted to a discourse of access to information and communication technologies (ICT) (Eubanks 5, 26, 39), framing the social conditions on a binary basis as *haves* and *have-nots*, to which the author strongly objects (23). Eubanks refers to the same phenomenon as representing a species of "magical thinking," whereby discussion of ICTs tends to be accompanied by unjustified optimism. This equates to a view of ICT as a simple solution to complex social problems - a "myopia shaped by race, class and gender inequality" (Eubanks xvi). Thus, such concerns are relegated to what the feminist cultural studies writer Lisa McLaughlin calls a "technocratic quick-fix"

(McLaughlin). In *The Digital Sublime: Myth, Power, and Cyberspace*, Vincent Mosco is equally critical of such simplistic views on media and technology that neglect complex social problems in today's society (Mosco). In brief, the modern understanding of justice and equity, as Franklin, Eubanks, McLaughlin, Mosco and others assert, is wrongly based on the notion of access to products or information resources. For this reason, Franklin refers to them as *prescriptive technologies* (Franklin 10). The prescriptive technologies carry a lot of ideologies and discriminative presuppositions for the citizens, including, as Franklin states, that these represent "systems of dominance and control" (17).

In the context of more recent debate about gender inequalities in the ICT field, Virginia Eubanks has followed up on the insight that the dynamics of social exclusion are *intersectional* (Eubanks 29), offering an important critique of the way that many past feminist theories of gender difference and technology failed to consider *intragroup differences*. As Eubanks points out, even among women themselves there are big differences at play in terms of race, class, age, and social status when it comes to understanding and injustice in the information age (ibid.). Eubanks stresses moreover that gender inequalities widely visible and active in common social environments tend to decrease and disappear at the "upper levels of the social grid." Eubanks shows, for example, that white educated women coming from middle-class families have a different approach to technology and a different kind of access to technology than women of colour coming from poor families.

> People who say that women are afraid of technology, or don't know how important it is, are missing the point... When you are just surviving, you're in a survival mode. You don't think about technology, you don't think about the latest anything. You are surviving. And that takes you a whole life - just to survive. Especially women! Women love to learn and are able to learn. They really like technology and want technology. If you offered a woman a system that they created, for everyone, they would want it, they would engage with it. But it's not like that (Ruth Delgado qtd in Eubanks 6).

For our purposes here, there are two important points to note in this quote from Ruth Delgado Guman, interviewed by Eubanks. The first point is familiar from points raised above: a *system* that is not built to suit a woman's needs naturally makes it very difficult for her to use male-oriented, male-shaped technology. A technology aimed at *everyone*

might also appeal more to women, though, because women are so often expected to think about their families, their children and friends when thinking of a social good. This potential concern for communal rather than individual access points to the *intersectional* fact that many different kinds of overlapping groups can be empowered or disempowered by common ideas and uses of technology. Ruth Delgado's reference to a sense of urgency related to simply surviving is also extremely important for our purposes here. As Eubanks underlines in her analysis of the discourse on ICTs by women in the general population, the statistics cited often take into account only a certain kind of relatively privileged middle-class women (who either own a personal computer or have easy access to one). This exclusion of women outside a certain social class makes it difficult to see and understand the different experiences women have with ICT due to issues of age, class, ethnicity, sexuality, ability and nationality (Eubanks 27–28). This intersectional feminist perspective is a welcome corrective to the traditional approach to understanding gender and technology, and it informs the ethnography and analysis offered in my study.

In line with Wajcman's claims, Virginia Eubanks supplies an important critique of technological design and development in her 2011 publication *The Digital Dead End: Fighting for Social Justice in the Information Age.* One of Eubanks' main points is that technology is often perceived as a product, as a "static ahistoric thing," and not as a site of possibility (Eubanks 21). The author claims that the digital divide represents a "product of social structure and institutionalized inequalities, a way to promote and maintain exclusion, to legitimize norms and forms of domination, serving corporate interests but rarely fixing social problems" (42). In short, the digital new order reveals an economic inequality based on massive investments in technology production but not in a more *just* society (ibid.).

According to the concept of *popular technology* presented by Eubanks in her book, all people have a rich array of experiences with technology, and these are shaped by the places these individuals hold in society (referred to as their *social locations*) (Eubanks xx, 219). These experiences come from the everyday lives of citizens and therefore represent a valuable resource for "thinking collectively and critically about the relationship between technology, politics, citizenship, and social justice" (Eubanks xx). With respect to this

approach, there are several design considerations that Eubanks mentions which would guarantee more horizontal, inclusive and democratic ways of producing technologies.

One of these considerations is that all individuals' experiences should be taken into account when designing technology used by those people. To date, only the perspectives of the *privileged ones* (mostly managers, scientists, and developers/engineers) are taken into account in deciding how a technology will be produced. Eubanks argues that people (citizens) are the experts closest to the problems and their solutions. On citizens' side, they should not consider these technologies as tools only, but also as promoting certain practices and policies - a democratic solution would be to promote engagement in these processes in order to ensure that everyone's interests and needs are taken into account. Eubanks also mentions that there is a need for a participatory design process, in which users are invited to take part in technological design (Eubanks 106–07).

The concept of popular technology is concerned with access-oriented approaches to ICT. Instead of seeking to move poor and marginalized women to the *other side* of the digital divide by giving them access to technologies, it studies ways to reform the *information age* so that it can ensure "fuller humanity for all people" (Eubanks 107). In addition, technologies should not be designed to suit *everybody*, but be more specifically linked and related to real individuals' every day activities and experiences.

> Because we so often believe that technology is self-directing, autonomous, and driven by inevitable progress, they argue, we give up our power as citizens to share our destiny. Technological legislation is often written, by default, by scientists, engineers, and architects, who rarely include democratic principles in their research and design (Eubanks 84).

Eubanks argues that there is a demonstrated lack of faith in the ability of ordinary people to understand and intervene in the constitution of emerging technologies. Unsurprisingly, then, the public is accused of apathy and submissiveness to policy issues around technology. However, Eubanks argues that many of these people are indeed aware of the technological architecture and the ends and values implied in its design.

One last important point is contributed by Crow and Sawchuk's chapter in the collection *Feminist Interventions in International Communication: Minding the Gap*, concerning the participation of women in policymaking around media infrastructure development. Women need to learn how infrastructure works, they argue, in order to be able to intervene at the policy level. This is necessary to avoid exclusion and domination in their technology practices. In the new media environment, there are very few women with decision-making power, and one of the reasons is that there are very few with the knowledge and skills required to intervene effectively (Crow and Sawchuk).

In brief, Eubanks's idea of popular technology provides principles for future designers and developers of technology to follow, representing a method of seeing the relations between gender and technology in a new way. First, it is imperative that the design of technical artefacts includes all people's experience, not just the privileged ones. Second, people need to be recognized as experts in the ICT that they are using, because they are closest to the problems and also to the solutions. Third, the discourse needs to change from a focus on access to certain ICT tools to discussing *real world technology* so that the politics of technology as well as personal specific practices can be taken into account{. And lastly, researchers in STS and gender need to change their guiding methodology: instead of bringing in statistical methods from online research, there is a need to introduce more participatory, emancipatory, liberatory action research, with real users, one by one. These principles, according to Eubanks, will provide a much better understanding on the source of the problems involved, as well as their reasons and consequences, instead of simplifying social problems into technology fixes and generalized solutions.

Conclusion

The feminist theoretical concepts of technology and STS reviewed here and the concept of popular technology all provide support for a feminist analysis of hacker practice. Many of the studies in STS or IT/ICT present analogies and similarities with the hacker - geek culture, for example gendered technological approaches and gendered perspectives such as fun versus work, pleasure versus obligation, etc. They reveal the fact that for women and men (and other gendered identities), the approach to technology is different. These

differences can contribute to the marginalization of non-male and non-mainstream identities in traditional hacker communities. As a solution, both Wajcman and Eubanks suggest that marginalized populations need to appropriate technologies on their own terms and not sacrifice their identities to adapt to the status quo. The absence of women in design and development helps explain the fact that hacking is also male-dominated, since hacking requires a deep understanding of the technological processes involved.

Using the theoretical lenses summarized above, then, this dissertation examines two case studies. The first one, Montreal's Foulab founded in 2008, is an example of a traditional hackerspace and illustrates the experiences and the dominant forms of reasoning found in such spaces. The theoretical frames just outlined help explain the presence of boundaries in such spaces, and the marginalization of women from these spaces, even if they are invisible or unintentional. The second case study, Montreals' Femhack founded in 2012, serves as an example of feminist hacking. What do feminist hackers understand by hacking, and how is the term redefined in these spaces? How do they re-appropriate technologies on their own terms, and build policies serving their involvement, participation, and learning practices? Nevertheless, before, I would like to describe the research design process including the methods and tools used for this research to take place.

Chapter 3

Research Design: Ethnographic Action Research and Two Case Studies

Given the research goals and questions of this study, the most logical methodological approach is qualitative analysis. The main direction of the study as defined above has two focii: a) understanding the relationship of space and boundaries in traditional spaces of hacking; and b) formulating principles for the improvement of hacking practices through the lessons learned in feminist spaces - their strategies of creating inclusive spaces, their broader understandings of hacking, their inclusive and empowering practices around learning though hacking. For these purposes, a pure comparative study of cases did not make much sense. The idea was not simply to compare spaces or communities, but rather to offer practical takeaways gained from understanding how these two hacker groups operate and contend with boundaries of inclusion and exclusion. I consider my research on these two spaces as case studies. As Robert E. Stake explains, choosing to do case studies does not amount to a methodological choice *per se* (Stake 435). He says: "A case study is both a process of inquiry about the case and the product of that inquiry" (Stake 436). I chose Ethnographic Action Research (EAR) as the best methodological approach to apply to my case studies. As the UNESCO-funded Ethnographic Action Research Training Handbook notes, EAR is a methodology that combines research with project development, and its goal is to deepen understanding of communication in local contexts (Tacchi). As explained in more detail below, the combination of ethnography and action research in Ethnographic Action Research is meant to ensure that the researcher can provide a rich understanding of the communities into which they are integrated during their participation. EAR involves the usual academic standards for the production of knowledge through rigorous, well-planned, structured and self-aware methods, but there is an added dimension: all participants actively engage in the research process and may contribute by sharing their feedback, thoughts and observations (J. A. Tacchi et al.).

The following sections outline the methodological elements of the kind of EAR undertaken in this study. The first sections deal with ethnography and action research. I next discuss the method of using case studies - its challenges and its application here. I then explain how my study is grounded in feminist research practice. Finally, I explain the research techniques used for gathering and analyzing my data, and describe the resulting roles of participants and the researchers in this case study of Foulab and Femhack between the years of 2010 and 2016.

Ethnographic Action Research - Study of Processes and Practices

As Austin Toombs indicates in his study on hackerspaces, "Falling In: How Ethnography Happened to Me and What I've Learned From It," a participatory ethnography has great potential for studying such environments: "ethnography could provide for accessing a deeper, tacit understanding of the community from an insider's perspective… One of the biggest strengths I saw in appropriating an ethnographic approach for my research on hackerspaces was its *participatory* nature" (Toombs). To better explain how Ethnographic Action Research works in practice, I will discuss the method's two main elements - ethnography and action research - in turn.

Ethnographic research focuses on studying the practices of people, their cultures, organizations, and social relations and processes. John Brewer accordingly defines ethnography as the study of people in naturally occurring settings, in which the researcher participates directly in order to collect their data about local social meanings and ordinary activities (Brewer 10). The goal is to provide a more in-depth understanding of the knowledge gathered and the production of meaning under study. I refer here to "rich" informational results with Tacchi, Slater and Hearn's definition of the term in mind, as meaning "grounded and relevant facts, observations, understandings, perceptions and interpretations" (9). The information sought is thought of as rich and grounded as opposed to being imagined as pure and abstract.

One foundational method for ethnography-based research is *participant observation*, in which the ethnographer participates in the community or the culture being studied, even

while maintaining an analytical or observational position aimed at describing and interpreting the subject of the study (DeWalt and DeWalt). The observer seeks, in this case, to identify patterns, relationships, commonalities, and the broader contexts of the social settings involved. The ethnographic aspect of this method provides grounded knowledge based not just on formal research activities such as interviews and discussion groups, but also on informal conversations, personal experiences and observations, debates, and in the case of hacker communities IRC[38] logs, field notes from online meetings, etc. In this way, as Tacchi, Slater and Hearn describe, ER takes the form of "diverse relationships and conversations," in which formal methods like surveys or textual analyses are treated as continuations of conversations and relationships grounded in the real world (Tacchi et al, 11). "In general, the key to ethnography is that we focus on understanding a specific place, in detail and in its own terms," they write (ibid.). For the purposes of this kind of research, some stereotypical academic methods like producing new texts based on nothing but a private reflection on other texts would be insufficient.

Due to their participatory character, the aims, methods and analyses of ER arise from and then feed back into the research process. The focus is on how problems and opportunities are defined by people locally, allowing the project to be creatively adapted. The division between researcher and subject can at times be blurred since the subjects become influential informants and even fellow researchers. The participants are themselves agents in the process. The researcher's role is to listen carefully to their related experiences and help provide structure in understanding the meanings of these abundant resources. As the discussion below makes clear, AR and EAR both build on this potential in ER for the research subjects to participate in a given study as agents with an active role of their own.

Action Research methodology is unique in that it includes, as noted by Greg Hearn et al. in the publication *Action Research and New Media: Concepts, Methods, Cases*, a deliberate focus on the processes and actions rather than on ostensibly static data. An AR study

[38] IRC or Internet Relay Chat is an online platform for transferring of text messages in real time between two or more people.

stresses the importance of the lived experiences of the participants and is guided by a flexible, open and eclectic process of inquiry with a cyclical, experimental character. The method of AR is experimental and cyclical in that it engages all project participants (as *stakeholders*) in a constant process of connection between knowledge creation and the critical reflection involved in the building of this knowledge (Hearn et al. 11). This kind of investigation naturally includes, on the one hand, the immediate circle of participants, their strategies of organization, and the ways in which the research question relates to their everyday lives. On the other, it also includes broader social contexts (e.g., local social divisions within the given community, as well as influential non-local factors like surrounding infrastructures, government policies, economic developments, etc.). This wealth of *tacit* information concerning the dynamic realities of the participants and their living space throughout the research process informs (and is informed by) the *codified knowledge* of the theories produced by AR and other research methods (Hearn et al. 15–16).

The goal of action research is, like its methods, scholarly but somewhat unusual: AR aims not only to understand the kinds of processes just named but also to allow for a certain degree of change in the system studied due to the research process itself. In other words, the very participation of the subjects in the study is a potential agent of change. In stark contrast to some traditional research methods, the potential for change is not limited to people acting on the conclusions of the researcher's final report, as Reason and Bradbury stress (Reason and Bradbury 1) in their initial definition of AR:

> [Action Research is a] participatory, democratic process concerned with developing practical knowing in the pursuit of important human processes… It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions of pressing concern to people, and more generally the flourishing of individual persons and their communities.

Since it first appeared after World War II, AR has been associated with *work in progress* strategies: it is often chosen when research circumstances require a lot of flexibility, or when a need is felt for a given change to take place quickly or holistically (O'Brien). Due to its stress on process and agency, Action Research is a common methodology within the

fields of emancipatory education, community development, and feminist research: it is considered a particularly appropriate method for observing minorities and excluded groups and enabling feminist analysis (Hearn et al.). Because of its subject-focused attention to local detail, it has an additional attractive potential to shed light on the experiences of those who rarely get the chance otherwise to express their views or raise their voices.

Due to its focus on emergent and/or rapid change, AR is often applied in studying the participatory design of technology or the process of feedback in cycles of innovation. Because AR places users and producers at the center of the research process, it allows studies to focus on the complete range of social relationships and processes involved in such dynamic systems (Hearn et al. 18). I have already indicated that AR is less interested in static data, and more concerned with fast development and change involving potentially unpredictable outcomes, focusing primarily on the creativity, flexibility and transformability of the processes, practices and people involved. I note further here that Hearn et al. argue for these reasons that AR is among the best-suited approaches to the study of processes and practices in technology-based communities and environments of innovative projects (Hearn et al. 9–10).

As noted by Tacci, Slater and Hearn, ethnography and action research have the potential to go very well together.

> [O]ur research approach is designed not simply to reach a project, but to gain a level of understanding of the local context and thus, to assist in project design, ongoing evaluation and monitoring and in a continual cycle of research (J. Tacchi et al. 2).

First of all, they share the common goal of understanding how a particular community and its members work together, offering the added value of participation, stressing the processes and allowing for change. Second, both are relatively flexible research frameworks, involving reflection on observation, and adaptation based on learning from the research experience (e.g. adapting the questions for new interviews, or spending more time on a newly-raised issue that not recognized in the initial plan). Third, the power offered to participants in ER to actively engage in the research process by sharing their

feedback is also well-suited to AR's goal of making both dynamic learning and subject-led change possible.

Ethnographic Action Research in two hackerspaces

This study is aimed at describing and understanding different processes happening in two hacker communities in Montreal. The study of these communities is conducted on the ground, as opposed, for example, to providing a philosophical analysis of particular abstract hacker ideals found in various hacker manifestos. The ethnographic action research (EAR) method proved to be an appropriate choice, bringing the combination of ethnography through observation, and action research through active participation in the processes of fast evolution of the two researched sites. These mutually complementary design frames are thus intended to provide a better understanding and explanation of the hacking practices, spaces, and learning actions in this study.

My desire to study real-time phenomena of hacker practices in-depth, to stay close to the participants, brought me to the logical decision of choosing an ethnographic frame for this research. A historical (or another type of data) analysis would have been necessarily incomplete, for example, because it is hard to capture the processes of communication among hackers in real time. The Femhack group held meetings and workshops during the research period itself. I had the advantageous position of knowing the players and the process from the inside. I could not have relied on sifting documentation due to the fact that none existed. Only ethnography could provide the tools needed in this case for performing a detailed description and analysis.

An ER approach alone would not have been sufficient, though, in building a comprehensive and constructive understanding of the hacking practices, space settings, and boundaries of the selected case studies. I wanted my thesis to make an insider contribution, in terms of both academic *codified* knowledge about hacking, and practical *tacit* community knowledge on the ground. I am, as just mentioned, an active insider in hacking communities as well as an academic interested in the cultural phenomenon of hacking. In

this context, the Action Research approach allowed me to use my dual belonging to make the greatest possible contribution.

AR methodology also recommended itself for my purposes here due to its appropriateness (noted above with reference to Hearn et al.) in technology-based environments and spaces of significant innovation. Different hackerspaces may vary wildly in many respects, but deep engagement with technology and innovation are dependably at the heart of all such spaces. Consciously feminist experiments like Femhack are, I argue in this thesis, particularly devoted to innovation, not least in terms of their conceptions and uses of technology. Finally, my project intends to provide conclusions in the form of perspectives and considerations for producing change. Because of the qualitative character of the research, EAR allows for such work-in-progress findings rather than statistically-based analysis and results, which this study is not intended to provide.

To conclude, the active participation of the direct beneficiaries (*stakeholders*) involved in EAR recommends it as an appropriate choice for this study. On the one hand, since it is aimed at studying and understanding the processes of change, EAR was ideally suited for my goal of gaining practical knowledge about the transformations occurring within my research sites. On the other hand, making my research subjects co-participants in an EAR process gave them the ability and the agency to integrate (consciously or unconsciously) some of the reflections and results of the study into their own future community actions and discussions.

Challenges of Using Ethnographic Action Research

EAR involves several challenges. Both the ER and the AR dimensions of the method require significant investments of time and resources. Before research can even begin in earnest, the researcher must invest in building research capacity and planning, developing relationships, integrating into the community, building trust among the participants, etc. Deliberately involving a wide diversity of participants (*stakeholders*) may present conflicts regarding representation, power relations, and assessments. The researcher choosing EAR

needs to be careful not to give more attention to those who simply happen to be more advantaged or feel more empowered, and hence be more available and more willing to participate.

Studying a given community as an insider offers many opportunities to collect valuable data from participants, and personal interviews enrich the observation and analysis of the practices and spaces under study. However, an insider approach, while strengthening the relationship between the researcher and the participants, may be experienced as blurring the boundaries of the relationship. A wealth of insider experience over a large span of time also creates the challenge of a daunting accumulation of collected data. There is simply no way to make room for most of it in a focused and condensed project like this dissertation.

Due to these considerations, this research project is necessarily limited in its scope. As the record of a process of reflection and intervention in real-time dynamic processes, this thesis offers a work-in-progress study based on rough data, personal opinions, and contingent conclusions from group meetings and brainstorm sessions held within the researched communities. It is not aimed at providing an ostensibly exhaustive, definitive snapshot of hacking, or even of anyone hacking community. It presents instead the cumulative fruit of critical reflection developed from an insider position, stressing in accordance with EAR methods the importance of participants' values, living experience, decisions, and the importance of change within their communities. The conclusions of this study are therefore framed as situated critical perspectives, as descriptions of dynamic communities and their directions, and as suggestions for change coming from an engaged scholar and interested insider.

Feminist Research

In her seminal work on feminist research, Alison Wylie argues that the question is not simply how to build methods of research more suited to including and empowering women, but also how to address issues that “have largely been left out of account, questions that particularly matter for understanding, with precision and explanatory force, that are, for varying degrees and in diverse ways, oppressive for those categorized as women or as

sex/gender variant" (Wylie 544). The questions we academics ask in our research determine whose experience will be highlighted and whose opinions will matter as a result. In this way, Wylie promotes the idea that contextual values, complexity, and knowledge generated based on current human needs have to be taken into account when it comes to research (546). In this way, researchers can contribute to the redistribution of power within relevant scientific fields (547).

As Wylie stipulates further, scientists need to take into account the marginalized voices in any given community, including those of women. Feminist interests and values represent an important resource - they repair distortions in conventional research by addressing overlooked issues. In this sense, Wylie names the four commitments of the feminist researcher, which I tried to follow throughout my research: The first principle is that the researcher needs to give priority to the "human needs" of women, and all those oppressed by sex/gender systems of inequality (549). This principle also stipulates that research should be "movement generated" rather than static, and includes insights for changing the situations thus studied. This principle supports the importance of using a method such as EAR here - in the first case study, to capture the reality of the relationships involved in the moment, and in the second case study to offer oppressed stakeholders a better chance to pursue their own needs and make their values and motivations better understood.

Wylie's second commitment stresses the grounding of feminist research in women's experience: taking women's experience in everyday life as a starting point of the research. This is necessary in order to treat gendered experience as a primary resource in creating an understanding of the gendered dimensions of community life in social groups.

The third commitment Wylie lists is ethical: it stresses the researcher's accountability to the research subjects and to all those affected by the research. Briefly, the research process should not be oppressive to the subjects of research. The knowledge production should be egalitarian and participatory (Wylie 549). In this sense, EAR research comes in handy again, offering a full range of participatory practices, in which the research participants are for example asked to comment on the research process and the preliminary results, and also to participate in the research process. Many of the participants in my study asked for a draft

of this thesis in order to gain additional insight into the processes happening within their community.

Finally, the fourth commitment of the feminist researcher consists of cultivating critical reflexivity, and providing contextualized claims (550). Feminist researchers are required to take into account their own social positions, interests and values, and include them as constitutive elements in the process. My own background as a woman, feminist, hacker, mother, and researcher necessarily has an impact on my research and its results. One important element is my very detailed understanding of the communities I have been integrated into as a member, as compared to someone who might bring a fascination with hacking to the project but have no insider knowledge of the communities (which could be valuable, too, in its own way, but which is not my situation).

In short, then, the feminist participatory method of my research includes centering women's feminist values, experience, and needs as a starting point, research participants take an active part in my research process, and my role as researcher involves a critical contextual reflexivity. My method foregrounds feminist perspectives and practices vis-à-vis hacking and technological tinkering, using feminist concerns, experiences and action-generated knowledge to ground the research process.

In working this way, my research builds on the seminal work of Virginia Eubanks, who argued that both the design of technology and research into it should be participatory, directly involving the users and their diversified expertise (Eubanks). This study builds as well upon Peddle, Powell and Shade's study "Bringing Feminist Perspectives to Community Informatics," which offers a model for the feminist analysis of community uses of technology, underlining the importance of looking closely at the social dynamics involved, including studying the role of minorities in tech communities and highlighting the question of what is considered *natural* or *normal* in such community organizations (Peddle et al. 33). Based on two case study examples, involving participatory-action research, the authors ask probing questions about who participates in a given community, and in what ways, exposing the invisible structures that may create boundaries for certain participants, the majority of which female. Their recommendations consist of an invitation

for more researchers to acknowledge feminist contributions in science and technology studies, as well as to welcome feminist interventions (Wajcman, "Gendered Technoscience" qtd by Peddle et al. 34). The authors conclude that feminist analysis should examine the kinds of exclusion inherent in invisible, everyday norms when it comes to community participation, initiative, and organization (Peddle et al. 41–42).

Tools and Techniques for Data Gathering

This research project has relied on several different tools and techniques common in the qualitative research paradigm for collecting and analyzing data. For example, for the ethnographic side of the research, I use reflexive participant observation, including keeping research journals, engaging in informal conversations, and conducting semi-structured interviews with different stakeholders.

My research journals contain the ethnographic observations from both case studies, and became generators of research in their own right. To contextualize the gathered data about the researched sites and their participants, I gathered further background information, such as founding documents, released videos, internal policies and rules from the communities in question. Much of the documentation has come from the organizations' websites, wikis, minutes from regular meetings, and IRC logs, blog posts, wiki pages. I also draw on my own documentation of over twenty events hosted by the two researched communities.

In addition, I have participated as an active member (hacker, workshop organizer and facilitator) in both of these groups while maintaining an analytical or observational position which has helped me to describe and interpret the subject of the study in detail (See on this point (DeWalt and DeWalt). The body of data thus produced consists of notes, photos, slides, and flipchart records taken during formal and informal local meetings, workshops, and members discussions. The goal here is to observe the informal culture, the relationships, the unwritten rules, and all such tangible and intangible particularities that are related to the participant-observer's role. The analysis consists of a search for patterns, relationships, and contexts relevant to the social settings studied, as well as common

features that contribute to a bigger picture of the hacker communities' social conditions and how they constitute space through practices and activities.

Finally, I have conducted 20 in-depth, semi-structured interviews with the main participants, including founding members, participants in workshops and other events, as well as former members of both communities between 2014 and 2016.[39] I held 12 additional shorter informal interviews with various other stakeholders - first-time visitors of the spaces, former members, and workshop participants. The goal of these interviews was to gather first-person information about participants' views and experiences with respect to my research questions. Some of these interviews took place with members who, despite being there from the beginning, had at the moment of the interview left the hackerspace in question. Two of these interviews included hackerspace participants who, in the end, never became full members of the Lab. Apart from these interviews of regular participants, I also held one with the film producer Alexandre Sheldon, whose movie HAK_MTL[40] came out in May 2019, documenting the current state of hacking in Montreal. The range of opinions my interviews revealed in terms of belonging or non-belonging proved valuable in collecting data on experiences of inclusion and exclusion related to the emergence of each of the spaces I examined closely as a part of these two case studies. Most interviews lasted from 45 to 60 minutes each and were conducted either in-person or via online Internet tools (Jitsi, Skype). All interviews were recorded and transcribed for later analysis. Follow-up emails and meetings were used to keep in touch with the participants for the purposes of updating and clarifying the information thus gathered and organized throughout the remainder of the project. While the bulk of this research was done between 2010 and 2016, I have continued to talk with members of both Foulab and femhack to the present moment, and indeed, several members have read and commented upon this thesis.

[39] For more information about the themes covered during these interviews, please see Annex A: Contextual Interview Guide.

[40] For more information and a preview of the documentary, visit: http://www.rapideblanc.ca/#/HAK or https://www.imdb.com/title/tt10353560/?ref_=fn_nm_nm_1a.

Sample, Selection Process and Research Ethics

To gather a representative sample of participants, I sent out a general email inviting participants from each researched site to participate in an interview. Some founders and key members (including former members) were contacted in person and invited to participate in the research. The two communities I studied were quite small (Femhack has had about 6 to 8 very active members, and Foulab at their highest point had under 20 official members, out of which 8 were founding members). For this reason, I interviewed 100 % of Femhack participants and about 50 % of Foulab members, including most founding members (some of whom had since left).

The selection procedure took into account the following prerequisites:

- how long the participant had been involved with the organization;
- what position they had in the decision-making process and how active they were in the respective space;
- maximum possible gender balance among participants;
- in the case of dual membership, a line of questioning targeting their relationship to the space benefiting from their most active involvement, but not excluding their global hackerspace experience.

Interviews were scheduled with interested participants at a time and a place that was convenient for both parties. Interviews were conducted at Foulab, my office at Concordia University in Montreal, or another private location as requested by the participants, including their homes, offices, or coffee shops. All potential participants were asked if they wished to refer someone to the research project and were encouraged to provide their contact information (a research strategy called the snowball effect)[41].

The participants signed consent forms[42] and accepted my recording of the interviews and some formal discussions, which are usually ruled by consensus among the members. Work

[41] For example, two of the participants referred their (female) partners and said that they, as visitors of Foulab, had thoughts and impressions that would be useful to my research.
[42] The Consent Form can be consulted below in Annex B.

in progress was sent to participants, to give them the chance to comment on the project's details and findings within an appropriate time window. One of the ethical challenges of this dissertation was the work in small communities, where most people know each other and even a small piece of information can reveal the identity of the participant. To ensure some anonymity, I mixed up the replies, often not mentioning names or giving identifying information. At the request of my academic readers, I added some of the demographic data (such as age or gender) of the interviewees in order for the reader to situate the person in the hacker community (for example: Alice, 33, female, Foulab visitor).

Researched Sites - Two Case Studies

This study documented and analyzed two Montreal hacker communities, the Montreal hackerspace *Les Laboratoires Foulab* and the feminist hacker collective *Femhack*, for a total research period of 2010 to 2016. After this time, I remained a formal member of these communities but ceased officially to collect data for this dissertation in 2016.[43] The choice of these case studies was easy for three reasons. Firstly, these are the hacker communities I knew best and I had the best access to in performing my research.[44] Secondly, living in Montreal, it was the least time and resource-consuming possibility - participating in weekly meetings, sometimes spending the weekend in the lab or at the hackathon, was not possible otherwise. And lastly, the intrinsic interest in the subject and the desire to better understand the processes that are happening, the desire to document the evidence in these particular cases, made it a valid choice for research. As Stake mentions in the "Case Studies" chapter of the *Handbook for Qualitative Research*, "in all its particularity and ordinariness, the case itself is of interest" (Stake 437).

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[43] This time coincided with my parental leave in 2017, which also provided me with the necessary "space" for thinking over the case studies and search for more objectivity in the analysis.

[44] My initial idea involved two additional case studies, which had to be dropped because of limited time and resources. The first one was *Hacklab* (https://hacklab.to/), a Toronto hackerspace, which I visited many times, building connections with "informers" who were ready to integrate me into the community as a researcher. The second was *Reseau Libre* (https://wiki.reseaulibre.ca/), the Montreal mesh network, which I "detached" from this dissertation and developed as a separate study. The study results came out as a journal article in the Journal for Peer Production, in collaboration with Evan Light. For more information, visit JoPP: http://peerproduction.net/issues/issue-9-alternative-internets/peer-reviewed-papers/enmeshed-lives/

The first case study involves mostly the ethnographic part of my project's EAR, in the form of observations conducted between 2010 and 2014 in the first official Montreal hackerspace called Foulab. Foulab is quite a unique place in Montreal and among the hackerspaces of the world. Ten years later, Foulab is still *the Montreal hackerspace* despite the opening of several other *spaces* of crafting, hacking and making (fablabs, makerspaces, startups, meetups, and more). Other Montreal spaces of hacking tend to have a more institutionalized structure, and be associated with organizations, university labs or corporative bodies. The pride of Foulab has, from the very beginning of its existence, been that it is independent of funding and political influence. The 100% male composition of this group represents a demographic example of a traditional hackerspace. The physical state of the space suggests more of a hacking *museum* with real-time hackers rather than a shared space. Foulab is undoubtedly a representative hackerspace, though comparatively, it is limited by its size and lack of activity.

The second case study involves the emerging Montreal-based feminist collective called Femhack. While Femhack members do not call their collective a hackerspace and do not maintain a physical locale, the practices, values, and principles embraced there are typical of venues commonly called *feminist hackerspaces*, and of deliberately feminist hackerspaces in particular. This is a kind of a feminist space, as described by Massey from earlier sections of this thesis, which does not represent a simple location (or, as she calls it a "flat surface"). Rather, it represents a human-led process and derives from the multiplicity of relationships and dynamics happening within (Massey, "Politics of Spatiality" 27). For this reason, Femhack represents, by responding locally to the perceived limitations of hackerspaces all over the world (including feminist hackerspaces), the first hacker community and *space* with an explicitly feminist and hacker character in Montreal. Femhack, while not a typical hackerspace, represents an intriguing example of this feminist hacker counterculture. These aspects include the strong activist (and especially technologically activist) character of the community, which shapes the practice for not just any kind of hacking, but hacking for the well-being of the participants, the planet, and humanity in general. Another significant aspect is the lack of hierarchy and free (as in "beer") participation as a way to include interested persons. By not grounding their practice

in any one physical space, Femhack offers "open space," including rules of mutual respect seen as valid for any space. Some of the guiding principles of the community include personal and collective emancipation, conscious identity work, and self-care. In the end, as Chapter 6 shows, Femhack is distinguished by a powerful vision of community, togetherness, and critical knowledge-sharing among participants (whether members or one-time visitors).

Both of my research sites did a lot of communication online. IRC channels, mailing lists, wikis, and blogs were all available and accessible for analysis. Participation in these forums often requires a certain degree of proficiency with the jargon, and an insider's understanding of discussions as follow-ups from previous meetings and initiatives. It also requires at times offline participation in meetings and workshops, since the online discussions tend to be continuations of face-to-face discussions. As a member and a co-founder of these sites, I had easy access when it comes to visiting, organizing events, participating in discussions, and proposing changes and new projects. Foulab membership offers free access to the site including all of its machinery and tools, but also to its private wiki space where founding documents and archives are stored. As a member of FemHack, I participated in most of the regular meetings, helped with organizing major events and workshops, and had access to any meeting minutes and decisions produced in my absence.

Stake's description of the development of case studies refers to the gathering of rich data around a small number of research questions. Such research gathers data in the following areas: the nature of the case, the case's unique historical background, the physical setting, and the complexity of operating under different contexts, economic, political, social (Stake 438–40). The search for data should always include an intense interest in the personal views and circumstances involved in each case (447). According to Stake, this takes a lot of time for data gathering, arrangements, analysis and write-up. The most important is that the write-up begins with the first, preliminary observations, and requires holistic comprehension of the case. Therefore, access is key to the study of the case studies, an insight my research confirms.

Role and Contribution of Participants and Researcher

Due to the nature of the research represented here, some of the participants have become, throughout the process, veritable co-researchers. Several of them have given the hacker movement a great deal of thought, and have themselves written papers, publications and theses on topics related to hacking and/or feminism. Over the years involved, I had conversations with hackers from each researched group related to their own struggles in the community, or with their peers, or sometimes with the practice of hacking itself. Each participant's ideas have been a real resource for creating interpretative categories of analysis. This close relationship with respondents also allowed me to notice the contradictions and convergence between the viewpoints of different participants, and even the self-contradictions of individual participants.

This research process has already made a noticeable impact, by opening up discussions and offering chances to talk (one-on-one and in discussion groups) on topics of space, gender hacker identities, boundaries of inclusion and exclusion, feminism, inclusive learning strategies, and more. The interviews themselves, at times became spaces of confession and sharing, eye-openers, of recalling significant memories that had been forgotten. These conversations and chances to share enriched the *codified* knowledge produced by the collection and analysis of the data, but they also enriched what EAR calls the *tacit* knowledge of the hackers involved - their local, personal, and spatially or relationally-grounded lived experience (Hearn et al. 15–16).

I see my personal researcher's role in this study as inseparable from my valuable first-hand knowledge of hacking from a feminist position. While quite a bit of research has been done recently on hacking and hackerspaces, very little of it has been produced from an insider's position. The art of balancing so many roles, including participant, organizer, coordinator, a friend, but also observer, ethnographer, and interviewer was a conspiratorial challenge I could not resist taking. My personal motivation was, on the one hand, that I wanted to see these spaces become more inclusive, safe, and sustainable. On the other hand, seeing spaces like these emerge and then disappear without much remaining sign of their existence motivated me to document the processes, events, and communication happening in them.

Choosing to do Ethnographic Action Research in those particular communities was a challenging yet beneficial choice. This research approach, being a combination of two sophisticated qualitative methodologies, represents an amalgamation of methods, making it complex and a bit tricky. The position of the researcher is one of the hardest issues to tackle. As in every research project, the one who implements it aims to be as objective as possible, but "pure" objectivity is especially impossible in ethnographic action research. Since researchers are situated right in the middle of the action, acting as members of a group, is hard at times to step back and position themselves differently from members (and as such, decision-makers). On the other hand, the research-observer always has in mind that one of their main roles in the community is the implementation of their research. Therefore, all conversations, including questions posed to other members as well as group discussions and decision-making, are all, in one way or another, biased by the research goals and questions of the researcher. On the other hand, it is clear that if the researcher did not have a place in the core of the group, actively involved in the discussions and decisions, they would not have so much access to relevant information and resources.

The ethnographic action researcher has multiple roles, including planning, facilitation, documenting, participating, observing, and interviewing participants. As a feminist hacker who is passionate about free and open source software and hardware technology, a media activist, a technology trainer, and a hackerspace member, I am in a strategic position to perform this project's research. On one hand, I am an active participant in the sites of interest, and have background knowledge on their historical evolution; I speak a lot of the technical language (jargon) of these groups and am in a position of understanding debates and discussions. Moreover, I know the communities well, which facilitates the exchange process and makes the subjects feel more at ease to share their views, as well as to ask for feedback on the research process. My special position as a hacker involved in different free-software and hacking projects, with an active role in many of them, provides me with long-term observation expertise on those projects, and intimate and lasting relationships with the participants. As a feminist, my position is relatively easy to relate to feminist critique and integrate it into my thesis.

As a member of Foulab for four years (and the only female Foulab member in the history of the hackerspace), I participated in a number of decision-making meetings (including a mandate of treasurer for over a year), general assemblies, informal meetings for establishing principles and rules, and rearranging the space to accommodate the diverse needs of the hackerspace and its members. I witnessed a number of internal discussions at Foulab regarding social policies such as the need for an anti-harassment policy[45] and women-only workshops. I witnessed online disputes about the role of women and feminists in spaces of hacking and the "boys' culture" surrounding hackerspaces in general.[46] As a founder of FemHack, I witnessed the evolution of this feminist and queer group from its very beginning. My role as a researcher was to observe but also to facilitate discussions, initiate projects and to be curious about my themes of analysis.

In conclusion, I would like to mention some of the most important challenges I faced in this project as a researcher. In the first place, it took a long time it took to get involved and immerse myself in these communities. It was also hard when I needed to step back from them in order to write my analysis. I was so used to the meetings and the spaces, moving away from them was a real difficulty. In the second place, my relationship with the participants sometimes felt difficult because I was meeting with the same people as a researcher and discussing the study, asking for their input as experts and participants. Some of these people were close colleagues and friends who did not see me as an observer. One side effect of this *friendship* was the difficulty created when some of them would become uncomfortably informal with me, for example in opening up to share their doubts about the success of this study. Some questioned the appropriateness of their spaces for the research, given that they are so small. Others questioned the quality and relevance of the participants' expertise, including their own. I had to defend my approach to myself and to others in constant debate.

[45] Which, in a matter of fact, remained a discussion, a policy was never issued.

[46] Like this online discussion, which I did not personally take part, but is led and argued in detail by a Foulab member:
https://www.reddit.com/r/montreal/comments/1jyhm5/hackerspaces_makerspaces_in_montr%C3%A9al/

A final challenge worth noting here relates to a statement Toombs makes about his ethnographic research in hackerspaces. “I cannot control my nerdiness,” he writes (Toombs). As a researcher, I felt this challenge too. When I visited hackerspaces, I would usually bring a DIY project to work on, or join another project in progress. It was always hard to retire to a corner to record observations and “produce” research in such an interactive, innovative environment. My nerdiness threatened to tip the participant-observer balance away from observation. There was also the fact that since there were so few people in the community able to organize events; I had to take over a lot of them. When I did, I tended to direct them toward my own visions of hacking, learning, and community organization. I felt the challenge Toombs mentions keenly too in doing the research analysis and writing the case studies chapters. I needed to de-center my voice to make the participants’ voices heard, keeping my own opinion, vision, arrangement (including literally space arrangement) separate from my account of what came from other members, participants, and visitors. Achieving this participant-observer balance was the greatest challenge of all, and I needed to work hard at being critically engaged and reflective when it came to my own position within my research community throughout the process.

Analysis and Interpretation

The research presented here is divided into two chapters, each covering one case study. Analyses of the two researched sites are given separately, since this dissertation does not represent a comparative study. In the first case study, I take a detailed look at a traditional hackerspace (Foulab) and examine the boundaries to free participation noticed by my participants (and myself). Due to time constraints, I have only been able to include this one traditional hackerspace, though my original intention was to also look at others (such as Hacklab in Toronto). Since I visited a large number of hackerspaces, though, I have at times tried to summarize the boundaries that recurred in all or most of them. Based on the testimony of members of other hackerspaces, some severe examples of exclusion can be found elsewhere that were not found at Foulab. I mention them in other parts of this thesis, but not in discussing the boundaries outlined in my first case study.

The second case study analyzes a less traditional group called Femhack, with two main goals in mind. First, I aim to document as much as I can the history of this emerging space, since there is very little written documentation presently available about the group, and none at all before 2016. The second goal is linked to the participatory aspect of my study: at Femhack I had the freedom to organize sessions, including hands-on events and discussions, which allowed me to observe, listen to participants, and ask questions my study was looking to answer.

The two case studies are quite different, but I used the same focus on *space* and *critical feminist theory* to look into both spaces and analyze the processes at work in them. In gathering my results, four lessons (takeaways) became clear. My research process involved many analytical themes and lessons learned, and was much more ambitious and critical in terms of addressing hacking practice. For reasons of time and focus, though, I limited my analysis to these four takeaways for the purposes of this study. In presenting my findings, I have included many direct citations gathered from my participants. I am aware of the danger of providing too much detail, but this choice allowed me to foreground the voices of the participants, highlighting their nuances and their visions. The conclusions arrived at in this way are of course subjective and perspectival, but given the methods and goals specified above, this result is a strength, not a weakness.

Chapter 4

Case Study 1: Foulab - Boundaries within Open Space

Unlike some bigger urban environments (e.g., Toronto, San Francisco, Berlin), for many years, Montreal had only one formal hackerspace listed on the hackerspaces networking website Hackerspaces.org: *Les Laboratoires Foulab*.[47] The space was founded in 2008 by Montreal techno-enthusiasts and was incorporated as a non-profit organization a few months later. Meetings were initially held at Chaos Café, but the group of 8-10 people soon felt a growing need to own a personalized physical space of their own, for hosting machinery, tools, and ventilation fans. This is how Foulab came to establish its physical locale on Bates Street in Park X neighborhood (Northern part of Montreal), allowing members to gather regularly, to share their tools, and to start accumulating spare computer parts and other hardware. About a year later, Foulab moved in Saint-Henri, South-West Montreal historic French-Canadian district known in the past as the black working class neighborhood[48].

Foulab established itself as a member-owned and member-funded space. In exchange for monthly dues, the members of Foulab get free access to a space for experimenting and hacking, meeting and discussing technology-related issues, and enjoying the use of tools, parts, and otherwise hard-to-obtain machinery. The Lab, as the space is commonly referred to by its members, is open to visitors on Tuesday nights, for an Open Night event. Curious people are free to visit, work on a project, use a rare tool, or ask for help. Usually Tuesday nights are the busiest times for the Lab. They attract visiting foreign hackers, local artists, and technological hobbyists, creating a unique atmosphere. On occasion, the Lab organizes workshops and demos on different types of technological skills, such as basic electronics, Arduino, or 3D printing. Weekends are reserved for member-only time; members hang out and get creative with the tools and parts. Some come up with a random project (such as fixing their bike) as an excuse to spend time in the Lab, away from home, free from noise,

[47] Foulab website: https://foulab.org, and https://wiki.hackerspaces.org/FOULAB

[48] https://en.wikipedia.org/wiki/Saint-Henri,_Montreal

enjoying quiet time on their own or in the company of like-minded individuals. Some members even stay overnight.

One noticeable particularity about Foulab, as compared to hackerspaces in the USA, the rest of Canada, or Europe, is its perfect bilingualism. There is no rule about language. People usually express themselves in either English or French. Visitors find the freedom of expression in different languages to be an asset, considering that so many Montreal spaces are divided by language issues. There are tech groups of Anglophones and Francophones around, but is hard to find a good mixture of both anywhere else in the world.

The Space

In Foulab, *space* is a defining factor for community organization. The Lab was created to meet a need for a physical venue to make hacking possible, and the members themselves do not often think much about it. It remains assumed, unnoticed, even though some of the members spend long periods of time busy in the Lab. There has been plenty of space-related work in the Lab. Some of this work is practical, such as fixing the leaking ceiling or dealing with too much heat in the summer. Other space-related work is aesthetic, such as optimizing the layouts of different corners, placing and making machinery work, and sorting out junk. The space is used in artistic and humorous ways, too. Members often leave their own artworks in visible places around the lab, including, for example, a cardboard cat hanging from the ceiling.

Since 2009, when Foulab moved into their current locale (a large studio in an old industrial building of about 1000 square feet) in Saint-Henri, there has been quite a lot of work done on the space. Projects and members leave their distinctive traces - arduinos strewn about, random posters and stickers adorning the walls, artist and geek creations hanging from walls and ceilings (like the illuminated flash sign announcing that the Lab is open, for example). Hackers wander among these collected items, leaning over their computers or work stations. Some quietly work in a corner while others listen to loud music in another, coming together to and chat from time to time.

"Chaos" is a word often used by strangers to describe their first impression of the Lab: stuff is to be found everywhere. The space has been called Ali Baba's Computer Workshop Cave, an *espace malade,*[49] a "clubhouse, a gang hideout or a pirate cave" (Megelas 16). An impressive bank of spare computer parts and equipment, including cables, screens, modems and routers of any kind - all sorted by model, year, power level, size - all available to those who are looking for equipment to hack. A long wall of spare computer and electronic parts follows its own logic. When asked, members can quickly find the sought-for item. Since there are not always labels on the boxes, though, it really takes someone knowledgeable to help with finding things like cables, chargers or routers. It may all look mysterious to a visitor, but a Lab member always seems to know what part is where.

There are corners dedicated to different hacking crafts: electronics, carpentry, ham radio, etc. The space has a soldering table, computer workspaces, a server box, a lounge or a *chill-room* for meetings and video projections, book shelves with tech manuals and Maker zines, a power tools wall, machinery, and spare parts. Empty beer bottles are found everywhere. A vintage computer museum, demos of old games, a tweletype[50] and a small robot called Mr. Coconut Head[51] hang around to entertain the visitors. The chill-room is equipped with car seats for comfort, disco-lights, a projector and Christmas lights attached to the night-lamps for fun. Hackers needing a break can also wander over for "beer around the keg."[52] A pile of *junk* often lies at the front door, brought by Montreal geeks in the hope that some skilled hacker might prolong the life of such old stuff.[53]

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[49] In French *espace malade* means "a cool place" (a Quebec expression, literally means "sick place" but used when something is very impressive).

[50] The tweletype is a hardware terminal with a keyboard for input and a printer for output. It prints on one long continuous roll of paper. For more information see: https://foulab.org/projects/fx/tweletype/

[51] Mr Coconut Head was a microcontroller machine on wheels, capable of moving in any direction. When he bumped into something, would simply turn and go again. Mr Coconuthead "died" after someone opened it up to take the Arduino for another project.

[52] Draught beer made locally by Foulab members, served from a pressurized keg coming directly from an old fridge dedicated fully to this purpose.

[53] There was so much junk at one point that a few members returned over 1000lbs (>450kg) of electronics to the local Ecocentre in May 2015. Mailing-list discussion, May 2015.

When members are not involved in hacking-related discussions, or advice-giving on tech-related issues, they enjoy the freedom to build stuff, use power tools from the Lab, play games, and learn new hacking skills. The separation of the space into discrete dedicated areas allows members to focus on whatever they are working on. These unusual features make Foulab a creative space where one can try different hacker experiments, have fruitful exchanges with other hackers about their projects, seek feedback, etc. While cluttered and visually "messy," the space is very well-equipped for making sense of DIY technology and supplying members with what they need for hacking it. They make the space culturally fascinating even for people who do not identify as hackers.

Experience Based on Status - Members, Users, Visitors

A group of about ten Montreal hackers founded Foulab in 2008, having met at one of the most well-known hacker events in New York, H.O.P.E.[54] They were the first members of the hackerspace, and about half of them are still around. Members of the Lab get specific privileges such as special status on the IRC channel, keys, passwords and full access to the space at any time they like, voting rights (including voting on future members' acceptance), space on the shelves for their projects, and an internal database with documentation. To become a member, one needs to obtain the status of a *user* first. Users represent a special category of visitors. They have fewer privileges than members have, and pay dues while they *test* - and are *tested on* - their suitability for a full-access membership that only becomes possible a few months later. They pay their monthly dues and participate freely in the meetings, but are not given full voting rights or keys to the door until they have been properly vetted by members over a given time period. They are free to visit the Lab only under the supervision of a member. To organize an event in the Lab, one needs to be a full member, or get the approval of such a member. Membership fees at the time of this research (2010-2014) ranged from 50$ to 75$[55] per month[56]. The former is the user's fee or also the

[54] H.O.P.E. stands for *Hackers on Planet Earth* is a hackers convention held regularly since 1994, usually in the Pennsylvania Hotel in Manhattan, NYC. http://hope.net/

[55] This fee was 100$/month as of 2018.

[56] These are collected to mostly cover the monthly fee of about 1250$ per month, as well as Internet connection and insurance (once a year of about 500$).

"starving hacker fee," while the latter is the full membership fee. After a few months (there is no official rule on the time frame), members can vote to decide whether or not a user can be a full member. A majority is needed for the new member to be accepted. Members and users visit the Lab often, and are often present at Open Nights. They keep themselves up to date about the space, chat with newcomers, and participate in discussions. Membership and participation rules are not publicly known.

Visitors simply come and go, often driven by curiosity about the space that is not advertised and yet well-known. Many of them attend the Open Nights once or twice, or even many times, without ever becoming members. Hackers interested in Fouab membership visit in person to ask questions about its functioning and decide whether they want to become members or not. Certain regular visitors like the Open Nights option to work in a hackerspace without the need to pay dues, and they end up hanging out in the Lab every Tuesday night. Many of those who visit the hackerspace only come for workshops, or for special thematic discussions or film screenings, without getting further involved in the life and activities of the hackerspace. Hackers coming from different cities and countries and representing other hackerspaces consider the Lab a kind of tourist attraction. They come to meet like-minded individuals, talk about familiar topics, and think critically about technology, its uses, and its configurations. At times, people simply share the space without talking to each other, all working on their own projects. A member named Abstract reports that he prefers this silent presence of other hackers to being alone in his home or basement.[57] Hackerspaces shared by like-minded people are in this way different from online encounters. While online meetups and discussions play a central part in the life of a hackerspace, they never fully replace the informal, under-ruled, chaotic-looking workshops, full of people wearing witty t-shirts with formulas and acronyms known only to a few.

Most of the members I interviewed go to Open Nights and workshops to meet new interested hackers, to demonstrate their works-in-progress, to chat, to share power tools (and teach others how to use them safely and responsibly), and to meet in person those they

[57] Interview with Abstract, Jan 17, 2015.

meet often online. Such members share that Open Nights are for socializing, and they choose times to work on their projects when there is nobody present, or when there are fewer people are in the Lab, so they can either have silence, or play the music they like at the volume they like, and work in peace.

The formally structured, tiered membership system exists alongside this yet loose system of participation. These different ways to participate create a range of types of socialization in the Lab, depending on Labbers' different needs: regulars come often to hack on their own or in small groups, and Lab supporters come occasionally, often just to socialize. In terms of space theory, Foulab represents what Doreen Massey (whose conceptualizations of space were was discussed in Chapter 2) calls an unfinished, unstable space: it is always evolving along with complex interactions between those that come and go, those who never return, and those who are almost permanently there (Massey, "Politics of Spatiality" 4). It is a space that is renewed with every workshop or *cleaning* session in which stuff gets moved around; an ever-changing space. Because the attendance of members is so unpredictable, one can never tell if there will be three or thirteen people the next time they "hit the Lab," even without the wildcard chaos of Open Nights. This creates what Massey calls a "multiplicity of trajectories" (Massey, *For Space* 9) for participants and their encounters in the Lab space. Their interactions are sporadic, unpredictable, and adjustable (some coordinate their visits online to make sure others know when they are around, while others do not). These chance meetings create the possibility of getting unexpected help on a project, or having an interesting conversation that results in a new idea emerging on the spot. This dynamism is part of what members sign up for when they join Foulab: the openness of the members about their expectations with regards to the space, its inhabitants, and the transformative experience. The members are in this way a lot like the space they have created: they have a remarkable potentiality and flexibility, depending on the day, occasion, and mood.

At the time when I was most involved in Foulab (2010-2014), the majority of its members were male, white, and mostly hetero-sexual, equally distributed in three age-groups: late 20-s to mid-30s, mid-30s to mid-40s, and mid-40s to mid-50s. I was the only female member for the entire 10-year history of the Lab. There were never more than 20 members

at the same time (mostly around 10 to 15). The majority had computer-related skills in science, engineering or information security. Some of them had obtained higher degrees (MA, Ph.D.), others were self-taught without any formal education. Only a few had some education in other fields, such as chemistry or philosophy or digital art, and had learned hacking on their own. Most members were Canadian, split almost by half between Francophones and Anglophones. English is the language spoken most often in the Lab, especially on the Open Nights when visitors coming from abroad do not speak French. The majority of the Lab members had no children, but some had a family. Two members had young kids (three counting me). One loved discussing the development of his baby with me. The other had an older child (7-8 years old) he brought in with him most of the time. I used to bring my 4-5 years old daughter occasionally at that time, who used to love the space, mostly playing Lego and watching movies in the chill room. For most Lab members with families, going to the Lab seemed to be their "time off" from the family and kids, where they were in their bubble, not bothered by the burden of the everyday life.

The Foulab Case Study

The Foulab case study serves two goals. The first is to answer my first research question about the boundaries that attract and maintain connection between such a small number of individuals, while a large number of hackers fascinated by the hackerspace never took the step of engaging in the community. While some studies have covered a few obvious issues, such as issues of technical innovation, but also harassment and gender-based discrimination in such spaces, I am interested in the social and spatial "invisible boundaries" that may be involved. I have felt accepted and at ease in spaces full of hackers, yet I am sad about those who have had bitter experiences and never returned to a space that has so much to offer in terms of techno-science, creativity, and freedom of learning and testing. My second goal is to discuss the boundaries experienced by my study's participants from their own points of view, in order to set the stage for my conclusions about the kind of boundary-drawing that may help create a truly democratic, inclusive hacker collective in which more hackers, including women, feel at ease.

In conducting my research, I realized quickly that different participants had very different ideas about hacking, including the spaces and the social relationships involved. The Foulab members I interviewed were remarkably unified in their uncritical vision about gender-related issues (with several exceptions). According to most, there was either nothing to be fixed socially, or they had no motivation for fixing it. One of the members explained that he comes to the space to hack, not to think about the social problems arising from other hackers' problematic behavior.[58] In subsequent conversations, it became clear that women and other visitors, according to Foulab member Ninja, are free to join the members, as long as they are passionate hackers, come often and contribute to the community (mostly financially, but also otherwise). As far as he could see, the only real boundary to belonging faced by such visitors was found in their own willpower.[59] Hackerspace is supposedly gender-neutral.

Clearly, interviewing members alone was not going to provide all the information I needed to understand the subtle processes of boundary-building involved in the Foulab community. I therefore approached former founders and members (one of whom was President of the Lab for several years), and asked them about their thoughts as disappointed fans. I also conducted short unstructured interviews with first-time and returning visitors about their impressions of the Lab. First-time visitors were always very impressed by the Lab, but often quite confused about the social setting. Their opinions helped me identify factors that people taking an active part of the Lab could not perceive. One university student noted that there was a lot of cursing in the Lab. I was used to this rough language, to the point where I no longer noticed it. Returning visitors were interesting in terms of the way they would visit the Lab on Tuesday nights but would never consider investing more time or money to become full members. They saw some utility in participating, and felt some belonging, but apparently not enough to invest any further.

Alongside the ethnographic research conducted, I interviewed sixteen hackers for the purposes of this case study. Most interviews took place in 2014-2015. I did six in-depth

[58] Conversation with Dexter, May 2014 in the Lab.
[59] Interview with Ninja from May 2014. Ninja is a nickname for a hacker member.

interviews with Lab members, and ten shorter ones with first time or returning visitors. Out of all interviewed participants, eight were male (or male-identified queer), and eight were female (or female-identified queer). All the females were either first time or returning visitors. Some of these visitors acted almost as members, but they never chose to pay the dues and formalize their membership status.

When I became a member, I had a Free Software and lock picking[60] interests. I discussed a number of topics with the members, I built several hacker projects, including a piece of free translation software to translate my MA thesis into English (because of the huge interest expressed by Anglophone readers). I was well respected because of my older age (late thirties at the time), international connections, decision-making skills, and cool t-shirts showing off all the hacker conferences I have been to and the principles I follow.[61] As a speaker (and sometimes a keynote) at international hacking gatherings, I had gained a local reputation. I was also a confidante for some members. When there were problems or gossip, I was often approached and asked for advice.[62]

The Unwritten Rules - Boundaries of Participation

After this relatively lengthy descriptive "mise en scène" of the Foulab case study, I want to move forward with my findings with respect to the theory of how space and gender intersect to create boundaries that inhibit or enable participation in hacker culture. In the ever-changing process of people shaping the space by occupying it and by engaging in them, the question of who shapes what and in which ways is central. A close ethnographic look at the social and spatial dynamics within the group allowed me to learn the unwritten rules, observe the decision-making processes taking place, and see the patterns of certain projects finding group support rather than others. My study reveals the social patterns found in the ways these hackers interact, form friendships, and create boundaries to construct their sense of belonging, their identity, in contrast to others they do not consider

[60] This is the skill of unlocking a lock by manipulating the components of the lock device without using a key. Although it is sometimes associated with criminal intent, lockpicking is the work of the locksmith.
[61] E.g. The Free Software Foundation Europe's T-shirt that says *Hacking for Freedom.*
[62] This is, for example, how I learned of several times when someone was insulted by a sexist (or other type of offensive) joke and left the Lab for good.

to be part of the group. I trace the way that hackers in a traditional hackerspace like Foulab define their hacker identities and associate themselves with certain people and not others.

Foulab's relationship to the commonly held hacker ideals of openness, equality, social engagement, and inclusion is conflicted. While the hackers' explicit mission is to provide people with free access to space and resources allowing the free use of equipment and exchange of knowledge and ideas through the exploration of different technologies, its space and socialization introduce clear limitations. While the space generates great curiosity among outsiders, there is a clash between the expectations of Foulab members and the hopes of Foulab visitors. Most serious hackers from Montreal have visited Foulab at least once, but they rarely stick around for extended periods. Not even all the original members have remained. The queer and female hackers I have met in the space have remained returning visitors without priorizing the community to gain permanent membership status. The small and homogenous nature of Foulab's membership points to significant social limits in the way the Lab's open ideals are put into practice.

As mentioned above, visitors to Foulab report appreciating a number of positive things about the space, including originality, a bi-linguistic sense of community, and a cultural fascination and originality compared to other hackerspaces they have visited. One female hacker, a long-time visitor to Foulab, expressed the conflict in these words: "For me a hackerspace is a fun place. There is a part of me that wants to go there and enjoy the environment, the people, and the projects I make or participate in. There is another part of me that wants to make it a better place, both socially and politically."[63] Despite such desires and such efforts, in time this hacker became (like so many other interviewees) disengaged from Foulab and lost their hope of making it a better place.

Lab visitors interviewed commonly shared that they do not experience the space as welcoming. They do not feel invited to become members of the group. One of the most repeated criticisms expressed, for example, was that the Lab is "not political enough" for an innovative, experimental environment like a hackerspace. By this, visitors seem to mean

[63] Interview with Gh0st, July 8, 2014.

that Foulab is not conscious and proactive enough about social or technological activism. Here are the concerns listed by my interviewees: the space is not welcoming to strangers; there is not enough gender diversity; there are no anti-harassment rules; its distance from downtown is prohibitive for many; the language used may be off-puttingly harsh at times; and the space offers little in the way of common projects open to newcomers or beginner hackers. In general, the space is seen as focused on *individual* hacker work rather than on building a hacker community in the city. While Foulab members enjoy being visited by outsiders, they do not put special effort into making visitors feel comfortable and welcome in the space. The space is mostly dedicated in practice to the comfort of the existing members.

Many of the interviewed visiting hackers indicated that the space does not correspond to their vision of hacking, and did not make them feel comfortable becoming members. The fact that Foulab is often called "the Montreal hackerspace" sets up great expectations for the Lab to represent the way "the hacker community" ideally ought to look. Hackers, visitors, and researchers have looked to Foulab as representative and been disappointed. Local researcher Alex Megelas, in his MA thesis *Power up! Learning in a Hackerspace* noticed "clashes" between his project participants and the Foulab community. Early in his research, he summarizes the group as a "community of practice" in which there is no expectation of high social engagement. Megelas quotes here Wenger's definition of communities of practice as "groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger 1 qtd by Megelas 23).

Since self-imposed limitations like these are, as mentioned above, a common and significant problem in many hackerspaces and tech environments, I have organized a detailed analysis of the social and spatial *boundaries* noted in observations and reported by study participants as barriers for joining the Foulab hackerspace community. The statements are not generalizable, since they are gathered from singular respondents. The scope and essence of the study points to paths forward and represents the kinds of voices least commonly heard in such spaces.

For the purposes of analyzing the boundaries identified in my work, I have borrowed from Massey's proposed classification of different social and spatial boundaries in her book *For Space* (Massey, *For Space*). According to Massey, boundaries are not about physical outer limitations, since space is emergent, continuously changing and political. The boundaries of a given place are created by *corporeal practices* (actions), *representations*, and the *work of objects* (e.g. walls). These boundaries can be social or spatial (or both). They represent overlapping relationships and are built inside a network of relations. Thus, space represents a meeting place, an ongoing production of boundaries involving human relationships (Saldanha 46). In Foulab, as in many other hackerspaces, boundaries are built in dynamic and experiential ways: a sense of general discomfort upon entering a "boys' club," power relationships related to the sense of belonging and status, conflicts between individual rights and group wellbeing, etc.

I have gathered participant reports on their experiences of Foulab in the form of responses in a table, in an attempt to identify the operative boundaries in Massey's sense. The table does not pretend to be an exhaustive list of all possible boundaries. It is a local illustration of how boundaries work in an open space. The boundaries are not necessarily negative. Some look necessary to defining a common identity. However, as I will show, many of them are incompatible with building a truly democratic hacker culture.

Table 1. Social and Spatial Hackerspace Boundaries.

Boundaries	Social	Spatial
Corporeal Practices	❑ Ignoring newcomers when they enter the space ❑ Talking among friends but not to visitors ❑ Patronizing attitude towards female hackers ❑ Female workshop participants and facilitators	❑ Abandoned individual hacker projects everywhere (marking the space) ❑ No common projects for newcomers and beginners to join (nothing to start getting familiar with

	feel directed ❑ "Teaching others"	hacking or getting a feeling a belonging) ❑ Openness (freedom) discourse
Representations	❑ Hacker jargon ❑ Hacker jokes ❑ Dress-code ❑ Sexist Language (belonging to a macho culture) ❑ Identification with the hacker culture (outsiders must feel they don't belong there) ❑ Prizing specific types of hacking	❑ Museum out of the hackerspace ❑ "Cave of Ali Baba" ❑ Stickers everywhere (also sexist) ❑ "Boys club" ❑ Beer culture ❑ Dirty bottles everywhere ❑ Dirty bathroom ❑ No kitchen
Works of Objects	❑ Membership status shows privilege and reminds of the boundary ❑ Lack of clear rules about using the Lab, about joining the members' club, about cleaning or using the equipment (power of those who are privileged enough to know) ❑ Lack of transparency on decision-making processes	❑ Lack of visiting options. Lab is only open when the members are free ❑ Hard to find the Lab, hard to get into the space ❑ Space organization - lack of inviting atmosphere ❑ Cleanup sessions by a few members (decisions are taken without the group) ❑ High monthly fee (hard to pay) ❑ Dust, beer bottles, lack of decent bathrooms

		❑ Lack of kitchen ❑ Not kids-friendly

Corporeal Practices

In the Introduction to this study, I discussed the idea that a given space is defined in the end by interactive relationships. The borders of cartography are just one expression and function of this process, with no reality of their own. For this reason, relationships between Foulab participants are able to create social boundaries. The ways in which people relate to each other, the ways in which communication happens, and the extent to which hackers "feel good" spending time with one another are of central importance. The way participants are introduced to a space, community or social (hacker) practices represent a crucial corporeal practice. When poorly done, it creates boundaries for those who are interested but new to the spaces. One study participant underlined this point with a comparative example:

> There are spaces that inspire me but the people who inhabit them do not inspire me, thus I do not like spending time there, and vice versa. For example, I visited once a data center in Austria, which is impressive by itself, but much more interesting to visit with feminist system administrators who have an approach to explain things in a funny and comprehensive way, and who make the visit a collective experience, rather than placing technology as high importance.[64]

Interviewees of every gender and status connected to the Lab affirm that traditional hackerspaces have their shortcomings (as do hackathons, hacker conferences, etc.). Many report feeling a mixture of fascination with such spaces and a certain discomfort when visiting. One female hacker shares: "I've had both positive and weird feelings with hackerspaces. It took me a while to feel comfortable there, and I am still not feeling

[64] Interview with Sigma from Oct 23, 2015. Female, feminist hacker, one of the co-founders of Femhack. Free translation from French.

comfortable to drop in."[65] Such mixed feelings dominate participants' replies to questions about Foulab. There is usually a lot of enthusiasm related to the space, the technology, the unique arrangements, or the hackerspace idea in general. When it comes to socializing or getting involved, though, there is a noticeable chill:

> They have amazing facilities available. But I didn't feel welcome the way people greeted me or talked. There's a lot of crowdedness, a boys' club of having conversations."[66]

While several participants specified that for them hacking is not dependent on any particular kind of space (since hacking can in theory be done in any possible space), the alienating limitations experienced in a physical space like Foulab can still matter: they might not always feel comfortable hacking there, or feel inspired to invest time and effort into making it a better place for hacking with others.

Newcomers also had trouble with the culture of individual projects, in which Foulab members work on particular projects alone, without engaging in the Open Night event or with the people present. One first-time visitor put it this way: "Everybody is in their zone, doing their own thing. It didn't feel like it could be a space where I could be a beginner. Or a member."[67] Another one adds: "If you are not already their friend, it is hard to [get to] know someone."[68] The lack of common projects made Foulab feel more like a members-only club than potential members of a community-in-the-making of the sense of re-emerging from their practices (Charland; Agamben). Therefore, newcomers would not only feel free to join in, but to contribute to its future character

> Foulab is still missing people who are ready to integrate newcomers to the space; they sometimes tell you hi, sometimes not. Moreover I believe it takes talent to make newcomers comfortable in the space. There are a few members in Foulab that have this talent but the space as a whole is quite socially hermetic.[69]

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[65] Interview with a female hacker visiting from the USA, Oct 17, 2015.
[66] Storm, Oct 17, 2015.
[67] Interview with Beta, July 13, 2015.
[68] Interview with Billy, Oct 17, 2015.
[69] Interview with female hacker and returning visitor, Oct 22, 2014. Nickname Omega.

Several visitors made it clear that the exclusive way Foulab members act does not seem to be conscious. There is simply a lack of engagement related both to people's struggles and to deliberately making the space livelier and more pleasant so that others are willing to join in. While there is a discourse about being *free to join* the hacker community, there are in reality many conditions that create barriers for involvement to occur, and for a sense of belonging to be instilled. The *free access* Foulab offers to technology is limited by a number of physical barriers, expertise barriers, and personal barriers created by a failure to be actively inviting. As the following section explains, a theoretically *wide open* space is not necessarily very open to all in practice. One interviewee expressed this problem to me with reference to a more practically *open* hackerspace, one where openness is not only spoken of, but is *practiced*:

> It's not just a question of saying: 'We are open to newcomers.' To open up and be welcoming is a hard job. I remember a space in New Orleans where they have an Open Workshop every Thursday for exploring something together. They don't call themselves a hackerspace but their practice is hacking (open culture, open source, etc.). With that workshop they practice their openness.[70]

Without common projects where newcomers or new-to-hacking individuals can join and progressively learn new skills, it is hard for them to participate in the space.. As another female hacker says of Foulab: "I know that it is a DIY space, but I never felt the DIT element in it. For example, every time I was there, the 3D printer was either broken or was printing something for someone... I never saw it being used for a community project."[71] If visitors want to use a piece of equipment, they need to wait and hope for help from a Lab member. As this interviewee so pithily states, there is a difference between a DIY ethic, which seems to reinforce the value of individualism and a DIT doing it together ethic, which allows for the creation of community through the participation of established and new members.

The social self-assertion of insiders and regulars at Foulab can at times take less subtle forms. One of the study participants hoped that she would meet and build a community in

[70] Storm, Oct 17, 2015.

[71] Interview with Sigma from Oct 23, 2015. Female, feminist hacker, one of the co-founders of Femhack.

Foulab but she was met, instead, with uncomfortable expressions of authority: "I felt very directed."[72] This frequently reported assertion of authority on the part of more established members to newcomers often took the shape of a "patronizing" attitude around tools and equipment. Users and visitors reported that they got only a vague, passing introduction to machinery, which created a dynamic of dependence and sometimes even a perception of disdain, which also failed to take into account that when it comes to access to tools, that members come with prior histories of access and engagement in a culture that is still divided in gendered terms. One female participant shared her experience with this issue in the Lab in these words:

> I feel that the way I was introduced to the tools and the machinery was very patronizing. I have done a bit of soldering there, but had the impression that four people were looking at me as if I was doing something wrong. Every time someone would present me a tool or a machine, it was a big deal.[73]

Another female hacker mentioned this kind of discomfort coming up specifically in the case of members asserting their authority during meetings or workshops. Such members often jump in to "teach" and judge the workshop leaders, even as they are trying to lead the workshop.

> There was one person who was not taking the workshop, who was a member there, from the very beginning arguing and asserting his authority. "This is how you should be doing it." He disrupted and discredited me while I was giving the workshop.[74]

As is stands in Foulab, there are a few members who take up a lot of verbal space in meetings and workshops (a telling phrase for our purposes here), which means shutting out others by commanding both time and attention There are people on the Lab IRC channel who speak a lot, or speak for others, thereby silencing others. Several IRC channel visitors have had to leave permanently, to avoid being "spammed" (bombarded with unsolicited and unwanted messages) by one particular participant who dominated communications.[75]

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[72] Sigma, Oct 23, 2015.
[73] Sigma, Oct 23, 2015.
[74] Storm, Oct 17, 2015.
[75] Interview with a male hacker, June 22, 2015.

In any hackerspace, one or two disruptive individuals can ruin the experience for others, leaving bitter memories of hostile discussions or patronizing behaviors. According to my interviewees, Foulab perpetuates this problem because there are no fixed rules to protect people from such behavior. The ideal of *freedom of speech, so* valued at the Lab, means that some members are against the creation of rules. Rules are understood only as something authoritarian, as putting limits on the ways in which participants are expected to communicate and interact with each other. As a result, some members feel free to say what they want without considering the consequences of what they are saying on others. Members of the Lab's "Foufem" sub-group (described in the following section) who initially held their discussions and planning meetings at Foulab complained, for example, that they were regularly interrupted by Foulab members who wished to jump in and give their opinions. As one member put it:

> There are also many white privileged men that sometimes interrupt meetings and just speak and speak and speak, and they are in their own head and have no idea that they are disrupting something rather than contributing positively to the meeting.[76]

In several cases, harsh and sexist language, including a few examples of women being directly verbally attacked in the Lab by having their competence questioned, resulted in them leaving the Lab and never returning. The lack of a basic code of conduct including anti-harassment rules (and the lack of interest in creating a code or in implementing it) created an unsafe environment for those few women hacking amongst the dozens of men typically present at Open Nights and space meetings.

I personally experienced little in the way of harassment or other forms of intimidation, except as a witness. I have always felt free to visit as the only female member, and to insist that my voice be heard in the meetings and conversations. I have, on the other hand, often felt that I needed to behave in a certain way in the Lab as a woman. For example, I usually (and not completely intentionally) wore a hacker T-shirt and jeans, to look as much as possible like any other hacker member in the Lab. I would usually pursue my own projects,

[76] Interview with Gh0st from July 8, 2015. Gh0st is a female hacker, a returning visitor to Foulab, and later became a member of Femhack.

either software or hardware-related, although I would at times discuss with others how to fix an issue. I would always bring a list of problems and use my Lab time to solve them with or without the help of others. I would (very intentionally) rarely participate in cleaning the space, washing dishes, or other activities typically thought of as female chores. There were cases where Lab members approached me on topics related to their children or their personal relationships, even though I never solicited such conversations. No matter how hard I tried to talk about technological interests, there were still some members who obviously saw me more as a female friend than just another fellow hacker.

The result of this lack of clarity and accountability is a conflict between the philosophy of *openness* in the group and the establishment of appropriate rules to be observed by the group. One member cited the difficulty of holding women-only events in the Lab, for example, due to another member's insistence that it would not adhere to the principles of freedom of expression and freedom of gathering. "What if a male Lab member wanted to participate?" the member asked, with an added note of sarcasm: "Not that a man would want to join, but just in case…" This kind of ideal *openness* shows in practice no effort to understand the historical or cultural circumstances that would necessitate women deciding that they needed to have closed meetings to address particular issues of concern. . Indeed, I was verbally confronted on the Foulab mailing-list when I suggested that the first Foufem hackathon be organized in the Lab. One member asked sourly why it should be a women-only event, since in the Lab people are usually not prevented from participating. In the long discussion that followed, some members said they were happy that more female hackers might get interested in the Lab, but several were quicker in backing the first negative response. I received encouragement from Lab members mostly in individual/personal direct messages (i.e., not as part of the public thread on the mailing-list). The member who started the negative thread eventually apologized, but since he did so in person, it did not form a part of the public debate. In the end, then, the public list preserved negative group comments, and positive responses were limited to individual personal exchanges. In this way, this member set a negative public tone which ensured that anyone reading the online discussion list would leave with the impression that his opinion was the norm, ensuring that it became the dominant opinion about such issues in the Lab.

A very similar dynamic of exclusive *openness* emerged later (2014), when a queer activist and hacker from Boston was passing through Montreal. They[77] wanted to make a presentation on the topic of cryptography, showing how grassroots activists should protect their personal information. This hacker-artist had created a zine on the topic and was distributing it freely. When I met with them, we spoke and I promised I would talk to the members about their workshop idea to see if the Lab was free on that day for organizing the presentation. When I wrote to the group, everyone seemed pleased. The hacker visited on the Open Night and discussed the workshop with other members, all of whom said they were very happy to meet such a talented person and to hear about their unique personal journey and hacker practice. However, on the mailing-list, one member declared that "she or he" looked "weird" to him, and had not made a good impression. He then criticized me personally on this mailing list for allowing such an undesirable presentation to happen in the Lab, despite the fact that over 30 people took part, and the fact that the presenter was very well prepared, and gave a fascinating cyber-security workshop, well designed for the broader public. Moreover, the visitors themselves helped clean the Lab before and after the event, helping everything go as smoothly as possible. The member who launched the attack on the mailing-list apologized two weeks later in a personal email, but once again, it was in private. His negative and homophobic notes on the public discussion list remained, and while no other Lab members had publicly supported these remarks, none had criticized them either. His excuses, coming as a personal message, did not reach the audience in front of which he had been hostile.

These two anecdotes exemplify a paradox and tension. The values of freedom and *openness* noted by interviewees could in fact produce their dialectical opposite: a boundary capable of pushing newcomers, and in particular women, away from Foulab. In an ostensibly rule-free space, the refusal to acknowledge the need for even a discussion of institutionalized protections against aggression, harassment, and other types of violence, whether verbal or physical became a "boundary issue" (Bowker et al.; Gauthier and Sawchuk). This potential feeling in this space, what some might call affect (see Gregg and Seigworth), which created

[77] This is the pronoun of their choice (they/them).

a feeling of a lack of safety and security is particularly relevant for female and queer newcomers arriving in a space that can be, as noted above, quite hectic and chaotic in general. There are for these reasons a real conflict for Foulab visitors between the values of individual freedom and the practices that build "community freedom". Clear rules and codes of conduct in a community of practice like Foulab were flagged as important by my research participants, and in their judgment Foulab is not clear enough about the import of creating such a climate in its shared space.

To conclude this section, the practices of social and/or spatial activities that dominate Foulab create community boundaries that create a kind of group character that despite the discourse of hacking and freedom, and technology and openness ironically have adverse consequences: they create not only a sense of belonging, but boundaries that are especially felt by women and trans people. While some of these boundaries provide both formal members and some visitors with a sense of the community, there are also expressions of belonging that clearly entail discrimination, including in particular gender discrimination (patronizing behavior, responses of distrust and resistance for women giving technical workshops of good quality, etc.). The following section details one attempt to mitigate the effects of this particular kind of ideal openness at Foulab.

Representations

Hackerspaces like Foulab are marked throughout by visual representations of hacker identity identifying their space and their particular approach to technology, to make the place clearly "their own." Among such representations of hacker culture found within hackerspaces, observers encounter hacker jargon and an unofficial dress code (jeans, geeky t-shirt, beard or untidy hair, laptop backpack, laptop with stickers). Foulab has a relatively "macho" character, attributable to its exclusively male membership. There is a powerful beer culture, and a dominant ideal of what a "real hacker" is and how they act. The result of all these community self-representations is that candidate-members feel that they need to meet certain expectations of proper or authentic hacker identity and appearance to belong to any hackerspace. However, as we will see in the next case study and in the comments of the feminist participants further on, it is difficult for some interested people to "fit" such a

narrow identity definition and to be treated as full members of the "club." In this way, representation becomes one of the most visible and obvious was for establishing boundaries of who is welcomed into a hacker space and who can become a member of aLab's particular hacker culture. Newcomers add their own values, which may transform the dynamics within a space, thus redefining its character by approaching hacking as either something to fear or something to admire. Either way, newcomers rarely have the courage to join in as equals at the beginning of their journey into hackerspace.

The "boys' club" feeling of the Lab is very significant in this context, since the boundary between work and play can reveal a very gendered reality closely linked to the politics of space and technology (Massey, *Politics of Spatiality* 190) As Doreen Massey has observed one person's ability to play may be contingent on someone else's invisible or undervalued labor, particularly in societies where there is a gendered division of labor that is unacknowledged. Massey writes:

> It is the highly qualified workers in high technology sectors on which this new research is concentrating. Well over 90 percent of these scientists and technologists are men. They frequently love their work. This is no bad thing until one comes across statements like 'the boundary between work and play disappears,' which immediately gives pause for thought. Is the only thing outside paid employment 'play'? Who does the domestic labour? These employees work long hours, and the flexibility of their organization is someone else's constraint. Who does the launderette? Who picks up the children from school? In a previous project, from which this one derived, and from which we have some initial information, only one of these employees, and that one of the few women whom we found, mentioned using the flexibility of work hours in any relationship to domestic labour – in this case she said that on occasions she left work of reproduction and of caring for other people; indeed it implies that, best of all, they have someone to look after them. It is not therefore just the old labour movement; it is also the regions of the 'new man' which have their problems in terms of the construction of gender relations. What is being constructed in this region of the new economic growth is a new version of masculinity, and a new – and still highly problematical – set of gender roles and gender relations.

In this socio-technical situation, hackerspaces like Foulab that offer a play-type environment, have a tendency to alienate women, whose gendered life-course often makes them see hacking in a different way than men because of their past experiences or their

present situations. Women who do not feel free to bring their children into the hacking environments that they find fascinating, for example, may end up leaving. If they have to choose between spending time with their children and exploring technology, it is likely they will choose the former. They may not have a choice because of the different parental obligations placed upon men and women in our society.

It is not surprising, given all that has been said so far here, that female visitors often reported the absence of a welcoming atmosphere at Foulab. The majority reported liking the people and the discussions, but expressed reservations about hacking in a "boys' club" like Foulab. They just did not feel comfortable. One male visitor confirmed this perception of Foulab as unwelcoming, referring to the "verbal space pollution" created when members spoke condescendingly, made sexist jokes only they could appreciate, swore, or made sexist comments in the presence of newcomers (including female newcomers in particular). In his analysis Alex Megalas mentions that some of the participants overheard the word "bitch" used conversationally during their project activity, for example (Megelas 60, 98). There is also a regular flow of "rude jokes" that confirm the insider status of those who share them, but tend to exclude other people around, and particularly newcomers. As Megelas himself puts it as a former member of Foulab, a hackerspace is a public space, and therefore members need to be more aware of the way that some of the "rough language" used during Open Night visits is pushing people, and especially women, away.[78]

Members of the feminist hacker collective Foufem confirmed the picture just outlined in interview. They reported liking to meet people there, and finding the hacker discussions fascinating. Two of them continue to find all kinds of reasons to visit regularly, to play Go,[79] improve their programming skills, repair a gadget, participate in a workshop, or to write a script for a new game. Four other interviewees, on the other hand, expressed serious reservations about hacking at Foulab, although they have often visited the space several

[78] Interview with Alex Megelas, July 25, 2014. Alex prefers not to use a nickname.
[79] Go is a strategy board game. For more information see: https://en.wikipedia.org/wiki/Go_(game)

times for meetings, workshops, or Open Nights. The feelings of most interviewees were mixed. One put it this way:

> I really like the people there, well, most of the people. I also don't like some people, but most of the people are really great, and it's good to see them. We have some common alignment in terms of the music we listen to, and we like to play Go together, talk about new things, technology things. About the space, I like the chill room, where you can sit and talk. I really don't like that the space is so messy and dusty. In my mind, Foulab is a mixture of good and bad in terms of place and people.[80]

These strong feelings of like and dislike are very often present in the discourse and are often related to different representations to which Foulab makes reference.

Another boundary met by Foulab visitors was a culture of prizing expertise and a preference for specific types of hacking. Visitors would often be asked "What is your hacking expertise?" or "What do you hack on?" on Tuesday nights. These questions pushed away some who felt that their interest or expertise would not be considered traditional hacking: if they did not hack in some traditionally approved way, then they would be seen as having no place in the Lab. I have spoken to media and tech artists, for example, who, before visiting Foulab thought of their creations as hacking, but after visiting the Lab began downplaying this characteristic of their projects.[81] They felt they were not real or authentic "hackers". Research participants mentioned the "hackerspace mindset", one that is geared towards engineers and specific hacker practices such as hacking electronics, hardware, software to the detriment of other practices such as food hacking, biohacking, or fibre hacks. Concern was expressed about hostility to activities equally interesting to feminist hackers such as teaching children coding, soldering, lock-picking, or knitting.

As one hacker said, she found it hard for overt feminists to claim their own space in the Lab, to have "un coin à nous" ("a corner for us") for working on projects they felt to be important, like a techno-feminist library:

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[80] Interview with Gh0st, July 8, 2019.

[81] Hacking is often clustered into information security hacking, (free) software hacking, lock-picking, hardware hacking, and a few more forms.

> We were often moved from one space to another - sometimes we were meeting at the table in the middle, sometimes in a small corner. Sometimes had to wait for a workshop to finish, or had to finish faster for something to start. However, installing our own machinery, placing feminist books, creating our own corner - this was not thinkable.[82]

The problem of condescending or patronizing attitudes based on a replication of values that devalued hacking associated with women's work presented barriers to full belonging even in gestures and activities meant to be helpful. For example, as a female member, I was often urged to go greet (female) visitors whenever they appeared at the doors of the Lab: as the only woman in the space, it looked like I was being asked to represent and take care of my entire gender. Another regular female Foulab visitor complained about being treated as the token female in the space being asked to represent her gender: "I don't want to be a representative, I just want to do the things I do."[83] Female visitors expressed concerns about the subtle ways that female hackers were made to feel as if they did not quite belong: by ignoring their presence completely, by exoticizing them (one participant reported a discussion about the way women's body parts appear in yoga pants, that took place with female hackers around), by not taking into account their needs related to basic hygiene, and by not giving serious attention to hacking projects or political struggles important to them. As a female visitors massively disinvested from participating in the Foulab community. As time went on, I observed that they spent less time in the Lab, used the equipment less, gave fewer workshops, and organized fewer discussions.

The dynamic just described helps to explain the perceived problem mentioned in the previous section: comments made by women that Foulab is "not political enough." A number of female and male study participants criticized the Lab for not taking action on questions of activism. "It's a site of experimentation but not a politicized space," commented one of the male regular visitors. As a few Foulab members stressed on multiple occasions, that Foulab tries hard to remain "apolitical," and therefore does not make organizational decisions related to social or activist issues. There have been moments when members gathered in the streets for demonstrations (e.g., in support of Canadian net

[82] Interview with Sigma, Oct 23, 2015.
[83] Interview with Gh0st, July 8, 2014.

neutrality), but they have insisted that they were doing so as individuals, and not as representatives of the hacker community.

Likewise, this also has meant that alliances with other organizations have not been made, which may have created new trajectories of movement between different communities with similar interests. For example, a membership application to the Quebec Public Interest Research Group at Concordia (QPIRG) was rejected on the basis that Foulab is explicitly not a politicized organization. This attempt to be "apolitical" pushes many activists, including techno-activists and feminists, away. In the words of one interviewee: "Some hackers cannot understand that hacking is political." Says one former founding member, disappointed by Foulab: "For me, you cannot separate the two."[84] According to such "hacktivists," Foulab should put more active effort into community building through creating alliances and have a more conscious understanding of the need to not only politicize its space, but to understand the politics already determining who feels they belong, who is excluded and why. For example, since Foulab is located in a comparatively poor and underdeveloped part of Montreal where there are not many community centers, the hackerspace could become more involved in the local community by making the space available for local projects. By being present at local public events in the neighborhood, or making the space known as welcoming to locals in the neighborhood, Foulab could easily have become more politically and socially involved. It could have expanded the profile of what it means to be a hacker and potentially have served as a cultural, educational, and technological center for the area. The ostensibly apolitical stance of influential Foulab members inhibits such engagement and growth, along with the potential of the space to accommodate women and others put into a minority position. In this way, the tendency of Foulab to be "not political enough" has in reality a significant political impact.

Things were not always this way at Foulab. In the beginning, efforts were made to engage feminist topics with Foulab members, as remembered by one of the earliest feminist hacker visitors:

[84] Interview with Max, June 30, 2015. Max prefers to use his real name.

> We've organized a lot of feminist meetings with different genders and hackers in Foulab, looking for the link between feminism and technology. This was very nice and I liked the process. I like this feminism. I also understand the importance to not have to maintain our own space, that there is this 'fluidity' between transgender and non-mixed spaces. I believe there is space for both.[85]

Unfortunately, it seems to many members that meetings aimed at persuading the community to be more inclusive took up too much time that should be dedicated to hacking, skills-sharing, and building. The motivation of feminist hackers to continue in this direction was not matched by Foulab's general membership. At the end of the day, these feminists concluded, it was much easier to find a place where they could evolve this direction on their own than to work on changing the culture and improving the inclusiveness of this existing space.

Works of Objects

First-time visitors to Foulab often complain about the general state of the space, including the overall level of cleanliness, the state of the bathroom, the lack of a kitchen, the beer bottles lying around, or the noise and air pollution coming from the carpentry shop next door. The organization of the space itself says a lot about the relationship between members and hackerspace visitors.

One spatial characteristic of relevance here is the neighborhood and the building in which Foulab is situated. As Massey reminds us, a space is not a bounded entity, or a container, but connected to its entire environment which partially determines who will have access. The building is only five minutes from the nearest metro station, St Henri, but to get to the hackerspace one needs to pass through the streets of an industrial area in which there is not much light. The industrial building housing the Lab is locked after 18h and there was, for a long time, no obvious way to contact the Lab from the outside of the building (e.g. a bell).

[85] Interview with Sigma, Oct 23, 2015. Original quote in French: "Je sais qu'on a fait beaucoup de rencontres féministes avec beaucoup des genres, pour trouver le lien entre le féminisme et la technologie - qui étaient très chouette. J'aime ça, ce féminisme… Je comprends aussi l'importance de ne pas avoir un lieu, pour femme et des personnes qui se présentent pour femmes qui il y a de fluidité entre espace transgenre et non-mixte. Je pense qu'il y a des espaces pour les deux."

As a result, it has happened a number of times that visitors have waited for up to a quarter of an hour at the stairs in front of the dark industrial building, before someone came by to let them in. One visitor expressed a concern about the location of the Lab in a neighbourhood in which she needs to either walk in the dark or bike a long distance, both of which pose problems for visiting more often: "I would really like to go to Foulab more often but it is far, I have to almost sleep there when I visit."[86] Again, for women concern about safety needed consideration because of their past experience as women.

The concern of participants about cleanliness is also often expressed in terms of the lack of basic sanitary conditions in the building. For a long time, there was no clean toilet or running water in the building. The door to the bathroom could not be locked, either. Some women in particular named this an obstacle, and many shared that they avoided by all means going to the bathroom while visiting the Lab. One visitor added, "I felt that it was complicated to do simple things like preparing basic food, or to go to the bathroom. To be menstruating in the Lab is really complicated."[87]

Many members of the Foufem group shared that they missed having a functional kitchen in the Lab when having their gatherings, which are often combined with a potluck dinner. The conditions of the space are also far from child-friendly, which presents an obstacle for parents and in particular women who are so often charged with child-care duties. These drawbacks of the space can also overlap at times. Interviewees complained, for example, about the "beer culture" that developed in the Lab on Tuesday Open Nights. One mentioned that heavy beer drinking makes her feel bad if she does not drink. She would prefer to make some tea, but this is a difficult alternative in a space with no running water (especially once the kitchen corner had been removed). She contrasted the Foulab beer culture with some European hackerspaces that offer *Club-Mate* - a caffeinated, sparkling beverage based on mate tea - which made her feel less alienated and intimidated, even if she did not always drink Club-Mate either. She explained the difference as having to do with heavy beer

[86] Interview with Sigma, Oct 23, 2015.

[87] Interview with Sigma, Oct 23, 2015. The original citation is in French: "Je sentais aussi que c'était difficile de se faire à manger, d'aller à la toilette, juste ça. Si tu es menstruée au Foulab, c'est super compliqué."

drinking (and smoking) creating the feeling of a drinking culture, and making the space feel like a club or a pub.

Decisions about how to create a sense of the Foulab identity through the details that create a sense of a a space are emergent and frequent in the Lab, whether it involves making space for a new member's tools and belongings, moving furniture around for a workshop, or adding new shelves for the museum. Members are generally slow to make individual decisions on changes in Foulab, because they are aware that it is shared- and there are no clear rules. Yet the path from idea to its implementation is nevertheless not very long; usually those hanging out at the time of the discussion take the initiative and make it happen. Decisions about the organization of space discussed by members are usually implemented by them, and often in the hours that follow. If someone proposes a cleaning, furniture-moving, or a shelving-making project at a meeting, it is common to see the project start right after that meeting. Scheduling time and a team for later does not seem to work at Foulab. There is a kind of ephemeral immediacy in the members' activities that seems particular to the space. If you want anything done in the Lab, like a cleaner corner, more storage, or a running server, then you really should be present and mostly do it yourself. The result is that little may get done for a while, or the Lab may at times be transformed completely in only a few hours. The unwritten related rule is that if someone wants the Lab to change, they have to be there, and often.

Cleaning the Lab is not a simple routine activity since it involves classifying and reclassifying cables, tools, spare parts, and computer components. Often sessions of "cleaning" the Lab do not involve anything like a broom or mop: they involve putting new shelves on the wall, or moving a given set of tools to a new corner, thereby reordering the whole space. From one Open Night to another, the Lab often looks completely different. Every time there is a cleaning session, there is a new theory in action of the space at work, deciding where things should go and how they should fit into that place. A kitchen corner was once created by members in just one night. A week later, cutlery, a microwave oven, shelves, plates, pots, and a coffee machine were added. One Lab member welcomed the initiative by cooking vegan meals for Open Night members and visitors. It was a well-received act of generosity, but when this member stopped coming regularly, the dinner

activity was abandoned. A few months later, the kitchen counter had collected spare parts from all kinds of projects. With no sink in the Lab, it was also hard to maintain clean dishes, and the members came to the conclusion that a kitchen was not needed anymore. All the dishes were thrown out and replaced with plastic ones. That was the end of the kitchen project.

The stratification of perceived expertise and perceived levels of belonging is codified in the official distinctions concerning members, users, and visitors. Study participants pointed out, among other reasons for not becoming members, the high membership fee ($75/month, now $100 /month). Even the "starving hacker fee" of $50 per month (mostly intended for users) was high enough that most of the women interested in Foulab membership could not easily afford it. Those who were the most active volunteers in organizing workshops and discussions were either students or part-time workers, with only a limited, precarious allowance each month. The lack of full membership status - even for those willing to be quite involved - prevented some interviewees from really taking root in the Lab, and therefore from succeeding in having their work be noticed and seen as valuable.

For one male Foulab visitor, a major reason for not becoming a member was the non-transparent nature of the process: "Nobody really asked me in or introduced me into the space."[88] While this hacker used to spend quite some time in the Lab weekly, he said visitor status allowed him now to do the things he would probably do anyway as a member (visit once or twice a month and work on a project of his choice). The problem of non-transparency in questions of belonging (Flynn and Chatman; Abrams and Hogg; Tajfel) also came up in the way only some hacker practices fit members' understandings of a hacking community. The online discussion list of Foulab has, for example, seen non-members request on a few occasions to meet in the hackerspace, or to organize a workshop, only to be refused because the activity they were excited about "is not hacking."[89] Because Foulab has no codified formal governance, it is not clear ahead of time what kinds of

[88] Interview with Mat, May 27, 2014.

[89] Mailing-list discussion from September 2010 about a Zombie screening request from a member of the Lab. The real reasons discussed were that the members could not use the machinery during the screening, and that the event would be advertised widely, meaning that a lot of "random" people would be visiting the Lab (which the members did not agree upon).

activities are allowed, and what kinds are not. Such decisions are therefore left mostly to the informal personal judgements of whichever members happen to be involved in a given conversation.

Foulab members often participate in a discourse about *openness* in their space that excludes considering any rules apart those related to physical safety. Everyone is supposed to be free to do what they want. One female visitor described the Lab this way: "It's a chaotic space. There are not many rules, everyone's free to do whatever they like."[90] Unfortunately, it turns out that this lack of rules, which is intended to ensure members' full freedom, may risk creating abuse, by providing no protection for members of the community who feel excluded for a variety of reasons, detailed above. This lack of rules may not create the desired open space, but instead contribute to a sense of community, because individual *freedom* is not necessarily felt in equal measure by all. Freedom in a community requires respecting the free space needed by all members: their personal space, their room for creativity, etc.

The semi-comedic line "Be excellent to each other" from the movie "Bill and Ted's Excellent Adventure" is a motto that many hackerspaces take as an unofficial bylaw (beginning with Noisebridge, a San Francisco hackerspace). However, as my research participants pointed out, such expressions of good intentions are not often enough, since no measures are put in place to ensure that such admirable principles are being observed in practice. One Foulab visitor said, "Making boundaries visible is important for me - I want to know what is expected in a space and what is not welcome. And in Foulab this is not clear."[91] Another visitor stressed the same problem in similar words:

> Everybody has a different trigger, a different kind of line that they are willing to deal with, and once it gets crossed, they don't even want to engage. It's important to respect people's different levels of tolerance. There must be some kind of protocol of where people come from, and respect it. What is the policy of this place? What are people dealing with?[92]

[90] Interview with Beta, July 13, 2015.
[91] Interview with Shadow, July 23, 2014.
[92] Interview with Omega, Oct 22, 2014.

In conclusion, the physical location and organization of the Foulab space presumed numerous sets of shared values and unstated rules that created numerous boundaries, despite a putative commitment to freedom and openness. These boundaries, values and the absence of clarity in discussing the rules of inclusion and exclusion were felt by many visitors to the space that I interviewed, and especially to first-time visitors. Foulab is not terribly exceptional in this way. Many interviewees shared stories about other spaces that were similar. This case study represents a particular example of a neglectful space that created barriers. This was not deliberately intended but rather the result of a lack of thought and effort in creating a more welcoming space, a well as because of a tension between interpretations between terms like freedom, openness and a lack of understanding of the conditions and experiences of women, in particular. The combinations of barriers experienced creates a significant wall for some hackers in terms of their desire to visit the space, or eventually join as members. In this way, the space is left to more permanent members, many of whom seem to see no pressing reason to change the status quo.

How the Foulab Women's Group Formed

A short time after Foulab moved to the Saint-Henri neighbourhood, a few women started showing an interest in participating in Foulab. One of them was me. I visited the space for the first time in November 2009, days after Foulab moved to the new locale. It was on a Tuesday night, and I went with a female colleague of mine. We were both involved in a volunteer-run self-help group for Free Software support, known by its French name *Les ateliers populaires du libre* (APL). We were looking for a space to host upcoming workshops, having been refused such space by LabCMO (UQAM), the Anarchist Bookstore, and a few other places in Montreal.

Our visit created immense interest for a number of reasons. First, the old space, situated quite far away from the nearest metro station, did not attract many visitors, and we were among the first. The fact that we were women with a strong interest in and knowledge

about GNU/Linux raised further interest.[93] Finally, the fact that we were proposing holding sessions in Foulab suggested the potential of attracting more visitors and exposure for the Lab. Based on that visit, we started organizing free software self-help workshops once a month, on Sunday afternoons. These were quite popular for some time, as participants interested in Linux would gather, bring their laptops and even desktops, and get to work on GNU/Linux installations and other free software projects.

Even after the end of the APL workshops, I continued visiting the Lab regularly, mostly on Tuesday nights and on the weekends. After a few weeks, I became a user, and a few weeks later, in early 2010, a member. Over time, other women started visiting the Lab. I met more female and queer hackers, and facilitated discussions around their needs in participating in a hackerspace, the projects they would like to put energy into. Some of these hackers already belonged to other groups: Montreal All-Girl Hack Nights, Montreal Girl Geeks and other feminist tech formations. They wanted to collaborate with the Lab and envisioned a feminist hacker group formed in the Lab. Some came from computer science, digital art, or engineering fields. Others were IT professionals looking for a venue to work on their side projects. A core group came weekly, with others visiting occasionally. In time, a group of regular participants took shape, which was later called half-jokingly Foufem.[94]

Many of the women who were coming to get help with their Free Software needs visited Foulab regularly during the Open Nights. They would occasionally fix bugs on their operating systems and gather ideas on how to "liberate" electronic devices. Some were willing to get more organized, and a couple of times there were suggestions to create a women-only night at the Lab. This idea was largely met with silence from established Foulab members. A few were open to the idea and spoke enthusiastically about it,[95] but

[93] In a typical "boys' culture" response, someone immediately argued with us that FreeBSD is a far better system than GNU/Linux.

[94] Femme = woman (fr.)

[95] E.g. someone expressed their hopes that their female partners would find it interesting to start visiting the Lab, too.

many were not. There were rumours that some Lab members found the idea "oppressive" since it infringed upon their individual freedom to visit the Lab any night they wished. The women-only night did not happen in the end.

Female and feminist hacker meetings were sporadic and had only a few regular members. In the summer of 2011, Foufem organized a workshop for feminist, queer, transgender, and female hackers. It started as a brainstorming session on hacker identity in the park nearby, and ended up being hosted in the Lab with discussions on participants' various mixed identities and the links between them.[96] It was an empowering gathering in which the participants got to know each other and talk about their own paths towards hacking. In the end, the participants put together a "mind-map" (a visual representation of the complex web of links to be found among a number of given key terms or concepts) on a nearby wall, much of which survived there for many years. The participants wrote their names, surrounded by activities they were interested in (such as biking, bike repair, soldering, knitting, academic research, parenting, and activism), and then linked the names one to another using those activities, using metal cables from circuit boards. The map was in the end very big and colorful. It served as lasting inspiration for the group, in that it showcased how many activities and struggles - as well as how many links - could exist already in such a small group.

On other occasions, a small group of self-appointed "hacker moms" used Foulab to encourage their children (mostly teenagers) to learn how to manipulate electronics and various hardware tools. A few kids, accompanied by their parents, would visit the Lab now and then, getting involved in projects such as soldering, Mega Lego construction, and basic electronics. The participation of children was received coolly by many Foulab members. They expressed concern that the insurance policy of the space was not suited to visits from minors, because they could hurt themselves with some tools, or poison themselves with chemicals that were lying around the hackerspace. The "hacker moms" had to find other spaces to let their children experiment with technology. One eventually founded the

[96] Pieces of the mind-map are probably still hanging on the wall just outside the Lab.

Montreal Mini Maker Faire (MMMF),[97] held in 2012 for the first time at the Montreal Olympic Stadium with great success.

With these developments and with time, feminist hacker meetings at Foulab became more deliberate and strategic. Foufem started identifying itself as a community of feminists enjoying hacking and DIY activities, and gathering regularly in Foulab. Foufem encouraged a curiosity about how things are made, and shared guiding principles such as the freedom to hack technology, the importance of privacy, and the sharing of hacker knowledge and practice with participants who identify with a relatively broad definition of hacking.[98] Activities and discussions were related to questions such as learning how specific technology works, what to do with old devices, how to build a tool oneself or repair a gadget, how to adapt an old device one to one's needs or jailbreak another. Foufem members shared ways to reduce the price or increase the life of technology by repairing, reusing, and adapting it, alone or with the help of others.

Over time, it proved harder and harder for Foufem to meet in the Lab, partly because some participants were allergic to high levels of dust and chemicals, which the Lab was full of (mostly coming from its industrial shop neighbors). Others felt uncomfortable and intimidated for the kinds of reasons documented above, including the state of the bathroom, the dark neighborhood, the sexist jokes etc. Between 2010 and 2012, Feminist hacker meetings kept happening at the Lab. They would sometimes be held during the Open Nights, but their members felt uncomfortable about the tendency noted above for male Foulab members to jump in and start giving advice on how to lead the workshops, what to include, or how to teach certain skills properly (e.g. how to teach participants Python programming language in the best way). Unfortunately, the traditional masculine hacker stress on individual expertise often led to patronizing talks about "the real best solution" and how it ought to be done. As the section on learning methodologies below explains, this

[97] Montreal Mini Maker Faire: http://www.makerfairemontreal.ca/

[98] Foufem website: http://foufem.wiki.orangeseeds.org/

dynamic represents a serious breaking point between mainstream traditional hacking and the more horizontal learning structures of feminist approaches to learning technology. This is one of the main reasons feminist hacking never took root at Foulab, despite the recognized attractiveness and sporadic successes of initiatives like Foufem. In the end, no participants who started out as Foufem members became Foulab members.

Chapter Conclusion

Foulab is fascinating in many ways. It is a relatively unique space and its attraction for local and foreign hackers is not without reason. The Film Director Alexandre Sheldon, who released HAK_MTL in 2019, shared that for him, as a cinema-maker, the space is visually amazing. When he thought about interacting with the representatives of the space, though, he said to himself: "Oh, this will be a hard job!"[99] In line with common hacker principles of technological openness, there is clearly an intentions at Foulab to bring technology to the people - to offer a space for fans to try otherwise unavailable machinery, a workshop where one can get their hands (and the space) dirty, and a community built around unusual technological knowledge. The space, however, lacks the resources needed to invite more people and more hackers in to benefit from this infrastructure. The space is struggling with rent issues and would benefit from finding more supporters.

In this chapter, I have listed the most telling boundaries that define in the space, making it a "clubhouse" kind of community of practice rather than an open-minded, open-door community that would bring together a variety of hackers. I have reflected on Massey's theory of space to understand how the instantiation of such boundaries are complex, both socially and spatially, and how the smallest details may dictate who belongs in the space and who may be excluded. These boundaries are related to people's physical actions, to representations, and to the gathering of physical objects. As seen in the examples many of these barriers are gender-related, and they reinforce established gendered relationships towards technology: it is often harder for women to engage within this hacker culture and within this hackerspace. The question of how much boundary creation is necessary in order

[99] Interview with Alexandre Sheldon, June 25, 2019.

to provide an identity for the group, and how much of what Massey (and other geographers) call *space politics* (related in this case to a lack of transparency, unclear rules, and narrow definitions of hacking) leads to exclusion. At Foulab, as in other hackerspaces, the politics of space are tied up with the *hacker politics* discussed in Chapter 1: hacker ethics and liberal principles related to freedom, elitist and meritocratic visions of the world, stereotyped hacker jargon, dress codes, and behaviors. The result is that very few people feel fully free to participate and support the Foulab's evolution into a more inclusive space.

This chapter also introduced the story of a feminist hacker collective that unsuccessfully tried to get established in the hackerspace. Hostility, a lack of clarity about what is available and possible, patronizing comments, and a lack of kids-friendly opportunities to participate in the Lab led to a breakdown in which a few feminist hackers decided to build their own space instead of trying to reform this existing one, with its stereotyped masculine understanding of technology.

Chapter 5

Case Study 2: Femhack - DIT in Feminist Hacking: Space, Definitions, Learning

The second case study follows the first one chronologically, but addresses very different considerations. Whereas the Foulab case study served to elucidate the phenomenon of spatial and social boundaries in traditional hackerspaces of hacking, the following study of the Femhack community is aimed instead at understanding emerging feminist practices within hacker culture and exploring the collaborative strategies groups like Femhack use to create inclusive spaces guided by feminist pedagogies and principles. In other words, the idea is to explore what happens when hackers apply feminist values, principles of collective action, and emancipatory pedagogical practices towards hacking. My passion for hacking in an anti-consumerist, feminist and empowering way and my continuing efforts to invite more people into the free software and hacker scene in general, are important elements in this story. As one of the two co-founders of Femhack (along with artist hacker and academic researcher Anne Goldenberg), I have been at the heart of many of its events, including workshops, hackathons, and discussions. This undoubtedly influences my assessments. There have been too few active members involved for me to be able to afford the luxury of taking a purely observational role. The product of my participant observation presented here documents the hacking trajectories of five of the main actors in the Femhack project (excluding myself in the formal data collection), with the practical goal of helping to open up the definition of hacking by describing feminist hacking viewpoints, practices, and spaces. On the ethnographic side, I have felt driven to collect rare documentation on Femhack's first years of evolution. No one interested in feminist hacking, including the Femhack group itself. They have not had the opportunity to document or analyze fully their hacking practices, their event outcomes, their activism, or their hacking and learning approaches. The majority of Femhack's discussions and decisions have been outside a calendar of events, and the Femhack teaching and facilitating methodology - while often

touted by the group as unique, efficient, and powerful - has never actually been written down until now.

To these ends, I did five in-depth interviews with all the core contributors and actively involved participants of Femhack for this study, documenting in their own words what these participants in the feminist hacker movement understand by hacking and freedom, and how they came to create and live their multi-dimensional identities as hackers and feminists (as artists, researchers, parents, and more). The research collected below shows what their hacking practices look like, including their spatial arrangements, organization of time, their collaborative and pedagogical practices, and how they see their feminist values as related to those practices. In this way, my study sheds light on what one of my participants so perceptively called the do-it-together aspect of feminist hacking. The chapter concludes by highlighting a feminist perspective on the concept and practice of hacking. Demographically, the five interviewees are female-identified, with two of them in their late 20-s at the time of the research, the other three in their mid- and late-30s. Two come from the US, one from Europe, and two are local. All five have university graduate degrees, three with PhDs and two with MAs.

Every one of these main five participants has either been a researcher in their own right or has put much explicit thought into what the formation of a feminist collective means, what the benefits are, and what their own involvement signifies. The analysis offered below has been discussed, organized, debated, and commented on by most of the five, all of whom I have tried to reflect as precisely as I could. I consider some of them true co-researchers for the active roles they have played in every stage of the research process. Most of the interviews took the form of passionate conversations between people who have given a lot of thought to hacking with a feminist lens. This stimulating process provided my project with additional motivation, making the work of documenting the people and processes of the Femhack collective feel easier and more fun. Although I am aware of the need to be concise, I have chosen, when necessary, to include more rather than less with the goal of preserving as many details, nuances and viewpoints as possible.

These five in-depth interviews are supplemented by eight less detailed interviews conducted with participants in different events organized by Femhack. Half of these participants are female, the others are either male or queer gendered. These participants were mostly in their 30-s, one was in their late-20s, and three of them were in their 40s. All participants in this study except one shorter interviewed are Caucasian. Most have some kind of higher education: one has a Ph.D., two have an MA, and all the others have at least some undergraduate education (not always finished).

Partly because this second case study is so long, it is split into sections. It unfolds, as case study methodologist Robert Stake recommends for such studies (477) beginning with the *physical setting of the gathering* (Hackathon 2012) and *the unique historical background* (Becoming Femhack) to provide basic facts about the beginnings of Femhack and a basic discussion of the kind of space and community the collective created. This groundwork is followed by a *spatial analysis* (Reconsidering Hackerspaces' Spatial Arrangements), and an examination of a few final important theoretical *contexts* (Redefinitions of Hacking and Learning).

Preamble: 2012 Foufem Hackathon

"We hacked our hackathon."[100]

In early 2012, the members of Foufem (the feminist Foulab initiative described in detail above in the previous chapter) felt a need to create a bigger gathering, in order to reach out to more feminists and hackers and invite them to join the community. The StudioXX bi-annual festival called HTMlles[101] was seen as a good occasion for such a gathering - a day-long hacking event focused on a diversity of hacker practices, featuring international feminist tech figures from all over the world. In this way, the first official and biggest event organized by Foufem happened on Sunday, November 7, 2012.[102] Feminist participants

[100] Phrase overheard at the end of the 2012 hackathon by one of the facilitators.
[101] HTMlles Festival 2012: https://secure.studioxx.org/en/htmlles and http://www.htmlles.net/2012/

[102] http://www.htmlles.net/2012/en/index.html

discussed hacker principles they resonated with, like the freedom to open up the black box of technology, privacy, community openness, and the sharing of common goods. The goal was to invite more women into a broader hacker community, but also to discuss a politically activist vision of hacking that related meaningfully to women's values and lived experience, all aimed at further opening up discussions about feminist practices and perspectives within worldwide hacker culture.

The hackathon generated unexpected interest. Over fifty participants from the HTMlles host festival, from elsewhere in Montreal, and from abroad came to visit, participate, and connect. The venue was advertised as open to all individuals self-identified as women, including trans and queer people. The day was packed with events, including presentations, skills-exchange sessions, hands-on-technology workshops, thematic discussions, art performances, and demos. The program included sessions on diverse topics such as Python programming, practical astronomy, hardware hacking, a kind of hardware exploration called "laptop auto-psy,"[103] a 3D printing session, and more. The event started with a discussion on how to make hackerspaces more welcoming to minority groups (including women, seniors, parents, and other under-represented groups) and it ended with a brainstorming discussion on safe(r) hackerspaces. In some ways, the Foufem hackathon was one of the most important events in the history of the initiative that would later become Femhack, since it clearly and successfully embodied the do-it-together approach to hacking, community organizing, and collective learning about technology in general.

One distinguishing aspect of the feminist hackathon (and all subsequent Femhack events) was its entirely self-funded character. Apart from a small subsidy from StudioXX and their in-kind support for the event in the form of coffee, croissants, juice and stationery, no other financial support was received. Participants had no obligation to pay for participation, and there was no membership or entrance fee of any kind. All the logistics were taken care of

[103] The Auto-psy workshop consisted in dismantling participants' own devices into their simplest parts. The idea was to learn about each part (hard-drive, RAM, wireless card, etc.), to demystify the everyday gadgets used by participants, destroying the "black box" myth and the fear of breaking them by opening them.

by volunteers, including cleaning before and after the hackathon, serving lunch, hosting an after-hackathon gathering, and maintaining a childcare area. Younger kids were welcome and taken care of by a self-organized team of teens, including some of the participants' children, who created a kids corners, designed games and activities for the whole day event.

The Foufem Hackathon was initially supposed to happen at Foulab itself, but late in the organization process (due to several disagreements with Foulab members), Foufem chose to find a new space. One of the main sticking points was the fact that the hackathon was advertising itself as a women-only (trans and queer-friendly) event, which led some male-identified members of Foulab to protest against a *limitation* on their freedom to participate. They argued that since Foulab is a *free space*, all members should feel welcome to take part in any events organized in the Lab. For this and other reasons, the hackathon was held at Espace Fibre,[104] an exposition studio for fabric-painting artists, which generously offered their space free of charge. The event was advertised as offering interested women a bilingual, kid-friendly, experiment-friendly, diversity-friendly, innovation-friendly and error-friendly space.[105]

The event was organized according to "Open Space Technology" (OST) principles. OST is a self-organized, simple and powerful method for connecting people around a specific goal or topic, in a free, semi-structured way. In his book *Open Space Technology: A User's Guid*e, Harrison Owen discusses his experiences organizing OST meetings, both large and small, and benefiting from the high productivity, the sense of connectedness between the participants, and the OST "ability to unite groups of enormous diversity in their education, ethnicity, economics, politics, culture, social position, or all of the above" (Owen 8). True to form, the Hackathon gathered and accommodated a large number of participants of all ethnicities, technical levels, and expertise.

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[104] Espace Fibre, http://espacefibre.com

[105] Source: http://foufem.wiki.orangeseeds.org/FemHack/

For those unfamiliar with OST, the beginning of a session may look chaotic and feel difficult, since the agenda and the plan are developed on the spot during the first session, by whoever happens to have arrived to take part. When participants take on the roles they have developed, though, the reward is worth the effort. They feel more involved in the process, and empowered by appropriating it and understanding how it runs. By providing participants with important responsibilities and enabling them to make decisions about the meetings, OST allows all participants (not just the planners or leaders) to take over an organizer's role. In this spirit, the Foufem hackathon had planned sessions, but no advance agenda. The participants came up with the rules of the space and posted them on the walls. They took responsibility for the successful accomplishment of the whole-day event, for example making the coffee, facilitating the sessions, and taking care of the potluck lunch. Participants managed to get involved in the logistics and attend their desired sessions, and their involvement enormously helped the organizers, who were also themselves presenters, workshop leaders, and facilitators.

The success of the event illustrated the principle expressed by OST promoter Michael Pannwitz, that the apparent gamble of letting participants do all the organizing themselves is essential to the success of an event even if in the moment there may be uncertainty in terms of the specific outcomes. As he states,

> Open Space is the only process that focuses on expanding time and space for the force of self-organization to do its thing. Although one can't predict specific outcomes, it's always highly productive for whatever issue people want to attend to. Some of the inspiring side effects that are regularly noted are laughter, hard work which feels like play, surprising results, and fascinating new questions (Pannowitz).

The Foufem hackathon was indeed a mixture of fun, hard work, and "a-ha" moments for both participants and the original organizers. The day was divided into three parallel sessions, leaving the choice of attendance to participants. The hands-on sessions balanced with discussions were attended by feminist artists, geeks, researchers, and amateurs, and the Hackathon offered space for the high diversity of expertise and technical skills (i.e., not only programming) highlighted by its OST setting.

One surprising aspect of this hackathon was the fact that the venue had no Internet access due to the thick walls of the building and the reluctance of the space owners to build a temporary wifi antenna on the roof of the building (which we proposed to install ourselves). In this sense, the event was maybe the first hackathon ever to run completely offline. Not having Internet access created a number of inconveniences. Presenters did not have a chance to show their work online, for example. They could show and use only what they brought with them. The information security training had to postpone the planned key-signing party for email encryption because it needed online verification of the keys. Along with such inconveniences, there were also benefits noticed in the offline setting. There were fewer open laptops, and more tinkering, hands-on work, and discussion; most preparations (installations) were done in advance, so it really provided participants with space and time to explore topics to the maximum (e.g., participants in the Python training were instructed to download the software and manuals in advance).

The large number of participants, the diverse activities, and the overall interest shown in the event proved to the future founders of Femhack that there was a growing need for a community aiming to organize hackers in a feminist way. There was a palpable hope that this would not be the last such hackathon. The enthusiasm for the diversity of topics, conversations, experiences shared, and training sessions pointed to a gap in the existing hacker movement in Montreal: a felt shortage in the variety of available projects, spaces, approaches to technology and hacking. In addition, there was an obviously different approach to community making, including creating safe boundaries, considering childcare on a weekend, and offline work.

This first feminist hackathon earned greater visibility for the Foufem collective and served as a public demonstration the type of space many feminist hackers would like to build - an open space, respectful of diversity, and encouraging about do-it-together practices (as opposed to stressing competitive, individualized efforts the way traditional hackathons do). It gave positive visible expression to the need for hacking space reserved for women, queer, and transgender geeks. It also gave rise to the term DIT - Do-It-Together. The feminist hackers involved decided that the traditional hacker ideal of DIY - Do-It-Yourself - was somehow lacking in comparison to the kind of exciting collective practice they were

enjoying. The DIT approach they had discovered in the OST experiment of the Foufem Hackathon was, they decided, more fun, more fruitful, and more empowering for people wanting to learn.[106] These differences were seen as matters of lasting importance to the Femhack members and visitors whose stories are documented and discussed below.

In brief, the 2012 Hackathon helped the feminist hacking group associated with Foulab realize that it had its own way of hacking. From the food-sharing practice and the prioritization of childcare during sessions to the "real introduction workshops", that showed great care for beginners, a type of "feminist pedagogy" had emerged in the space as well as a challenge to the individualistic approach praised in traditional hacker gatherings, replacing individual freedoms with a type of DIT collectivity. In addition, the OST process of the gathering made it possible to notice how much the physical environment is of importance: space represents an important dimension of social relations. According to Massey and other theorists of space, valorizing spatiality is the first step towards understanding the power relations and politics taking place within it, making it possible to move on and make changes toward a more inclusive, empowering and safe environment.

At this time, the collective began to see itself as more independent from Foulab and the mainstream hacker movement. The co-founder of Foufem wrote right after the hackathon:

> There is an idea, which is making its way into my mind... Maybe there are two different needs around this beautiful project: a feminist space at Foulab and a feminist women-only nomadic group… maybe one could be Foufem and the other one could be Femhack. Not exclusive groups and spaces but [related initiatives] with slightly different missions.[107]

While the group did indeed try to organize two groups (one meeting at Foulab, and one meeting independently), it soon became difficult to coordinate parallel events. Instead, individual members continued visiting Foulab occasionally, with Femhack acting as the main community. The limited nature of time and resources, the alienating memory that the

[106] Conversation during the debriefing session from the hackathon involving five organizers and workshop/discussion facilitators.
[107] Excerpt from an email by a Femhack co-founder from 14.11.2012 to the group.

Foufem group had been refused a women-only event in the Lab, and the perceived negative connotation of the adjective "Fou" (crazy) when used in "Foufem" (aka *crazy women*) all contributed to a sense of increasing distance from Foulab.[108]

Becoming Femhack

Femhack grew from two (and soon after that, three) co-founding members (Anne Goldenberg, Sophie Toupin, and myself) to six regular contributors, and started to hold regular meetings. In 2013, Femhack started meeting every two weeks to discuss the creation of a formal collective of feminist hackers, and just to spend time actually hacking. The first meetings served to select dates for future activities, and to hack, of course. There were small group sessions on mobile phone hacking (jailbreaking), computer systems hacking (GNU/Linux OS), and the possible uses of digital encryption in real day-to-day life (PGP, TOR, etc.).

Over time, the need for a regular physical meeting space became more pressing. The group did not have the funds to afford long-term rent for a physical space. They decided to apply to join a coworking collective that was focused on hardware hacking and had already hosted a number of Femhack meetings. The collective offered mostly in-kind support and training in exchange for a small room in the space, but the offer was rejected. The writing of this offer took a few meetings and although it was rejected it allowed Femhack members to come up with the first documented discussion of its mission, goals, and needs for actual space.

By 2013 Femhack took the step of defining itself as a feminist collective of technologically curious, politicized, and activist women proposing a creative learning and experimenting environment for those interested in obtaining new technical hacking skills or discussing

[108] While Fou+Lab was seen as ludic and positive, Fou+fem was sometimes talked about as "the crazy women" in a sarcastic sense.

open, politicized, and feminist techno-practices. The official description of Femhack reads as follows:

> FemHack is an autonomous group from Montreal whose mission is to create an empowering and inspiring environment for politicized feminist and queer hackers. Triggered by Do-It-Together practices, learning-by-doing and curiosity about how things are made, believing in the freedom of technology, privacy, and openness and sharing of common goods, FemHack identifies with the most avant-gardist elements of hacker ethics. We take an intersectional feminist perspective to what we do and think, which means that we hack patriarchy, capitalism and other systems of oppression.[109]

Femhack thus defined itself as reaching out to people who typically felt excluded from mainstream hackerspaces due to ethnicity, gender, or technical skill level. Femhack aimed to build a space free from elitism, meritocratic values, or masculine privilege, and actively encouraging technical exploration without fear. The group was driven by the desire to see the hacker movement expand to include different types of expertise and diverse views on hacking, gender, and technology activism in general.

Femhack has consisted since 2013 of three to six core members, although the number has at times risen to ten or twelve members. When members were asked to co-organize workshops, many backed off, asking instead to remain participants in workshops and discussions. Femhack does not work, however, on such a diffusion-only principle, but on a participatory one: members share their skills and experience rotating responsibility for organizing, sharing technical skills, and facilitation duties. As of the time of this writing, Femhack consists of only three invested members (three others have left the country), who work by consensus on how, when, and where to host events. While the organizational core is small at the moment, each event (such as) can involve attendance by 30 to 50 members.

The years following the 2012 Hackathon were busy for Femhack. The collective organized a number of large and small gatherings and workshops. Since Femhack has no fixed location in the city, these activities took place in a number of spaces, including Foulab,

[109] Source: http://foufem.wiki.orangeseeds.org/

Montreal parks, The Anarchist Bookfair, La Passe,[110] founders' and members' homes and backyards, houses outside the city, international hacker gatherings, local cafés (Utopic/Escalier), universities, co-ops, community group offices (StudioXX, Koumbit, Studio 303, Espace Fibre), and even a boat.

To keep Femhack alive and productive, members scheduled regular organizational meetings (sometimes bi-weekly, sometimes monthly), alternating with educational/ training sessions. The most regular meetings were the skills-sharing sessions and the Free Software mutual help workshops, which continued until late 2016. There were also large events, such as the three HTMlles hackathons, held in 2012, 2014, and 2016. Among the most informal events were numerous weekend-long, out-of-the-city gatherings, during which members and participants held workshops. In 2015, the most remarkable meeting was probably a one-day panel called Autonomous Infrastructures, in which participants spoke about the democratization of resources like software, hardware, and networks. Finally, in 2016, Femhack hosted an international event called Trans Hack Feminism (THF!), which took place in StudioXX and in the streets of Montreal. All the while, Femhack members were organizing and attending other events, for example hacker camps in the Netherlands and in Germany, called OHM (2013), in which three Femhack members facilitated brainstorming sessions with their international colleagues on how to improve hackerspace experiences and conditions for their members.

In the following pages, I will discuss the dynamics of this creation and re-creation of space on the part of Femhack, to further flesh out these ideas and to further ground them in the EAR methodology of my study. I do so with attention to three relevant topics. The first addresses a revealing internal community discussion about the type of community Femhack represents and the values it assigns to it. The second describes four of the major

[110] "La Passe is a printing and typography workshop, a library, a space for gathering and exchanges, a pole of reflexion and action, a rallying cry and an uproar for getting organized. It lies in the heart of poetry library Gaëtan Dostie located at 1214 rue de la Montagne. As Dostie was the personal secretary of Gaston Miron and editor in chief of the Partis Pris editions, the Library holds over 35,000 prints, posters and hundreds of hours of video, witnessing of Quebec 60s and 70s Counter-Culture. It is in this cultural environment that La Passe invites poetry, avant-garde music, counter-culture lovers and activists to meet. La Passe aspires to be a catalyst for the plurality of independent local communities." http://lapasse.org/

events organized by Femhack members, illustrating the kinds of hacking spaces Femhack actually creates in practice. The third sums up the feminist hacking of spatial arrangements used by Femhack in its events, which turned into core values of the organization.

Reconsidering Hackerspaces' Spatial Arrangements

Femhack took its inspiration partly from feminist hackerspace collectives in North America and Europe, and partly from feminist or women-only tech collectives. It does not fit the description of either kind of group neatly. Participants accordingly spoke of Femhack as being a feminist tech collective, and not simply another hackerspace.

> When you look at certain hackerspaces, you think it's so cool, there is so much potential, you are learning and experimenting by yourself, hanging out with cool people, being able to ask questions rather than trying to figure it all by yourself. If we cannot gather in a hackerspace, it becomes necessary to create something with a similar purpose: exploring, experimenting, learning... The goal is to also organize it in a more politicized way, in a more conscious way.[111]

Femhack does not have a permanent physical space run by members who pay monthly fees, as many traditional hackerspaces do. On the contrary, while discussions of what to do about physical space persist in the meetings, there is a marked lack of interest in founding, organizing, and maintaining a locale. There are practical reasons for this: it arises partly from the financial precariousness of Femhack members, who do not feel they can afford to pay monthly dues for owning a hacking space. In addition, there is the problem of time commitment: the scarce time resources Femhack participants have are already used up in organizing events, facilitating workshops, and discussing the way ahead. The collective plans and runs its events on a case-by-case basis, finding physical spaces equipped and shaped by current needs.

[111] Interview with Shadow, July 23, 2014.

Femhack differs from the women-in-tech collectives, such as the Ladies Learning Code or Montreal All-Girl Hack that proliferate in Montreal in that such groups usually rely on corporate funds and aim at attracting more women into the tech industry. This model is considered by the Femhack members to be too commercial, apolitical, and not satisfactorily grounded in feminist principles. Femhack has never accepted any funds from corporations, nor has it held its meetings in corporate labs or offices. This organizational difference from both member-supported hackerspaces and business-supported tech collectives makes Femhack somewhat unique.

> We visited many hackerspaces, makerspaces, other workshops, and gatherings in town, and we did not identify with their way of organizing. It took us a few years and many events to figure out what the values of Femhack are.[112]

In many of the conversations related to future development, activities organizing, and growth, Femhack participants often dream about the most fitting space they have not yet found in Montreal. On a number of occasions, the group has identified conditions for what a desired space would look like, responding to their basic values. In this spirit, each time Femhack comes together, its participants reorganize the space to fit the values and needs expressed. Some of these conditions include room for a feminist tech library (zines, manuals and other readings), a quiet corner for reading, study, meditation, and conversation, and a kitchen (or at least the amenities necessary to prepare food, make tea or coffee, and refrigerate a few products). The ideal space is imagined as being on the minimalist side - it should be easily transformable into a classroom, a workshop with tools and machinery, or a venue for a common project. According to one Femhack member, the ideal space should create a feeling of togetherness, in which concepts like mutual help, skill sharing, and creativity emerge as essential. This ideal space remains ideal: “But for that, we need committed hacker feminists that are ready to put time, ideas and resources into this collective project, to foster a movement of feminist hackerspaces.”[113]

[112] Interview with Gh0st, July 8, 2014.
[113] Interview with Shadow, July 23, 2014.

Femhack members enjoy not having the kinds of financial obligations associated with maintaining a permanent space, and some have remarked in a positive way on the sense of mobility produced. One of them said that Femhack reminds her of a *temporary autonomous zone*, in which participants make their own rules. She says, "I really resonate with this idea of a *mobile space*, and I've even adopted this term for the way I do my own [artistic] practice."[114] In the interview, she shared her dream of owning a camper van that would serve as a mobile hackerspace. It would travel around the continent, offering a space for hacking technology, holding discussions, tea drinking, and skills and tools sharing. In short, the lack of space created by practical concerns is often experienced as a burden avoided:

> Without [permanent] space, there is no pressure. If we had space, then you feel the pressure from the number of members providing dues every month. But we don't have this. If nothing happens this month, nobody would worry. If we do six events, all we need is the organizing capacity of people. This fluidity of our desires matches our possibilities is what we appreciate.[115]

As one of the co-founders shared, Femhack's small numbers can be limiting: "We do not have the capacity for organizing bigger stuff."[116] On the other hand, she says, the very lean machine of Femhack core membership does not burden anyone with monthly dues or space-maintaining obligations. This is in a sense liberating, since members and participants can come and go without obligation. Significantly, the Femhack collective is not currently looking to expand, or even to find energy and resources to advertise its activities widely: "We do not make publicity," the co-founder says. "People find us." Another member commented on the positive potential of Femhack's agile *fluidity*, at least for the meantime, explaining that, while the interest is big, people come and disappear. The goal is not to grow, but to agree on the core principles and the way of functioning of the organization before opening up to a broader public.[117]

The need to organize spaces and people case by case means that Femhack does not prioritize individual tinkering done for its own sake. The focus is instead on a sense of

[114] Interview with Sigma, Oct 23, 2015.
[115] Interview with Shadow, July 23, 2014.
[116] Interview with Sigma, Oct 23, 2015.
[117] Interview with Shadow, July 23, 2014.

togetherness and shared learning prioritizing applied hacker practice, revolving around issues like repairing objects, fixing bugs, backing up data and archives, *liberating* the operating systems of mobile phones, or everyday encryption.

DIT in Operation - Four Events - Four Spaces

This section discusses several concrete examples of Femhack organizing socialization around tech-related hacking practices, prioritizing sharing and mutual help in the hacking process. It is stressed here that the spaces thus created involve a sense of openness and togetherness. People come and go, but they follow rules ensuring inclusion and respect for all the other individuals involved. My review of Femhack events here shows that the DIT approach produces new and rare hacking principles and practices, for example phrases like "hacking with care," and projects like "fix it together" weekends. These visualizations of the events demonstrate the DIT character of the practices and the way that, no matter of the space, the values of socializing, hacking and decision-making, stay the same.

This recreation of space by Femhack events resonates with Massey's vision of space as a "process with multiple dimensions," a dynamic reality offering a sense of the unexpected and unpredictable, in which meaning is not prescribed but remains in a constant state of transformation (Massey, *Politics of Spatiality* 4). Massey suggests further that human experiences of a given place are unique, depending on the circumstance, gender, personal preferences, and unique historical, social and cultural situation. Femhack's existence is grounded in such unique experiences of the changing spaces of the meetings, the people, and their interactions. Space thus becomes a process, a fluid entity, fueled by the interdisciplinarity of the participants.

The Femhack activities covered below happened between 2012 and 2016. Tracing the events of these years provides a sketch of the ways in which a particular kind of feminist

hacking space was constructed as a "complex web of relations" - space not as territory or geographical location, but as dynamic occasion and moment (Massey, *Politics of Spatiality* 265). One significant dynamic discernible in the course of these events is a community vision of "extension," in which members experience their group belonging as simultaneous belonging to larger movements or communities (Massey, "Politics of Spatiality" 5). This kind of community-defining "extension" builds on Femhack members' interdisciplinary profiles, proving that rewarding hacking can come from different fields of interest and even different generations, by doing things together. The participants' stories also demonstrate that what they learn and experience at Femhack events serves to "extend" visions and practices of hacking, connecting with other fields of interest and other identities (feminist activism, art, music, etc.).

For the sake of space, I have limited the discussion here to four such events held in four different spaces: Espace Fibre, Bulbes, La Passe, and Studio XX. In describing them, I highlight the contributing activities and take-away experiences of Femhack members, stressing their relevance to the kinds of feminist hacking space thus created.

2014 - Espace Fibre - HackFest

HackFest 2014 was Femhack's second-biggest event after the 2012 Hackathon, offering a day full of hacking activities for a crowd gathered to engage with feminism and technology. Organized once again as part of the HTMlles festival put on by StudioXX, this hackathon was almost as ambitious as the 2012 event. Organized again in Espace Fibre, Femhack advertised this second hackathon as an *intergenerational feminist space*. The collective wanted to counter a number of common ideas about age, youth, and aging, and engage queer, feminist, geek, and hacker communities. It proposed using practices of diversity and the reappropriation of technology to unite different generations around hacking practices. The announcement for this event described it this way:

> FemHack invites you to a whole-day event, uniting different generations to hacking activities related to technology, art, and feminism. This HackFest aims to contribute to the demystification and re-appropriation of technologies, including hardware, software, and the body. Its tools are intersectional and intergenerational feminist perspectives and learning from

> peers. There will be hands-on workshops, presentations, performances, and craft experiments. The event is experiment-, diversity-, innovation- and errors-friendly. No tech skills required, curiosity is enough![118]

As part of the program, there were workshops dedicated to learning encryption and Github, soldering, and Android phone jailbreaking. There were also discussions related to the misogynist #GamerGate phenomenon, "Hacking Motherhood" and the politics around childbirth, as well as one related to the potential for feminist hackerspaces to hack sexism and racism. Potluck and childcare services were once again organized for and by the participants.

The success of the event was considered a great accomplishment both by the organizers and the participants, and was noted in the evaluation session the strong sense of the sharing of common values among participants as the most important outcome. The only complaint from certain participants was that while the discussions were very interesting, they were run in parallel to the hands-on sessions. Those who wanted to participate in one needed to miss the other. One of the Femhack members defended the choice by saying that there is a common divide among people who want to do "practical work" and those who want to "talk about what it means." She said that while she herself was quite interested in the philosophical part of hacking, learning how to do things in practice was much more rewarding and better suited her needs as a hacker.[119]

The kind of frustration registered by some participants here is, I note, part of the Femhack reality. Since all the members are very different, there is a tendency for every member to pull the organization in a different direction. Open discussions of what to and how and why are therefore very important for the organization. They affirm the consensus vision of Femhack as a techno-activist organization, and offer examples of discussions related to hackerspace topics like racism, sexism, and other types of injustice - discussions which are rare and appreciated in the experience of many participants. Some participants shared that these conversations had helped them carve out their own places in tech collectives in which

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[118] Source: description of the program for the event on the HTMlles website: http://www.htmlles.net/2014/index.php?page=events&lang=en&evId=83

[119] Conversation with Gh0st during the event.

they had not been sure they belonged before. This kind of identity-building in hacking is an important aspect of Femhack's potential, and deserves the time it is given to be expressed, discussed, affirmed, and analyzed.

HackFest 2014 was considered by the participants a noticeably inclusive space. One first-time participant who arrived as a presenter and later became a member of the organizing team shared that she was feeling quite anxious about her first hacking performance when she arrived. In addition, she was running late, and got lost searching for the venue. She shared her memories from the event:

> Actually, the first time I took part in Femhack was in HTMlles 2014 hackathon. I was incredibly anxious because I was running a workshop. It was my first time. […] But as soon as I stepped into the space, I was greeted at the door and all of my anxiety went away. There were food and coffee and tea and nothing had started yet, and everybody was calm, chill. I was asked if I needed anything for the setup. This was so reassuring for me. They had options for me. I actually felt more welcomed than in any other hacker situation before.[120]

In the evaluations they provided after the event, many other participants shared a similar appreciation for the warm ambiance and the feeling of comfort that came from an acknowledgement of their needs, a non-discriminative space and welcoming recognition of everyone's technical level, creativity level, and personal preference.

2013-2015 - Bulbes - Fix-it-together (FXT)

Fix it together (FXT) was another yearly event hosted by Femhack for three consecutive years. The events took place in a cottage called by its owner the Bulbes, one hour away from Montreal - a space provided by one of Femhack's founders. FXT was self-organized in an Open Space way by the participants, and fluid in terms of the program, hacking workshops, and other events. The participants decided on the activities, the breaks, the menu for the meals, and the topics. Participants also volunteered to facilitate sessions. The announcement for the event advertised it this way:

[120] Interview with Storm, Oct 17, 2016.

> We think about it as a mutual help moment, to take care of things, beings and spirits together. Let's unleash our imaginations, let's bring needs and skills together and welcome them and us for a collective time.

Each participant could propose their activity, lead a hacking session, provide a skills training, fix something, or share "stories, witchcraft, feminist hacking and visionary fiction."[121] Participation was open to Femhack members, affiliates, and participants in previous Femhack workshops. The items to be fixed were various, like "your old winter coat, a bike, or a backpack." Participants also made jewelry out of origami, and led sessions on knitting, data backup, anti-procrastination strategies (*time-hacking*), encryption, food hacking, and phone hacking. There were also sessions on body self-care including ergonomics for hackers, breathing exercises, hiking, etc. Every participant was expected to facilitate at least one session, and the rest of the weekend would be free to participate, to relax, to take care of and play with the children, etc. In an Open Space spirit, responsibility for the logistics including facilitation, cleaning, and making everyone satisfied with their participation was shared among all participants.

FXT was one of the most successful Femhack events ever in terms of bonding and a feeling of togetherness, and participants left with a clear idea of what Femhack values could look like in reality, when all participants are given enough time and space to share and pursue their own organizational and personal goals.

2015 - La Passe - Autonomous Infrastructures

The Autonomous Infrastructures Dialogue was one of the biggest and most participative discussion events facilitated by Femhack. Held in April 2015 in *La Passe* around a potluck brunch, piggybacking on two major international events - PyCon Montreal (a Python Conference) and AdaCamp (a women-in-tech conference). The Dialogue encouraged feminist hackers to discuss critical perspectives on the infrastructures and resources used by feminist groups. Such resources included (but were not limited) to "code, software,

[121] Excerpt from the announcement for the 2016 FXT event.

hardware, design, space, etc."[122] The event offered insight into some of the main problems faced by feminist hackers in engaging open technology. The description of the event went like this:

> [This event exists to] connect the dots between the seemingly immaterial digital age and its material impact on the environment (the extraction of resources such as rare minerals and metals, such as coltan, gold, copper, etc. to build our digital devices), the exploitative nature of labor (online communities as commodities, data mining by data empires, poor labor conditions in factories designing devices, etc.) and the new digital spirit of capitalism that lies behind highly controlled and secretive infrastructures (algorithmic governmentality, closed-source design of devices, mass surveillance, etc.), among others.

According to the meeting report (see Annex E), twenty-five individuals participated in the gathering. "There were university professors, Ph.D. students, independent researchers, activists and hackers, among others, and they came from backgrounds as diverse as technology, biology, film, social work, communication, political science, literature, etc."[123] Participants all did a short presentation on a project, a tool, or a practice related to four thematic areas: software, hardware, spaces, and social solidarities. The guided dialogue was focused on the physical spaces that feminist hackers create, including ways to feel safe but also ways to embody feminist geek and hacker practices. The spaces discussed were primarily feminist hackerspaces, but also feminist biohack labs and feminist tech convergences. Software and hardware conversations led to discussions of freeing up everyday technologies, learning where they come from, how they are made, and the impacts of consumerism on Western society. Solidarity discussions focused on using "feminist tactics to enable social solidarities." Such tactics could mean the creation of "safe(r) spaces, popular education, and respecting and acknowledging the incommensurability that might exist between different systems of values," including particularly but not exclusively indigenous systems.

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[122] Source: http://foufem.wiki.orangeseeds.org/Autonomous_Infrastructures_As_Feminist_Hacker_Practices:_The_Way_Forward__63___Guided_Dialogue/

[123] For more information regarding the event, please consult Annex E.

The goal of the event was to delineate principles and priorities for using autonomous infrastructures in feminist hacker practices. It was the first organized public discussion of its kind, searching for technical solutions and social improvement according to a clear activist and feminist vision. It became the springboard for a series of plans for more meetings focused on these questions and their relevance to hacking practices. The event succeeded in generating enthusiasm about autonomous infrastructures. Respondents requested more activities, meetings, discussions, and workshops (including possibly a feminist tech camp or institute), to carry forward the work of the Dialogue.

2016 - StudioXX - THF! – Week of Feminist Trans-Hack Events in Montreal

The Trans-Hack Feminist event had been held previously in Calafou (Catalonia, Spain) and Puebla (Mexico). Femhack volunteered to hold the third one in July 2016 in Montreal. The goals for THF! were expressed as follows:

> The event aims at addressing the lack of women, queer, trans and diversity in technological fields in general and hacking more specifically. But even more so, it aims at creating a community that critically assesses the hegemonic narratives around technologies, the modernity aspects of its underlying Western assumptions and its inherent capitalist inflections, among others.[124]

Following the pattern set by previous events run by Femhack, THF! took an Open Space Technology approach to organizing the daily agenda. The participants sent in their proposals for sessions in advance, but the organization and implementation of the schedule was done on the spot. The activities of THF! 2016 were divided into four thematics: *Decolonizing Technologies, Autonomous Infrastructures, Queer and Feminist Pedagogies,* and *Hacking with Care*. These were the activist pillars Femhack had chosen to build its activities around in 2016. In brief, the idea of decolonizing technologies addressed the problem that "colonialism has invaded and embedded the digital realm and our

[124] Source and more detailed information can be found here: https://thf2016.noblogs.org/post/2016/07/ and here https://transhackfeminist.noblogs.org/call-for-proposal/ .

technologies in general."[125] Autonomous infrastructures thematics discussed the process of users becoming more independent from corporations in the realms of communication and network technologies. The Queer, Feminist and Anti-Racist Pedagogies thematic addressed the need to find ways to make hacking non-oppressive. And finally, Hacking with Care outlined a set of practices that "foregrounds the art(s) of well-being as powerful means to encourage, mirror and sustain connexion to ourselves, altruism, and to embody a web of trust." In these ways, THF! focused on the inclusive, open, activist DIT hacker values and practices promoted by the other Femhack events described above.

To summarize this review, the years in question witnessed the creation of a diversity of spaces and events, all of which were clearly marked by the particular values, principles, and philosophy promoted by Femhack. The various events were held in very different spaces, adapting the space to the activity and the activity to the space, and always highlighting the activism, the multidisciplinarity, and the ideals of the feminist hackers participating.

In concluding this section, I want to discuss briefly the details and the implications of the controversial decision of Femhack to create women-only spaces - partially as a social and spatial flexible boundary, and partially as a redefinition and reconsideration of the hacking spaces.

"Women-Only Spaces are a Hack"[126]

In this section, I turn my attention to Femhack members' thoughts regarding the question of organizing women-only spaces in hacking, documenting and analyzing their viewpoints through my own feminist hacker participant-observer lens. As noted above, some major Femhack events were advertised as restricted to female-identified feminist participants, including queer and trans individuals. In practice, men were often allowed into such events

[125] Excerpts are taken from the description of the event. For more information, please visit: http://transhackfeminist.noblogs.org/ and https://thf2016.noblogs.org/.

[126] The title of this section is taken from the blog of Julia Evans, Feb 2014.

as allies and friends, if they were feminists. The *women-only* label only served in such cases to discourage men who did not identify as feminists, and who would not ask to participate with the understanding that the answer may at times justifiably be no.

The concept of women-only spaces is not young. From Virginia Woolf to bell hooks and Andrienne Rich, the debate on assigning space for women as a way to confront the oppressive boundaries of "race, sex and class domination" (Hooks 15) and shifting the reality of choice and location has been part of the feminist tradition of oppositional political struggle (Woolf; Hooks; Rich). As the Roestone Collective notes, from the late twentieth century, the idea grew into a concept of safe(r) spaces within the feminist movement (Collective 1346). In over fifteen years of hacking practice, I have encountered the need a number of times to justify women-only choices for space rules, and send away participants who did not identify themselves as female and/or feminist. I should say in introducing this account of such events hosted by Femhack and their implications that I am neither on the women-only "side" of the argument (mostly because I believe genders are fluid, which makes it hard to divide up a population usefully simply by naming them women or men), nor completely against the thoughtful implementation of "women-only" rules (mostly because I have seen firsthand the emancipatory power such events can offer participants).

According to the Feminist Hacker Zine, women-only spaces are simply a response to the various stories of discomfort, vulnerability, and even harassment that occur regularly in traditional hackerspaces (Burek 6). Julia Evans, a feminist hacker from Montreal who runs a group called All-Girl Hack Night, addresses the issue in an interesting way by calling women-only spaces an *emergency hack*. In her blog, Evans discusses the feminist hacker practices found in women-only environments. For her, such spaces clearly serve their avowed purpose of avoiding sexual harassment, sexism in general, and the lack of confidence women can feel when entering male-dominated environments. They are therefore important in her opinion. Evans nevertheless sees women-only hacking spaces as a deceptively simple "quick-fix" to bigger social problems. The "hack" of making women less excluded by simply excluding men does not address the wider problems involved, or contribute much to a dialogue about dealing with these problems (Evans).

Questions about what "counts" as admissibility to women-only spaces add to the challenge. In a blog post entitled "On the Design of Women's Spaces," Kat Marchá provides, for example, a list of various types and levels of inclusion related to rules of exclusion based on gender (Marchán). As she points out, narrowly defined "women-only" spaces push away non-binary people who do not identify as either male or female, and who therefore suffer in their own ways from gender-based oppression. In practice, some feminist hackerspaces have tried to include non-binary people while maintaining safe(r) spaces in a culture where the participation of men so often introduces oppressive social dynamics. In their *About us* section, MergeSort (a New York City feminist hackerspace) stipulates for example: "We want to be a place where non-binary people and women can make things, learn, and work on projects without fear or intimidation."[127]

The majority of Femhack members take this latter route. They agree with the idea of creating women-only spaces, as long as they include people struggling with marginalization in hacker communities. In an article I wrote back in 2014 with Sophie Toupin, the Femhack decision to organize (theoretically flexible) women-only hacking sessions was explained as meeting a need for feminist hackers to take control over the rules and to experiment with creating their own conditions for feminist hacking spaces. The question is "how to create spaces where boundaries are set by the members, for them to feel empowered to hack and tinker with technology" (Haralanova and Toupin). As one of Femhack's founders adds, women-only spaces can also function as incubators in which women can gain the kind of experience and confidence traditional hackerspaces tend to deny them: experience and confidence they can use if they like in mixed spaces later.

> Women-only meetings? I think they are important. If that's what people want, then that's what is needed. Because when it's followed what is needed, people in the room will know they are in solidarity with each other, troubleshoot, problem-solve and prevent things to happen. So, we'll be more prepared when we go in mixed spaces.[128]

[127] Merge Sort NYC. Source: https://www.meetup.com/mergesort/about/

[128] Interview with Omega, Oct 22, 2014.

Another Femhack member made the point that hacker communities often feature lots of humour, jokes and fun. She noted, however, that in many traditional hackerspaces, this ostensibly good thing often takes the form of sexist jokes or comments questioning a female participant's technical abilities. She defended women-only spaces as temporary safe havens from this unwanted special attention: "To be a part of a community where the inside jokes aren't at the expense of women, sexist or not, that's pretty awesome."[129] As another interviewer added, the ambient harassment faced by women in traditional "boys' club" hackerspaces can be even worse if the woman in question happens to identify as queer:

> I think if you are queer, you are more likely to be harassed pretty much in all environments by the fact that you are not keeping with the heteronormative standard, so it makes you more resistant to join places where you could potentially be harassed. With all the news out there about tech communities that are incredibly misogynist and sexist already and then you magnify this with sexism against women that keeps with normative ways of signifying gender hierarchy. Even these females can get prosecuted in such environments, let alone women that do not dress as society needs them to dress. They can suffer from harassment in a field they might love. I think that's the reason that women and queer are creating their own spaces - so why not their own tech community?[130]

From this point of view, the potential appeal of women-only spaces is obvious. One respondent reported feeling annoyed at the fact that feminist hackers are constantly asked to justify this understandable desire for gatherings in non-mixed spaces:

> It is so naive and so primary as a reaction when male hackers start bragging they feel excluded from [women-only] workshops. The majority of them already know way more on the subject. We need sometimes to be among those who understand us, in order to reinforce our argument, but also to enjoy hacking, to be in calm. To learn new things, we need to be in a confident space, we cannot learn while we are struggling. This is what I want to create.[131]

This participant made reference in this context to the common conflict discussed above between the practical exclusivity and the theoretical openness of hacking communities. She

[129] Interview with Gh0st, July 8, 2014.
[130] Interview with Gamma, Sept 28, 2014.
[131] Interview with Shadow, Jul 23, 2014.

argued that traditional hackerspaces who claim to be radically *open* to newcomers often exclude marginalized people by not acknowledging and challenging pre-existing power imbalances brought into the space. This participant confirmed that women-only communities are a sensible remedy when *freedom* and *openness* in a typical hacker definition mean in practice a lack of motivation to confront an unfair status quo. One interviewee addressed this paradox of the *exclusive openness* of many traditional hackerspaces with a pro-women-only paradox of her own: "You need to be exclusive sometimes to be eventually more inclusive."[132]

It should probably be stressed again in closing this section that the women-only remedy was seen as working best when it was treated (by the women involved) as flexible. A number of participants highlighted the need for a community interested in inclusion to stay *agile* and *flexible*, in order to be ready whenever things might change to make opening up the group a more desirable option. One comments:

> I'm thinking of NOLOSE,[133] for example - after years of wrangling over a 'no cis men' policy that made both trans and cis people feel frustrated, they switched to a model of 'allies welcome, everybody held accountable for your privilege.'[134]

The basic insight of this *caveat* is that men can be valuable allies, and just as useful in defining and embodying feminist hacking. In the end, then, even if the use of women-only spaces in hacking is seen as imperfect and sometimes qualified or criticized, it was also widely appreciated by my study participants. "At least there is the desire of challenging systems of oppression" evident in such initiatives, said one interviewee: "in more mainstream communities, there is no such desire."[135]

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[132] Interview with Omega, Oct 22, 2014.

[133] NOLOSE is a U.S. community describing itself as a place for "fat, queer and trans folks". For more information, see: http://nolose.org.

[134] Interview with Storm, Oct 17, 2016.

[135] Interview with Shadow, Jul 23, 2014.

Conclusion "Hacking the Spaces"

The events and spaces created by Femhack between 2012 and 2016 stand in stark contrast to the traditional model of hackerspace spatial arrangement and community-building seen in Chapter 4. The feminist values expressed in a Femhack space play an important role, as we will see in the following pages, in terms of the access, belonging, and relationships (between humans but also between humans and technology) built in that space. Instead of offering a "clubhouse," the space becomes a site of collective action with a) added ease for newcomers, b) added ease for non-conforming identity hackers, and c) added ease for people with different levels and types of expertise, including beginners.

In concluding this chapter, I want to list in one place here the core values and principles that emerged from my Femhack interviews and observations, in terms of the feminist hacker organization of space. Considering this synoptic review underlines the contrast between Femhack's spaces and traditional hackerspace arrangements, and sets the stage for the following chapter's discussion of do-it-together practices as the thread that links my study's overall conclusions and recommendations together.

(1) **A combination of hacker, feminist and activist values.** In line with traditional **hacker principles**, feminist hacker philosophy valorizes the enjoyment of exploring systems, technological freedom including control over one's own privacy, open access to computers, and making knowledge available to more people as a decentralization of power (Coleman, *Coding Freedom* 17). These hacker values are however supplemented with **feminist and activist principles** of the kind listed in most feminist hackerspace mission statements. These include fighting against patriarchy, destructive aspects of capitalism, sexism, racism, and other structures of oppression. Along with these, there are technological solutions (tools) for reducing social problems like environmental damage, including the repurposing, reusing and repairing of old technology.

(2) **A diversity of learning styles.** Feminist hacker principles of collectivity promote inspiring, creative spaces (including hackathons, workshops, and more), offering a wide diversity of activities and techniques, including but not limited to brainstorm

sessions, discussions, hands-on sessions for building or breaking things, demos, teahouse skills sharing, and artistic forms such as dance. Discussions are as important as skill learning in what they clarify hacker and feminist values among the participants (for whom either or both may be unfamiliar).

(3) **"Real introductory courses."** Some participants have negative experiences with traditional hackerspaces' learning styles, which can alienate newcomers with patronizing attitudes or high level instruction ignoring the needs of beginners. Feminist learning practice addresses these problems and needs (as detailed below), by offering learning experiences better adapted to a wide variety of hackers.[136]

(4) **A diversity of topics**. Feminist hackerspace culture shows greater diversity in the practices and topics considered hacking. It acknowledges expertise often rejected by traditional hacking spaces, in which hacking is solely dedicated to computers or information security. The Femhack's principle of *hacking with care*, for example, includes attention to body hacks, caring for self and others, problems people might encounter sitting for a long time at the computer, the effects of stress, and more (See Goldenberg).

(5) **Autonomy and Gratuity (Economically Inclusive Spaces).** Like traditional hackerspaces, Femhack insists values its independence from corporate and private (financial or other) contributions and influences. Unlike typical hackerspaces, however, Femhack experimented with a model that did not oblige anyone to contribute financially to participate. The kinds of contributions that were encouraged included potluck meals, volunteer assistance in organizing events, giving workshops, etc. In this way, the collective managed to be economically inclusive. My study participants considered the high dues of traditional hackerspaces a boundary against joining and being accepted as a decision-maker. Their preferred focus was therefore less on monetary contributions and more on collaboration, active participation, sharing responsibility, tasks, and decision-making power among participants.

[136] There is a section dedicated to discussing feminist pedagogies below.

(6) **Applied real-life hacker practices anchored in needs.** Gathering, learning, and hacking are not considered actions undertaken for the sake of personal improvement and self-actualization alone. They are activities anchored in addressing real-life problems. In this sense, feminist hacking is strongly linked to other parts of hackers' lives. Examples include hacking and food (potlucks), hacking and motherhood (childcare), hacking and identity (queer and other ways of living a non-typical hacker's identity), hacking and environmentally conscious practices (such as preserving the life of devices rather than buying new ones), and other types of activism. In this way, hacking is more consciously related to a feminist hacker's life course, integrating technology holistically into life experience. Technology and human values are aligned by applying hacker practices to more areas of life than coding and computing alone.

(7) **Diversified communities (Diversity-friendly spaces).** Feminist hacking prioritizes diversified communities and works to meet the needs of disadvantaged people such as the disabled, the elderly, people who do not speak the majority language of the event, and beginners. A non-judgmental, non-patronizing, encouraging, respectful approach to others and to oneself is encouraged. This principle includes body care, technological care, and childcare.

(8) **Collectivizing *freedom*.** In a noticeable departure from the traditional liberal visions of individualistic freedom lionized in traditional ideas of hacker identity, feminist hackers imagine the notions of freedom and hacking as part of a social justice project aimed at emancipation and collective freedom. This ideal of freedom is less about individual experiences and liberal values, and more about collective emancipation, even when pursuing traditional hacker goals like increased user control over everyday technology.[137]

Feminist hacking is, in a nutshell, about space and its associated power relations, social connections, and community-building aimed at increasingly horizontal relationship structures. It valorizes collective and empowering environments, and the drawing of safe

[137] This topic is discussed in the next section, Feminist (Re)Definitions of Hacking.

boundaries that lead to greater inclusion. Feminist hacking presents a more fitting model for the busy female and/or feminist looking in hacking for fewer toys and more tools.

Feminist (Re) Definitions of Hacking and Freedom

Now that I have introduced the Femhack collective, including their spaces, feminist hacker practices and related values, I can address my second analytical theme, namely answering the questions of who the feminist hackers involved are, and how they define (redefine) hacking. I begin below by presenting the results of my research into Femhack participants' backgrounds. I show in particular that their backgrounds are remarkably similar in some aspects. Yet in terms of education, they are remarkably interdisciplinary, which helps to explain the foci and values they brought to the events and spaces discussed above. I next outline the way these hackers' draw upon the resources from their backgrounds (including their interdisciplinary educational experience) to re-imagine the contested notions of *hackers* and *hacking* through a feminist hacker lens. Finally, I turn my attention to the notion of *freedom* that emerges so often and so prominently from these hackers' practices and conversations. I show that for the feminist hackers observed and interviewed for this study, there is a real and significant clash between the individualistic hacker ideal of "freedom" and an activist, collectivist ideal.

Hacking in the Life Course of the Multidisciplinary Feminist Hacker

Interdisciplinarity seems to be at the heart of the kind of feminist hacking investigated here. It looks significant, for example, that not a single participant reported having followed a straightforward path into hacking. Even those who had studied Computer Science (or Applied Biology or Physics and Astronomy), and met inspiring technologists in high school or university shared that they were never actors on the hacker scene: "I fell into hacking kind of by accident,"[138] said one representative respondent. For some participants, their parents were inspiring role models: "I did programming and had nerd influences from

[138] Interview with Omega, Oct 22, 2014.

home,"[139] one reported, because both parents were scientists. Another considered her mother to be the "hacker of the house," since she used to fix everything herself, providing the children with a DIY role model and the ideal that everything is fixable or modifiable: "You just have to make time, read manuals, and put some patience into it" was the lesson.[140]

Unfortunately, not everyone received the support they needed to pursue the passion they discovered for technoscience. The participants shared a number of challenges related to the common life courses of women interested in technology - challenges discussed by a number of academics whose research focuses on women in computing (Collet, *L'informatique a-t-Elle Un Sexe: Hackers, Mythes et Réalités*; Collet, "« L'informatique at-Elle Un Sexe?»"; Keller; Marwick; Margolis and Fisher, "Geek Mythology and Attracting Undergraduate Women to Computer Science"; Margolis and Fisher, *Unlocking the Clubhouse: Women in Computing*). One interviewee shared the troubles she had encountered in trying to keep up with her graduate education in an unsupportive and competitive masculine educational institution, in order to continue doing what she liked to do most: pure science.

> I had excelled in Math and Physics in high school and I was encouraged by my teachers, friends, and parents. I felt really confident in my abilities to continue my studies. But that all came crashing down in College. I didn't have the supportive community anymore; I went to school far away from home. I struggled a lot with meeting friends, I missed home, I was lonely. I had a hard time in Math and really hard time in Physics courses. The teachers were not supportive. The courses were predominantly male. And I had so much pride that I can do everything on my own, that I didn't connect to other students or study groups.[141]

Later on, this hacker moved into a social science field in which she found more support, a mixed groups of student friends, and far fewer links to hacking. Her case is not unique. Hacking became a "hobby" (or secondary life priority) for many of these female hackers,

[139] Interview with Gh0st, July 8, 2014.
[140] Interview with Sigma, Oct 23, 2015.
[141] Interview with Storm, Oct 17, 2016.

pursued as their real passion while they were studying, during their young adult years, in social-scientific fields such as anthropology, geography, cultural studies, sociology, philosophy, and political science.

One interesting revelation of this research is the indication that a multiplicity of interests can create a passion for hacking - not simply an interest in technoscience, but also a curiosity about the potential relationship of hacking to different periods in their lives. Most of my participants had studied in different disciplines and had special attachments to fields such as music, art, tinkering, data science, and biology. For them, hacking related to other disciplines, linking them to techno-cultural practices with utility and "a way of thinking" - a "lifestyle." Their lives had multiple dimensions in which hacking was applied.

To put it another way, hacking appeared in their lives as an "inheritance" from the ethos of diverse life experience. For example, one participant reported that she was drawn into hacking by her interest in building her own musical instruments:

> Hacking, fabrication, experimenting came mostly from music [making my own pedals]. I was interested in critical artistic practice that engaged scientific knowledge. I found out about the Hacktory in Philadelphia. I bought my own Arduino kit there, we had a soldering party; that's where I first started soldering.[142]

This kind of hacking ties into the traditional hacker ideal mentioned above of owning something more fully by building it as opposed to simply buying it from a shop. In other words, hacking here appears as a critique of the values of disposability in consumer culture. It also shows how hacker practice can be related to a multidisciplinary interest in a number of fields, and thereby (as seen above) a number of creative identities. As one participant put it, "We are not just hackers, we have a mixture of identities."[143]

Another example of the multidisciplinarity common in my research sample can be found in their creative contacts with academia. I did not realize before completing several interviews that many Femhack members (and event participants) were researchers like

[142] Interview with Storm, Oct 17, 2016.
[143] Interview with Shadow, July 23, 2014.

myself, two with a Master's degree and three with a Ph.D. The majority of them were in their mid-to-late 30s, and they reported that critical thinking, research and academic practice represented an important aspect of their identity. Their research covered topics related to feminism, various types of hacking or STS (Science and Technology Studies), and biology or community activism. My participants had done a lot of thinking about the way technology factored into their lives. One participant shared that she became passionate about *thinking machines* while finding ways that computers and technology can help extend the potential of the human body. Another studied the social and political aspects of technology, including the idea of collective knowledge production outside of the formal education system, and the perspective that technological advances can be associated with both restrictive and empowering ways of being in the world.

As previously concluded, feminist hacker ethics and principles are in some key ways aligned with traditional hacker practice. There are also practical or philosophical differences (or variations) at work, located by my study's participants at the core of their visions for hacking. All participants, it turned out, had needed to actively *search* for the life paths that led them into hacking, and this search had involved much learning (both formal and informal). Almost all started with some technical background, but some had moved on to the social sciences or STS instead, while cultivating their deep interest in technology and hacking in the background. The life courses of women present challenges for hacking - including school, parenting, work and social pressures. The result for my study's participants was a multidisciplinary identity. Each one's attraction and contribution to hacking brought an ethos to bear that arose from a variety of life experiences, often including activist values like a distrust of the mainstream Western consumer culture of technology. In a similar way, the marked tendency my interviewees showed toward academic and amateur research reflected and fed into a strong active interest in the effects of technologies (free and open source, for example) on their lives and on the people around them.

Hacking Hacking

Learning about the Femhack members' educational backgrounds helped me to better understand their motivations in building a non-conformist feminist hackerspace based more on relationships than on a permanent physical location like more traditional hackerspaces. One important point that came up frequently when talking with feminist hackers is the idea that there is no one definition of hacking for all, and there is no one hacker ethic for all. The concepts of *hacking* and *hacker* could instead be quite personal, fluid, open and non-technological. In the words of one participant, hacking is "an approach, a philosophy, and a confidence."[144] My participants mostly associated with the term *hacker* with someone who enjoys solving problems in an unusual, autonomous and non-conformist way. In line with this definition, a *hack* is any unconventional solution to a technical problem in which being original or unconventional is more important than mere technological mastery. Participants added that hacking is related to "a pleasurable feeling" of "subversion, independence" and "integrity," gained from knowing how things work and not needing to be a passive, dependent consumer or user.

When asked what feminist hackers enjoy about hacking, the often most mentioned aspects included opening up one's creative side while experimenting with software or hardware, applying subversive methods to typical techno-practices, and inspiring other people to think differently about technology. One feminist hacker who used to work in the observatory of a university campus described her experience this way:

> We would take the telescopes apart, clean them, we did a lot of secure protocols, data analysis. I really loved computer science, not just coding, but coding in practice. I was really fascinated with these processes: meta-data, data analysis, calibration, instrumentation. I like to take things apart, repair things, I like to do things on my own, or with someone else. Tinker around with electronics and tinker around with things and my interest in that comes from many different avenues in life.[145]

[144] Interview with Shadow, July 23, 2014.
[145] Interview with Storm, Oct 17, 2016.

Another hacker added: "I like the problem solving of coding. Debugging things, fixing, repairing code. I get a lot of satisfaction out of that."[146] The fact that hacking is usually a not-for-profit activity means that the hackers I interviewed were usually repairing, repurposing, and learning from technical artefacts: "It often brings surprising results and is considered fun."[147]

From this point of view, according to one interviewee, a violin-builder who builds her own instruments might be a hacker because she is interested in different aspects of her work and has unconventional and passionate approach to her profession and tool: "She is not just a worker, but a builder and she improves her violins every time she builds a new one."[148] According to another participant, getting into a traditional journalistic domain and transforming it into an Open Source project is a hack. A third participant gave the example of her personal achievement of installing GNU/Linux on her computer as a hack in her way of thinking. For her it related to a pride and confidence in her ability to move away from a proprietary way of thinking about software. In line with this more global vision of hacking, most participants spoke of it as a collective project:

> For me, [hacking] is taking different practices or different ideas or technologies and bringing them into conversation; doing something that intervenes in the normal, typical practice of technology. Or science. It is changing how people think about the world.[149]

In line with all the qualities, hacking for these hackers was also a social project, a community opposing consumerist notions of technology, and linked to an ideal of *collective emancipation,* as opposed to a solitary achievement and competency. For them, an alternative, grass-roots approach asking the question of how things are made and how they work highlighted the stories of the actual people who had produced the material items in question, and made them more conscious and respectful of the work of others.

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[146] Interview with Omega, Oct 22, 2014.
[147] Interview with Gh0st, Jul 8, 2014.
[148] Interview with Storm, Oct 17, 2016.
[149] Interview with Storm, Oct 17, 2016.

In my interviews with feminist hackers, I often encountered some reflection and hesitation on the question of whether they really can (or really want) to call themselves hackers or not. They wondered aloud about which aspects of their lives were hacking-related and which were better described as simply research or activism. One of them concluded, "I am not afraid to call myself a hacker,"[150] despite mainstream depictions of hackers as either malicious thieves, or tech superheroes whose mastery of computers makes them functionally indistinguishable from "magicians." Another participant who strongly identified with hacker principles and philosophies, showed hesitation: "I still have a long way ahead of me with regards to these issues," she declared. For her, being a hacker seemed like more of a process and an unconventional way of learning and doing things.[151] Another participant put it this way: "My identification is a hacker in a process of becoming." She shared reflections about her own practice, wondering why she was not always comfortable calling it hacking: "Maybe it's also being part of so many skills and practices, and never being able to cultivate those skills and mindsets to perfection."[152] For her, hacking had taken on the appearance of a near-perfect state of applied expertise, unachievable for most people in real life.

The open character of the notion of hacking expressed by my participants made room, I noticed, for other kinds of identity exploration as well. One Femhack participant pointed out that she identifies as far more than just a hacker. She identifies herself in many different ways as a full, complex individual. For her, hacking worked as "an expanding concept," and she enjoyed mixing hacking with many different aspects of her life (e.g. approach to science but also to everyday technology, feminist activism, and social justice struggles). She considered participating creatively in projects such as community radio, making mesh networks or creating pirate radios to be hacking too: "If the bike is a technology, then one can hack a bike."[153] Another participant put the identity question quite succinctly by sharing these thoughts:

[150] Interview with Sigma, Oct 23, 2015.
[151] Interview with Storm, Oct 17, 2016.
[152] Interview with Shadow, July 23, 2014.
[153] Interview with Shadow, July 23, 2014.

> I guess anybody can be a hacker. The hacker is depicted in the media as such a small subset of people, mostly related to middle-class, young, white men... But if you think that hacking is less of an achievement and more of a solving of problems, then more people can be hackers.[154]

While pushing for more diversity in definitions of hacker culture, participants nevertheless expressed reservations about being associated with some kinds of hacker or maker culture, such as the hackerspaces and fablabs run for the benefit of either private individuals or government projects. For these feminist hackers, hacking should be strongly politicized, and its potential for activism should be celebrated. "I am hacking things that are useful to me but I want to return this know-how somehow back to the community by training others or sharing a tool, a skill, or documentation for more people to use,"[155] said one participant. From this point of view, learning by doing-it-together creates a common strength, which was experienced (along with hacking's subversive approach to technologies) as very enjoyable by my interviewees.

To summarize, the opinions collected in my sample varied in some ways from the Jargon File's type of definition explored in Chapter 1 and echoed the multidisciplinary portraits of the feminist hackers previously presented. There were also similarities shared, such as sympathy with common hacker principles and freedoms around technology in general, the enjoyment from learning and making things, and the ludic and pleasurable parts of hacker practice (as also mentioned by Coleman, "Hacker Politics and Publics" 512). The participants seemed to agree with these hacker ethics and principles while disagreeing with the ways traditional hacker communities most often organize around such principles and practices. They indicated in particular that the way the dominant notion of the hacker is used to create a boundary around a specific subset of people (i.e., off-puttingly competitive and programming-savvy young white men) perpetuates an elitist picture of hacking that only makes room for a few. This echoes earlier debates around feminism and hacking where Adam's research has pointed out that meritocracy adopted as a hacker principle leads to a type of elitism and a boundary playing role specifically on less contributing or contributing in different fields hackers. Through hacking of the hacker culture in its pre-

[154] Interview with Omega, Oct 22, 2014.
[155] Interview with Sigma, Oct 23, 2015.

formatted concept at the moment, these results join the works of Söderberg and Delfanti and Söderberg who express concerns with respect to a culture that is not flexible enough to open to more diversified and flexible terms of these notions (Söderberg, *Hacking Capitalism: The Free and Open Source Software Movement*; Delfanti and Söderberg).

Collectivizing Freedom

The notion of freedom demands attention as an ideal that both the traditional hackers and the feminist hackers spoke often about, from remarkably different points of view. There is a noticeable overlap within hackers in general in the kinds of approach to technology as liberating by ideals they expressed, mostly with reference to the principles of freedom, such as free software and hardware freedom and network neutrality. Discussions of social ideals of freedom led, on the other hand, to two very different types of discussions. This raises questions pertinent to my study: What does freedom mean in a hacking context? How are hackers described in the relevant literature with reference to discourses of freedom?

Words like *free* and *freedom* are used generously in discussions of hacker culture, partly due to the common language of free software hacker culture. The notion of freedom that emerges from the statements and practices of most feminist hackers differs from the one described above as embraced by the mainstream hacker movement. All of the feminist hackers I interviewed agreed with the free software movement's guiding ideals in the sense of considering users' rights to be important assets in the use of technology. Core liberal hacker ideas of freedom, though, such as the right to full control and access, and adoration of computers (Coleman, *Coding Freedom* 17) were seen as less important than ideals such as empowerment, emancipation, social justice, activism, and mutual help. This divergence of opinion about the meaning and use of freedom can be seen in the words of interviewees presented below.

Freedom was a topic of central importance for the feminist hackers of Femhack, in speaking about the technology around them and their relationships with it. Freedom was

identified with a kind of ownership that included the software freedom of using, sharing, and modifying a given device. Reference was made, for instance, to a "freedom to not to be prosecuted for wanting to change the machine you own."[156] Participants wanted to move away from "the ideology of the black box" and see artefacts as tools to be opened up and discovered, to be learned about and learned from, and to be changed and adapted to suit one's particular needs. One participant framed this freedom in terms of a kind of self-actualizing "intimacy" with technology:

> I find freedom when I manage to open my computer and discover what is under the lid. I like a lot to think about the question of the level of intimacy, and at the same time the gap we have with understanding our computers. To experiment with this intimacy, and at the same time to realize that we are strangers to the objects that surround us. This gives me the insight to explore more. And the more I explore, the more I feel this freedom in me.[157]

The personal freedom spoken of by participants was, as already indicated above, hard to equate with the individualistic ideal of the typical hacker: it was imagined in the context of an ideal community's sense of freedom. In hacking together, the enjoyment of personal freedom had to take other people's personal freedoms into account. Freedom was for my interviewees, therefore, a matter of collectivity and compromise: personal freedom should be anchored in activism, in social justice, and in consideration for others:

> It's often the case with feminism, where there are many social justice issues combined, not just openness. So, I think the priorities [regarding "freedom"] need to be shifted somewhere in the mentality of the mainstream hackerspace culture to consider these issues.[158]

The elitism and meritocracy of hacker culture discussed above is seen as negative in feminist hacking. Participants described the dominant hacker ideal of meritocracy as "killing the community" by putting too much weight on the individual. As one participant put it, "You can't just value a person by what they do - everyone has a different starting point and a different advantage or privilege."[159] The ideals of meritocracy and

[156] Interview with Gh0st, July 8, 2014.
[157] Interview with Sigma, Oct 23, 2015.
[158] Interview with Storm, Oct 17, 2016.
[159] Interview with Omega, Oct 22, 2014.

competitiveness, so deeply valued in many hacker and F/OSS development environments with their hackathons and hacking contests (Coleman, *Coding Freedom* 17; Adam, "Hacking into Hacking" 128; Levy 43; Chopra and Dexter 47), were identified as obstacles for women and beginners wondering how they could consider themselves hackers. The multiple priorities of the common life course of a woman, the pressure to disengage from computing at an early age, the relative lack of formal technical education, and family engagements and/or the work of caring for others can make independent self-improvement on the mainstream hacking model much less straightforward for female hackers. The feminist hackers interviewed accordingly reject meritocracy and competitiveness as the best ways of learning and integrating into a community by stressing a do-it-together element in their hacking. Freedom in this model is less centered on the *self*, and it comes with some kind of responsibility for the rest of a group: a collectivized articulation of the principle of freedom.

The concern expressed here for social awareness in hacking practice points to the way that hacking and activism were seen as intimately related by Femhack members. The majority of those interviewed had some experience in activist and rights-protection movements. In their words, hacking should have a "political" meaning and its outcomes should include bettering the conditions of living beings and the planet. For my study participants, hacking for activism (or *hacktivism*) could go in a number of directions. Hacking and activism could be approached, for instance, as struggling for technological freedom, whether this involved software, hardware, networks, or social infrastructures. Another main focus was the right to privacy, and the sharing of knowledge about the protection of personal data. Supporting a culture of free learning and shared data (such as the Creative Commons License) was also seen as important in this regard. For these feminist hackers, struggling to support such human values constituted a big part of the hacker ethic, and a main reason to become a hacker.

The activist focus on freedom described here often involved explicitly feminist principles integrated into the visions of hacking activism described by my participants. Their activism included forming groups aimed at improving the living conditions of women (hacker groups, computer science and mathematics classes in school, etc.). Such feminist activism

was also valued for helping feminist hackers to be critical about hacking, as opposed to simply taking mainstream hacker practice and ethics for granted.

> I took a feminist approach to hacking - expanding that conception of mathematics and computer science, which, on its end, has a potential of being creative and open-ending, and I love that there's not just one way of doing things; it's kind of boundary-crossing in that way.[160]

In these ways, feminist hacking was described as oriented toward a relatively social and applied kind of techno-practice. Femhack members demonstrated a keen and lasting interest in activism and the political side of hacking. For them, hacking is not limited to the individual *fun* of discovering and exploring. It involved creatively engaging technology with political or activist goals. The learning involved was valued for usability and practical knowledge (individual or collective), and rarely done simply "for the sake of it." The interest participants reported in technology freedom, free software and hardware, autonomous infrastructures, secure communication, and independence from providers and technicians did not, then, point only to a desire for solution-based outcomes: it also embodied a consciously critical approach and a politicized position with regard to technology and its artefacts. Feminist hacking is in this way oriented toward a more social and applied type of techno-practice.

To summarize, the definitions of hacking offered by feminist hackers make it clear that a sense of freedom (which includes software and hardware freedom, and various aspects of truly owning a machine) is highly valued. Freedom translates, as in mainstream hacking, into exploratory actions and the ability to modify technical artifacts in use. The feminist hacker does not strive for the freedom of personal growth alone, however, but considers the community and their personal freedom links to the well-being of the other members of the community. Freedom pursued in and for a group takes new and different directions: it includes, for example, the right to explore and hack without intimidation or judgment. Hacking is accordingly anchored in activism and consideration for others, as seen for

[160] Interview with Omega, Oct 22, 2014.

example in the motivation to hold mutual help and skills-sharing workshops. Collective considerations of personal struggles and social justice are for feminist hackers' crucial elements of "hacking" in all its personal significance and complexity.

Hacking is from this point of view a creative and subversive practice of critical thinking and experimenting with technology. It is also a source of pleasure and fun. The knowledge thus shared can lead to independence from experts and a confidence that comes from knowing more about the artifacts that surround us all. Building, problem-solving, software and hardware freedom, and unconventional thinking and practice are all instances of hacking. Hacking is therefore not seen as an isolated project or an individualistic concept, but rather as a form of "group emancipation" that builds and connects the knowledge of people with similar needs and alternative visions.

Conclusion "Hacking the definitions"

The Femhack participants' hacking profiles are noticeably different from the typical, traditional hacker profile. Members of traditional hackerspaces typically focus on highly specialized programming skills. Femhack members show a markedly higher interest in a broad kind of multidisciplinarity, practical and theoretical, technical and social. Higher education and research backgrounds are not known to be typical among hackers. Both were common for Femhack members. Activist profiles are also not typical for hackers, as they are for Femhack members. In the Femhack hacker profile, hacking is a passion and a hobby, but it also inspires experimentation and the application of techno-science practice to other projects like art, music, activism, and feminist struggle.

This mixture of interests was seen to be connected to a multidisciplinary approach among feminist hackers, in which hacking becomes a way of thinking about things in all their complexity, "out of the box," i.e., even more unconventionally than in traditional hacking environments. Research and academic thinking were seen to be formative in the multidisciplinary feminist hacker profiles traced here, bringing complexity to ideas about technologies including their relation to the body, to hardware origins, and to extended usage. Feminist hackers were seen to apply hacking practices in feminist and techno-

activist ways that gave a specific direction to hacking: in addition to being a learning and experimenting process, hacking becomes an activity with a deliberate desired impact on society. It becomes a solution to social problems, including traditional hacking problems like privacy and the protection of personal data, but also new problems like the building of networks between activists managed in unconventional ways. For some of the feminist hackers interviewed, this activism included maintaining active ties with traditional hacker groups in order to work toward better spaces for hackers worldwide regardless of gender and other differences.

This *hacktivist* character of the Femhack member profile shapes the kind of *freedom* they were seen to seek and enjoy in hacking. Femhack members were not only more likely to feel free to identify more things as hacking, working as they did with a multidisciplinary approach and an expectation that hacking is an open-ended *process of becoming* and a way of thinking about things in their complexity (and unconventionally). They also saw hacking as an activity that ought to have an impact on the freedoms enjoyed by others in their groups in their wider society. The feminist hackers interviewed did not only seek the libertarian freedom of exploration and the ability to modify technical artifacts. They were not satisfied with the freedom to grow and explore and express themselves as individuals. They experienced their freedom as related to that of other members of a community. Hacking for them involved a kind of *group emancipation* involving people with similar needs and visions.

In the feminist hacker profile, activism and hacking seem to go together, with the goal of using their hacking skills in their everyday activist practice. The path to hacking for feminist hackers often requires greater effort in terms of connecting with technology in non-passive ways, including a struggle with the lack of social support for pursuing technical knowledge, and the result for my participants at least was an unusual determination to form communities around practices aimed at sharing such knowledge much more freely and widely.

Redefining Learning through Hacking ("Hacking Learning")

Learning is often associated in Western societies with the goals and personal development of individual students, but the feminist pedagogies involved in hacking practices like Femhack's stress communal (rather than individual) practices. The feminist hackers I studied value and enjoy hacking's traditional DIY (do-it-yourself) ideals, but in terms of their approach to learning they have a noticeable tendency to put such ideals into practice in a DIT (do-it-together) way. The Femhack collective offers a clear example of a feminist hacking group with a strong sense of what "hacking together" means. In this section, I analyze how "togetherness" is constituted (in terms of space, equipment, knowledge), and outline the factors that make a Femhack learning space welcoming and inclusive. It will become clear that the feminist pedagogies (in theory and practice) of Femhack founders, members, and trainers serve the goal of inclusion. From the interviews, my ethnographic observations, and my own participation in numerous workshops (including almost every Femhack workshop since its founding) as facilitator, organizer, and trainer, I collect and discus below a representative set of principles on inclusion and "togetherness" from Femhack events. While I do not claim this list to be exhaustive, it is the most complete set of material I have seen so far related to organizing deliberately inclusive and collaborative hacking events.

During interviews and observations, I noted that all the core members of Femhack (who are also the collective's trainers, facilitators of discussions, and skills-sharing mentors) have different areas of expertise, and use different explicit methodologies in the learning sessions they lead. They also possess different kinds of feminist theoretical expertise, all of which brings much diversity to meetings and workshops. There are, however, a few shared pedagogical values that can be seen at work in all Femhack events. For example, the *sharing* of knowledge among all participants, as opposed to the *teaching* of some by others is a common core ideal. This focus on the assembled group sharing knowledge results in more attention paid to the people involved, and less attention paid to formal teaching methods: "There is not one learning practice that is better than another," one trainer said. "Mostly, it is the consciousness of the group, for the participants' needs, for

our own needs and fears."[161] There is no one explicit pedagogy espoused by all. There is however a cumulative kind of feminist pedagogy at work that aims at inclusion and makes the Femhack experience valuable in participants' eyes. Another trainer flagged the principle of inclusion as important in describing the overall "teaching style" of Femhack this way:

> We are putting a lot of thinking into this. There are a lot of things about other spaces that make them inaccessible. But we haven't written anything in terms of unified methodology yet. We are talking through it, and practicing it. We try not pushing people away.[162]

For these reasons, Femhack members have never documented any rules or methods for teaching to guide trainers. It will become clear, though, that they do all share an identifiable intersectional feminist pedagogy of a kind, in that they deliberately put into practice the kinds of values in learning environments that they believe will not push people away from the space thus created, or from hacking itself.

Feminist Pedagogies (Framework of the Example)

In line with the mission statements of many feminist hackerspaces, my interviewees mentioned "feminist pedagogies" as a fundamental value for feminist hacking and learning. They saw these pedagogies as essential to achieve the goal of genuine inclusion. The contrast they identified between Femhack's learning techniques and traditional hackerspace training practices was seen as one reason the collective needs to create its own space to conduct training in their own way. One of the Femhack members described, for example, the traditional ways of learning in the technology field in terms of a lack of safety that threatens harm and ultimately exclusion.

[161] Interview with Gamma, Sept 28, 2014.
[162] Interview with Sigma, Oct 23, 2015.

> The idea of *feminist pedagogies* brings to the topic of the vulnerability of learners who get out of their comfort zone to immerse into something new and unknown to them. It reminds of the "violence" of today's education system, which could "hurt" the self-esteem of learners when it comes to something complex, new and even scary, as could technology-related topics be sometimes. It could produce a "fear of technology", or a sense of impostor syndrome that one can never be good enough when facing technologies. Or even worse, a discouragement to "master the craft" and fail to learn and experiment.[163]

The new skills taught by this member are sometimes too complex, she said, for most learners to stay in their comfort zones. To make this potentially uncomfortable learning process less threatening, she avoids the "scary" competitive sink-or-swim approaches of traditional hacker groups, prioritizing instead care and inclusion in what she describes explicitly as a "feminist pedagogy."

The concept of feminist pedagogies can be traced back to the work of Paulo Freire and bell hooks on feminist epistemology, teaching strategies, and inclusive classroom settings - including an erosion of the common power hierarchy of trainer and trainee (Freire, *Education: The Preface of Freedom*; Freire, *Pedagogy of the Oppressed*; Freire, *Education for Critical Consciousness*; hooks, *Teaching to Transgress*; hooks, *Teaching Community*). More recently, the description of Crabtree et al. in *Feminist Pedagogy: Looking Back to Move Forward* has specified three key aspects of this approach: feminist curriculum, non-hierarchical methods of teaching, and an ultimate goal of participation in activism (Crabtree et al. 4–9). The "feminist curriculum" component refers to the incorporation of feminist theory into the material covered. Feminist critiques of traditional classroom habits and materials become part of the material, including acknowledgement of the existence of oppressive social structures and encouraging students to think critically about prescribed knowledge in any subject area. The "non-hierarchical methods" component refers to interrogating the common power relations between teacher and student, and treating the students as active subjects in the learning system. From this point of view, knowledge is not simply transferred from the teacher to the student, and in fact knowledge can be shared in either direction. Participants are invited to question not only the content, but also

[163] Interview with Sigma, Oct 23, 2015.

dominant models of transferring knowledge (ibid.). The "activist" component reflects the hope that learning can transform social structures - it need not simply reinforce and reproduce them. From this point of view, education is itself, in Freire's striking phrase, "the practice of freedom" (Freire 1976).

In the following final subsection of this chapter on Femhack, I trace the ways in which these key concepts of feminist pedagogy appear in the practice of the collective and in the reflection shared in interviews by its members, regarding the pursuit of what my participants called inclusive, healthy, and supportive learning environments.

Femhack Curriculum

The "feminist curriculum" component of feminist pedagogy appears in Femhack theory and practice as habits of identifying real-life forms of oppression, taking action, and developing specific political strategies for ongoing activism. While Femhack's mission has hacking and exploring through technology at its heart, members are expected and welcome to bring questions related to feminism and other types of activism into meetings and training sessions. At Femhack, such questions are, as noted above, "intersectional." The problems of patriarchy, unequal distributions of power and privilege (of whatever kind) in society, and different forms of oppression related to technology are common and representative examples. The meetings described above on "decolonizing technology" and "autonomous infrastructures" are examples of educational interventions addressing the patriarchal and neoliberal social structures involved in using technology for women, feminists, and hackers. From Femhack's pedagogical point of view, learning and practicing hacking cannot be separated from intersectional feminist struggles. Learning about hacking involves, instead, critical, purposeful, and interventional practices addressing such struggles - it is not enough for feminists to approach hacking as an individual leisure adventure of "exploration" or a self-improvement hobby of "gaining new skills." The attention noted above in Femhack events as paid to identity, privilege, patriarchy, and capitalism reflects a conscious decision to confront such injustices in the world and try to

counter them. In this way, feminist hacking builds activist connections with wider intersectional feminist movements and communities.

Femhack members reported seeing the sharing of hacking knowledge as a "gift," a sharing experience, and a project with concrete "utility." Every Femhack event was accordingly aimed at raising awareness about hacker practices, but also about exploring the impacts of these practices on people's lives, and attention to strategies for making new knowledge and skills useful in real life. Meetings stressed skills-sharing, mutual help workshops, and learning-by-doing sessions. The inclusion of hands-on sessions with such goals ensured the practical aspects of these projects were always engaged. "Discussions are good," as one member put it, "but to learn, we need to get our hands dirty."[164] For example, a *Femcrypt* workshop[165], was usually structured in three stages. First, the session aimed at awareness-building around the necessity of encryption. Second, it presented a number of tools that could be installed and used by each participant. In the end, a hands-on section (often including a problem-solving or trouble-shooting session) allowed participants to install the tool of their choice, test it, and start actually using it before leaving the workshop.

This common structure for workshops had significant implications related to the kind of feminist pedagogy sketched above. The contributions and skills-sharing activities were, for example, facilitated by members of the group who had various kinds of specific knowledge they wanted to offer to the rest of the group. In this way, Femhack serves as a space for skills-exchange among members, as opposed to a place where one kind of knowledge comes from one standing leader or group of leaders. There is room in such a system for every member, and for every kind of knowledge. As one member put it, "all knowledge is valuable."[166]

Since most workshops lasted only a couple of hours (or at maximum a day or two), the goal of such sharing is not to provide participants with all skills possible, but rather to

[164] Interview with Gh0st, Jul 8, 2014.
[165] Femcrypt is a Femhack-organized training session on personal data encryption, including email, web search, and files.
[166] Interview with Gamma, Sept 28, 2014.

create some awareness, momentum, and curiosity among participants. The goal is to highlight and demystify a given technology, and to accompany participants in their first experience with it, helping newcomers to overcome any fear they might feel about the technology in question, and discussing the particular sticking points and follow-up plans of each participant. From this point of view, the trainer is not responsible for choosing and providing everything important about the workshop. Knowledge is seen by Femhack trainers as ongoing; sessions provide a beginning and some guidance, but they are approached as facilitations, conversations, and practical guidelines rather than chances for leaders to provide every piece of possible knowledge to the participants in a hierarchical manner: "We don't rely on a 3-hour workshop to have all problems solved," reports one Femhack trainer: "It is an individual learning curve, and it is our responsibility to continue learning after the workshop."[167]

I have already alluded to the fact that Femhack hacking sessions typically foreground "utility." By this I mean that the events are dependably linked to the specific practical skills and needs of participants. This seems to be one of the biggest differences between Femhack sessions and comparable events hosted in traditional hackerspaces. The idea of making something simply "for the fun of it," and the idea of learning something for the sake of knowing one more thing, seem to have a limited appeal for Femhack participants. They are typically interested in the practicalities of every process of experimenting and learning, due in large part to the fact noted above that women are often busy carrying multiple social obligations and therefore lack the time to simply "entertain" themselves with something they find interesting, no matter how passionate they may be about it. The preference for practicality can be seen, for example, in Femhack's "mutual aid" hacking sessions focused on real-life problems.

For Femhack trainers, knowledge is not a goal in itself. It is not seen as unified or even objective. Knowledge is expected and welcomed from many sources, and is treated as transformative and ideally emancipatory. The goal of sharing knowledge is to "light a fire" of curiosity and ability in participants rather than to deliver a finished product. The ideal is

[167] Interview with Gamma, Sept 28, 2014.

to provide awareness, resources, and tools for an ongoing learning practice, usefully grounded in real-world personal needs and real-world social struggles.

Teaching Style and Participant Role

The second key component of feminist pedagogy listed above is the critical attention paid to power relations between trainer and trainee: in intersectional feminist learning environments, the teacher is not superior to the student, and learning can be shared both ways between them as active subjects in the process. At Femhack events, this principle appears in the shared affirmation among presenters and trainers that no one person is expected to have the ultimate set of skills, over against all others present. The workshops and hackathons are organized so that everyone present can contribute something: a particular hack, a piece of technical expertise, a contribution to presentation or facilitation, etc. Participants are invited to become active contributors to the workshops rather than passive learners, acknowledging and sharing the different kinds of expertise brought by various members of the group. The pedagogical message stressed is that knowledge on any given topic is not somehow owned and diffused by the trainer or facilitator at a Femhack session. It is commonly created and shared.

One workshop participant highlighted this character of Femhack learning by remarking that although they had picked up valuable skills at a *Femcrypt* workshop, they did not feel like they had been "taught" anything in a mainstream educational way. Another shared her appreciation of the fact that because everyone is encouraged to bring in his or her unique knowledge and personal experience, participants become agents in their own learning process and in the learning accomplished by others. Assuming that everyone is an *expert* in something is part of the strategy for inclusion at Femhack events, consciously opposing the common hierarchical "[hacker] elitism" one participant mentioned as not being missed much when she took part in a Femhack workshop.

The structure of Femhack events encourages the ideal of "togetherness" by requiring participants and facilitators work together in approaching the given topic. The names of the events alone ("mutual-help workshops" and "skills-sharing sessions") advertise that no

elite knowledge provider will be involved, and that mutuality and solidarity will be stressed. The Open Space environments employed at Femhack events concretize this ideal of shared learning and decision-making processes. Among the trainers, there is an additional unwritten (but often internally discussed) rule stating that Femhack workshops must make room for the full active autonomy of participants. In the words of one facilitator, "We like to put the tools in people's hands so they can do it themselves."[168]

Another aspect of the de-hierarchisation of Femhack training sessions (and another indication of the assumption that all members have valuable experience) is the rotation principle applied in organizing workshops. Mandating a teaching leadership that regularly rotates ensures that everyone becomes a trainer and everyone becomes a learner, further reducing potential boundaries between members in terms of elitism and expertise. Moreover, this practice, combined with the marked multidisciplinarity of feminist hackers noted above, ensures that a large diversity of teaching topics are included as important (e.g., not only tools-oriented skills, software, hardware, etc.) in exploring technology. As documented above, Femhack sessions have accordingly made space for discussions of body hacking, privacy and encryption, programming, building safe(r) spaces of hacking, bike repair, soldering, OS installation, wearable electronics (combining Arduino hacking, programming, and sewing techniques), etc. "Each of us has different priorities and is pulling towards different skill-sets and directions," one trainer says: "If we had more people, it would be even more diversified in terms of activities and skill-sets."[169]

Feminist Emancipatory Practices

The examples just sketched of "doing it together" show that at Femhack, the activist component of feminist pedagogy has an immediate local dimension. Trainers work to oppose oppressive social structures in the "classroom" itself, by focusing on respecting differences, accomplishing mutual goals, and privileging participatory learning. In doing so, they validate the personal experiences of participants as legitimate and important, and

[168] Interview with Gh0st, June 8, 2014.
[169] Interview with Sigma, Oct 23, 2015.

model social understanding and activism in the learning process. "We are very different people," one trainer says: "We try to accept each other's position."[170]

Considering everyone's unique multidisciplinary expertise important, adapting workshops on-the-spot to the needs of participants, and deliberately making space for beginners are all strategies for dealing in an inclusive way with the differences among Femhack members and participants. One Femhack member expressed the principle involved in these words, as she reflected on the need to avoid creating exclusive barriers, and to respect difference - a need too often ignored in traditional hackerspaces:

> If you go to Foulab, someone will ask you: 'So what do you hack on?' It's humiliating, even people who hack may not call their work 'hacking.' So if I hack, I could be a member of your group. If I don't, then I am excluded? I feel that we don't have this in Femhack. There is less of an elitist culture of hacking in Femhack. Questioning people's skills or people's identity before you know anything about them is a barrier, which in Femhack does not exist.[171]

The principle of respecting difference also appears in the feminist hacker scene in the form of Femhack's public invitations to workshops. Invitations offer by definition an idea of who might be welcome in a given space. Femhack invitations make the inclusivity of the space created explicit, listing the target technical levels and genders, advertising kids-friendly sessions, specifying the price involved (usually none), noting considerations like wheelchair accessibility, and naming the languages that will be spoken. The fact that Femhack events are usually free of charge addresses a social understanding of the financial precarity of many participants, for whom money could be a barrier. This inclusive preference for no-charge events is the reason for Femhack's policy aimed at organizing close-to-zero-budget events (a goal achieved by negotiating the use of a free space, locating free equipment, and providing free trainers).

The sharing of food noted above as normal Femhack practice (including tea, snacks, and sometimes a potluck brunch or dinner) has become another part of the collective's strategy

[170] Interview with Gh0st, Jul 8, 2014.
[171] Interview with Storm, Oct 17, 2016.

for inclusion; it creates a welcoming environment when everyone brings something to share with the rest. Even if they did not bring anything, participants can feel welcome in being invited to share the food. Food can be expensive, too, and there always seems to be plenty in the end, so Femhack facilitators see no need for anybody to be called out or excluded for not contributing. Sometimes those who have not brought food are able to help with setting up or cleaning up instead.

Participants commonly report that "doing it together" in this way helped them lose their fear of hacking and technology - a fear often exacerbated by their experiences with more mainstream technological experts. One participant offered the comparative example of her negative experience at a learning session held in a traditional hackerspace: "It will be easier if I do it," the expert hacker said, as he took the computer out of her hands, in order to "help" her in installing GNU/Linux. The problem, of course, is that the woman did not just want her new system installed. She wanted to learn how to install it herself, step by step, partly in order to be able to then go and help other people in her community do the same. This "technician's approach" - even when it comes from a desire to be helpful - is seen by Femhack members as a disempowering mistake opposed by feminist DIT theory and practice:

> The problem isn't me, it's the way that they present technologies to us. It's an emancipatory question. If you present the things as too technical, too complicated, you present them as hermetic. People will never try to do it by themselves, because it's too inaccessible, too unsafe, or too difficult.[172]

With this emancipatory goal in mind, Femhack workshop facilitators deliberately work to "demystify" specific software, tools, terms, or concepts related to technology. These workshops often have the effect of challenging participants' prejudices about the technology involved, making it seem more relatable and also practically accessible. On the need for this kind of work, one Femhack trainer said, "Taking into account how much prejudice women face with technology, and how hard it is to counter it, it is important to create space to do so."[173] Participant feedback confirms that many women do indeed feel

[172] Interview with Sigma, Oct 23, 2015.
[173] Interview with Omega, Oct 22, 2014.

empowered after installing a new GNU/Linux operating system on their own after having a great discussion about it, after learning how to be more independent from corporate tech providers (from jailbreaking a phone to simply deciding on a better Internet service provider), or after finding out how to be more free from computer experts (by learning, for example, how to install a WiFi card on their own).

Conclusion: "Hacking Learning"

In the combination of skills and practices that Femhack workshops provide, no one is considered a total expert and absolute owner of the knowledge and skills involved. A facilitator is seen instead as learning while helping others. Discussions are not limited to virtuoso technological fixes and skills. Topics are instead often related to strategic ways of liberating technology and its users, with the explicit intersectional feminist goal of encouraging empowerment and autonomy. These feminist hacker learning practices aim at providing a space of solidarity, in which individuals can build confidence and togetherness with one another in learning new things and "getting their hands dirty" from practical hacking projects. The Femhack community shares skills and knowledge among participants. The empowerment of the participants (and trainers, too) is encouraged by opposing the traditional hierarchy between trainers and trainees, and by incorporating an activist feminist agenda into all hacking sessions. The hacking involved engages real-life problems, with attention paid not only to the particular "tech fixes" involved but also related issues of technological freedom, empowerment through technology, and the nature of the feminist struggle as part of wider social struggles (including the social uses and abuses of technology).

Femhack sees learning as a personal path in which trainers assist the learning process but are not the most important players in it. Participants are encouraged to find ways to emancipate themselves through their own practice, and to follow their own personal paths toward technology freedom. This is why Femhack affirms that there is a diversity of paths in building hacker knowledge, and recognizes that many different types of knowledge are important when it comes to technological production and use. There is no assumption of one "right way" to do things.

In all the ways just named, Femhack redefines learning as a community project closely related to women's struggles, empowered by feminist views of hacking, and based on a feminist pedagogy. In creating its own vision of hacking, Femhack erodes the kinds of barriers against full inclusion often encountered in traditional hackerspaces, creating a learning and hacking environment that is effective while respecting participants' differences and needs. This intersectional feminist vision aims to cultivate truly welcoming spaces in which people can feel safe to hack on their own terms.

Chapter Conclusion

The goal of this chapter was to document and contextualize some of the hacking stories and practices that emerged as representative of Femhack in my participant ethnography. My summary of these findings stressed that unlike traditional hackerspaces and hacker gatherings, feminist hacking practice as described by my interviewees incorporates an activist perspective and a broader definition of hacking, both of which serve to acknowledge and include people who usually fall on the periphery of hacking. A notion of "togetherness" emerged, serving the vision of a collective space for those who may want to find out more about hacking but feel intimidated to do so in traditional hackerspaces. The "do-it-together" approach on display at Femhack events involved a collective process based on solidarity, respect, sharing, and a revolutionary kind of non-hierarchical learning. Femhack initiatives created spaces for different configurations of togetherness, in which these "do-it-together" practices superseded "do-it-yourself" ideals. Participants reported the hope that DIT feminist hacking might have the potential to bring more hackers and more kinds of hackers into a local scene. To this end, Femhack serves as an example of a feminist hacker collective willing to experiment and "hack" the social boundaries found in more traditional hackerspaces.

Femhack is still a small collective today. Activities have been more sporadic because of the busy lives of the members – one is finishing a Ph.D., another has just started one, and a third has been focused on travelling and cultivating her artistic career. Three other members have moved permanently abroad (one to the US and two to Europe). Despite

these limitations and the irregular frequency of their meetings at present, Femhack is ready to hold more events like the ones reviewed here, some of which are in fact being planned for this coming Fall (2019). In the meantime, members have begun discussions with a sister organization about sharing infrastructure (including physical space, equipment, and other resources). This newly founded collective called Batiment 7 has a compatible activist hacking mission. It hosts activities organized according to similar values, and is excited to assist and host Femhack's.

The vibrant and fast-changing nature of Femhack documented here involves a natural precariousness. As one observer put it, Femack could very easily "disappear" at any time due to contingencies like its founders' changing life priorities. It has no sustainability plan and no funding. The advantages and risks of these organizational peculiarities make Femhack an interesting project for documentation. It has provoked great interest in the Montreal hacker community and abroad (interested hackers routinely contact Femhack from the US and other parts of Canada, excited to participate in the collective's future activities). Femhack offers an interesting model of feminist hacking community, in that it offers participants an innovative space for exploration based on feminist principles of inclusive participation, feminist pedagogies, software and hardware freedom, and participatory design. It would be hard to name another hackerspace so inclusive anywhere else in the city. Non-traditional hackerspaces are rare in Montreal, especially those operating free of charge and offering informal yet welcoming atmospheres for learning through creative engagement with technology.

In my judgment, both traditional hackerspaces and non-traditional hacktivist groups could learn something from the Femhack experience summarized and analyzed here. The collective's "opening up" of definitions and practices of hacking promises, for example, the potential to bring in more hackers and more types of hackers - including people from groups traditionally marginalized in terms of technology. The practical activist applications that emerge from Femhack events as empowering and consciousness-raising for participants provide concrete evidence that hacking can be important for activist and feminist causes, and vice versa. Hacking can, according to the data provided by Femhack members and participants, be usefully intertwined with anti-capitalist, anti-colonialist and

anti-oppressive struggles of all kinds. The fact that learning through hacking can take the form of the emancipatory collective practices of diversified groups - rather than simply individual projects of apolitical personal interest - adds a world of potential richness and value to the evolution of hacker knowledge and practice.

Chapter 6

Do-It-Together in Montreal: Lessons Learned on Building a Feminist Hacker Community

Introduction: Four Takeaways

In recent decades, hacker practices have been transforming attempting to move away from the elitist and individualist hacker culture of the 1980s. Through mass gatherings, hackathons, and shared hackerspaces, the movement has been opening up to larger numbers of interested people. More and more would-be hackers are getting involved in non-conformist uses of technology and experiential learning through making. Many have been forming communities to share their experience and expertise. Unfortunately, while hacker culture has been opening up in these ways, the definition and the ethics of hacking have remained as rigid and hermetic as they were when the pioneering writers described those decades ago. Hackers are still commonly associated with young, male "computer aficionados driven by an inquisitive passion for tinkering and learning technical systems, and frequently committed to an ethical version of information freedom" (Coleman, *Coding Freedom* 3). These traditional and liberal hacker ideals present significant barriers for interested people who do not fit the mainstream hacker profile or resonate with such traditional ideas about what hacking represents.

This thesis has documented local examples of mainstream hacker culture and feminist hacker culture. In this section, I summarize the key takeaways of my research. The problem of exclusivity confirmed by my study and the potential identified for inclusivity are, it turns out, inseparable from the need to define (and redefine) hacking itself. Hacker theorists Alessandro Delfanti and Johan Söderberg have recently questioned the very definition of hacking. Their 2018 article "Repurposing the hacker: Three cycles of recuperation in the evolution of hacking and capitalism" describes how hacker practices have expanded from software development and moved to broader fields of technological explorations, including "digital manufacturing, political activism, open hardware, and DIY biology" (Delfanti and

Söderberg 458). According to these scholars, there is a need to explore the limitations of hacking and to revisit the narrow association of hacking as all about computer technology. They call this necessary process "hacking being hacked" (459) and describe the ways in which the old DIY practices of the Arts and Crafts Movement increasingly address the need for a new political and social approach. They describe a process in which hackers pass from "one generation to another, from one field of engagement to another, and from one geographical center of activity and influence to another" (459). In this process, hacker principles are often transgressed and transformed. My research here traces the way this process works out in a community that aims like Femhack to build on hacker principles by letting more experts, more activities and technologies, and more spaces to find their place in the global hacker movement.

Since 2002, I have been hacking on different software and hardware projects, while becoming closely involved in the organizing of local self-help groups, install-fests, fix-it meetups, hackathons, security workshops, and gatherings for activists and feminists interested in hacking-related topics. In this thesis, I have taken a close insider look at two hacker communities, to gain an understanding of how the social dynamics of belonging are worked out, and to draw lessons regarding the building of communities that truly are as *open* as possible. My research into Foulab and Femhack aimed to answer these research questions about inclusion and exclusion:

1. What visible and invisible boundaries of inclusion and exclusion exist in traditional hackerspaces and how is the concept of space related to them? In other words, why do traditional hackerspaces, while attracting certain individuals, dissuade many others from participating, whether intentionally or not?
2. What are the lessons to be learned from feminist hackers' strategies for creating inclusive spaces, pushing the definition of hacking and using feminist pedagogies to interact with technology?

In pursuing these lines of inquiry, using existing research on hackerspaces and feminist techno-practice, my thesis has documented a feminist perspective on hacking; one that shows what a consistent feminist hacker practice represents and how it expresses (and

challenges) traditional hacker ethics. It has acknowledged the diversity and nuance that has been added to the definition of hacking, and hacker practices, by feminist hackers, by documenting and analyzing their ways of creating more intentionally inclusive spaces.

The work of my thesis relies upon two primary theoretical supports. Recent critical theories of space helped me deconstruct the notion of space as mere container or territory, and approach it instead as a set of relationships among people and things that are continuously coming and going on in any given hackerspace (Massey, "Politics of Spatiality"; Massey, *Space, Place and Gender*; Massey et al.; Lefebvre and Enders; McDowell). The writings of Doreen Massey, Linda McDowell and others helped me to link the concept of space to questions of gender division, social inclusion and exclusion, and the building of identity as it relates to power relations between people in hacker communities. This focus on gender, power relations and inclusion fed into my second crucial theoretical support: the progressive critical investigations of feminism and technology that has been conducted under the name of *technofeminism*. This theoretical base for exploring feminism and technology, pioneered by Judy Wajcman, helped me to situate feminist hacking practice within a broader perspective of women and technology, which added to my understanding of the power relations at work in spaces of hacking and the reasons women are building their own spaces to hack on their own terms (Wajcman, *TechnoFeminism*; Wajcman, "Gendered Technoscience"; Faulkner; MacKenzie and Wajcman, *The Social Shaping of Technology*; Mackay and Gillespie; Cockburn). Finally, the work of Virginia Eubanks, Ursula Franklin and others on the relationship between gender and inequality in the field of technology gave me an overarching framework in which to situate the specific and practical challenges my interviewees spoke about when they related their personal histories concerning technology and social exclusion (Eubanks; Granjon et al.; Franklin).

Building a feminist perspective on a given issue often involves looking into big questions or concepts in a way that considers gender as a category of social inclusion, rather than simply ignoring it. I want with this thesis to contribute to a better understanding of hacking using a feminist lens, showing how is hacking perceived and defined in the actions of feminist hackers - creating the rules, activities, and spaces for a model of hacking in which a broader public could participate. In my conversations with feminist hackers, I noticed

that there is no one feminist hacker perspective - there are many. They are all related, however, to what might be called a global techno-feminist perspective, aimed at promoting social justice and addressing the impact of perpetuating patriarchal social structures in technological fields. Emerging feminist hacker perspectives contribute new approaches to hacking and to the analysis of gendered approaches to technology. This is partially because, as we saw in the previous chapter, the life course of women is significantly different than it is for men, as are the expectations placed upon them in terms of fields of study, labor, as well as childcare and other types of care.

As noted already, a broad feminist perspective aims at redefining hacking itself, rejecting its elitist expression and offering a pluralist one. This perspective looks to build hackerspaces up not as insider-oriented *communities of practice* but rather as inclusive settings by acknowledging diversified practices, multidisciplinary skills, and pedagogical philosophies as belonging within hacker practice. I found that this emerging feminist perspective stresses learning through hacking, and particularly learning about and through technology with others, i.e., *the do-it-together (DIT) collective character of feminist hacking*. The move toward DIT (rather than DIY) ways of thinking breaks with the individualist, liberalist, elitist and meritocratic elements of the hacker movement. It strives to promote collective values of gathering, space organizing and learning, such as building sustainable knowledge related to anti-consumerist, anti-disposable, practical uses of technology; growing as a collective rather than just as individuals; non-hierarchical, inclusive and empowering ways of knowledge transfer; and the collaborative discovery of solutions leading to emancipated users.

The pages below summarize my study's findings on the principles and processes just described by listing four major takeaways from my six years of research. The case studies of the Foulab and Femhack communities offered vital insights into Montreal hacker practice, the hacker community in general, and the practical dimensions of a feminist vision of technology. In studying these two sites in parallel - one an established traditional hackerspace and one an emerging feminist space - this thesis documented and contributed to evolving feminist perspectives on the spaces and politics of hacking in Montreal and beyond.

The first takeaway of my thesis can be stated very briefly. It takes the form of an evidence-based affirmation. The critical investigation offered in my study confirms the judgment (outlined above in the Introduction and Chapter 1) that the traditional hackerspace model tends to reproduce patriarchal structures, creating barriers against the full belonging and participation for women and other technologists in the hacker movement. The spaces following these conventional hacking philosophies, practices, tools handling and understandings perpetuate exclusive social structures, despite all the traditional ideals of radical freedom and access cherished by the mainstream hacker movement.

The second takeaway focuses on a particular dimension of inclusion and empowerment. I have found that when the definition of hacking is broadened to include areas in which men are not already the local default experts (as is often the case with engineering, for example), it creates a more diverse and equitable field of expertise. Opening up the definitions of hacking empowers more participants to step in as experts (as opposed to being seen, for example, as burdensome amateurs), and creates an atmosphere in which it is understood that all members have something to learn from each other. This breaks with common hacker hierarchies and power relationships. Hackerspace expertise need not be limited to computer programming, infosec, and coding, as the Montreal hackers of my study demonstrated by exploring the potential of ham radio, hardware hacking, biohacking, art-hacking, free software hacking, lock picking, and more. Feminist hackers demonstrated a markedly fuller range of hacking practices, including computational linguistics, wearable electronics, mixed media and electronics, artistic hacking projects, crypto-dance, food hacking, body hacking, autonomous infrastructures and *hacktivism* aimed at creating a more just society (e.g. intentionally decolonizing technologies).

The third takeaway of this study concerns the ways in which feminist hackerspaces work to mitigate the problem of perpetuating common social and spatial structures of exclusion. My investigation found that the feminist hackerspace model, as practically embodied in the local example of the Femhack community, is designed to better welcome participants at any level of experience and with any kind of expertise, in order to create a safe, welcoming, nonjudgmental environment for hacking and learning. These intentionally inclusive spaces are actively inviting and not just open in theory. Choosing to invite women and other people

underrepresented in mainstream hacker communities (including children, the elderly, LGBTQ people, disabled people, etc.) and making sure they can participate and belong is more empowering and transformative than simply making the gesture of leaving the door open for them. Real outreach is proactive.

The fourth takeaway flows from the stress feminist hackers place on the collective dimension of their practice. My study showed that for feminist hackers, as for traditional hackers, learning is an essential part of hacking and solving problems involving technology. However, the feminist learning process stresses collaborative environments, feminist pedagogies, and emancipation processes leading to autonomy (rather than freedom) as being of highest importance. Accordingly, hacking principles informed by feminist pedagogies foreground learning strategies based on sharing, collaboration and participation: non-hierarchical principles of knowledge transfer create spaces that support technological activism, empowerment, and social engagement through learning. These feminist pedagogies for hacking work against the various barriers to inclusion often encountered in traditional hackerspaces, creating spaces respectful of participants' differences and needs. The collective vision of hacking that results is an intersectional feminist vision connecting hacking to women's struggles and other forms of hacktivism, by cultivating welcoming spaces in which people can feel safe to hack on their own terms.

All four of these takeaways drawn from the Montreal hackerspaces examined in my case studies point to the benefits of hacking dominant understandings (including academic understandings) of hacking itself. In the following pages, I provide summarized reflections on each of these takeaways, aimed at addressing the research questions just listed above.

Takeaway 1: The Problem with Traditional Hackerspaces

Through my ethnographical observations and interviews with hackers, including asking feminist participants about their understandings of the social dimension of hacking activities, about belonging to the movement, and about how traditional hackerspaces

respond (or fail to respond) to their needs, I assembled a picture of the boundaries that define mainstream hackerspaces. My research participants' ideas and experiences have helped me to critically evaluate the notions of *space* and *communities of hacking* related to the sharing of equipment and skills, local modes of knowledge transfer, and the ways in which hackers succeeded (or failed) in helping each other. My findings have supported the claim that the traditional model of hackerspace practice tends to create spaces that are exclusionary for many. By producing barriers to participation, the traditional model limits access to the technological development, innovation, and learning happening in such spaces. The common habits of predominantly male groups perpetuate patriarchal gender norms already in place in the field of technology. Reading my ethnographic observations through the theoretical works of Massey on *space* and *gender* reveal that while space in traditional hackerspaces is often given a great deal of attention in terms of order, arrangement, and technological storage, it is not often taken into consideration with regard to facilitating communication or collaboration between all its users and members, creating an inclusive community, or encouraging non-hierarchical structures for human relationships. This lack of attention to space as dynamic and community-building is also evident in the relevant academic literature about hackerspaces and their ethics (Coleman, *Coding Freedom*; Dunbar-Hester; Crow et al.; Grenzfurthner and Schneider; Megelas). Only feminist hackerspace literature addresses the potentially exclusionary social dimensions of space, and discusses inclusive practices capable of making more people feel at ease to visit and hack (Adam, "Hacking into Hacking"; Davies; Fox et al.; Haralanova and Toupin; Toupin).

Based on the insights of the participants, I categorized the boundaries they reported meeting in traditional hackerspaces. This entailed looking closely at the politics of space. The spaces created by traditional hackers and following the hacker ethic have created boundaries for outsiders by discouraging physical access and instilling emotional feelings of discomfort. Even if newcomers develop a fascination for the space and its members, they often face a boundary every time they try to appropriate the space as their own. At the beginning of my research, I pictured these boundaries as invisible, and the rules as powerful but unconscious and subtle. Over time, in conversation with my research participants, I

became aware that many of those boundaries are in fact quite visible and do not necessarily represent unconscious attitudes or decisions. They may be intentional. The local rules of space and community created by members can serve to guard their special *insider* status, and to exclude outsiders from decision-making processes.

In my analysis, I categorized the boundaries thus produced into three groups: corporeal practices, representations, and works of objects. As mentioned in Chapter 4, the boundaries involved arise from both the politics of space in general (including social relationships, unclear rules and lack of transparency) and hacker politics in particular (the preservation of the identity of a very segregated group of people, through a dress code, jargon, and behavior, but also through the liberal principles of individualism and meritocracy common to hacker culture). Despite the dominant hacker discourse on freedom, according to which everything in society, including technology, should be free and accessible for the common good, my analysis shows that the insistence of traditional hackerspaces upon *individual* freedoms (including, for example, the individual freedom of speech) comes at the cost of ignoring the ideal of organizing around collective freedoms. This means in practice that the rights of one individual (usually already a member of the space) take priority over the need to provide a space affirming fundamental rights for all. This exclusionary dynamic helps to explain why certain types of activities never take place in hackerspaces, why certain types of individuals never join, and why there is a felt need among marginalized hackers to create their own ideals and their own support networks in hacking.

From the technofeminist perspective described in Chapter 2, the traditional co-construction of technology and gender marginalizes women in technological fields, supporting the social impression that hi-tech is a male domain. As Wajcman points out, there are two consequences: The first result is that women themselves choose to avoid associating with technological fields. The second is that women are further marginalized by the fact that technology design is focused on "decision-makers" and the technological design levels of the field (Wajcman, *Technofeminism* 45). The implication for hacker culture is that women, regardless of their interest in technology, are less engaged with technology and less motivated to enter fields and environments that already seem hostile. An exclusive spatial

and social dynamic, combined with a narrow definition of hacking, keeps women at the margins of the hacker movement (and technological development in general).

In terms of community boundary building, Foulab does not differ greatly from other hackerspaces in North America and elsewhere. Hackerspaces are often committed to *openness* in principle. Some hackerspaces are deliberately oriented toward the hard work of openness and community-building. Others, like Foulab, limit such practical openness by making the ideal openness of a no-rules environment their priority, partly because the lack of formal rules serves the local membership's status quo. The putative hacker idealism of Foulab's refusal to infringe upon individual freedoms (e.g. in implementing anti-harassment and conflict-resolution policies) makes the space less free and open in the final analysis, not more free and open.

In brief, my analysis of the Foulab case study confirms the emerging hacker idea that the traditional hackerspace model is unfortunately deeply rooted in dynamics of exclusion that are gendered. Since they perpetuate inherited exclusionary structures of mainstream society and related fields of technology, spaces built on the traditional model have proven to be incapable of creating the conditions for the genuine inclusion of women in particular. This situation will likely continue until local power structures change, local spaces are reorganized within a broader community, and conscious work is done toward creating and maintaining a more open, inclusive, and welcoming kind of hacker community.

Takeaway 2: Hacking *Hacking* - Broadening the Definitions

The second central conclusion of this thesis addresses a conceptual gap between the traditional hacker movement and feminist hacking, namely the feminist break with the stereotypical image of the hacker. There is a felt need to problematize definitions of hacking that propagate exclusive practices by reproducing stereotypical images. Most interviewees in my study indicated that they often have a hard time considering themselves to be *hackers* at all, for example, due to the difficulty of fitting in or identifying with the

most common understandings of hacking. This problem of identity makes it hard for these techno-practitioners to find a meaningful kind of belonging within local hacking environments working on the traditional model.

Studying the feminist hacker community in Montreal and Femhack in particular can help interested parties identify broader, more inclusive definitions of hacking. The multidisciplinary backgrounds of the feminist hackers who participated in my study, their histories, their levels of expertise and their variety of skills led them to approach hacking in novel and complex ways coherent with other important aspects of their individual lives and identities. The four main characteristics my study traces in this novel and more open and inclusive approach to hacking (unpacked immediately below) include broadening the definition of hacking, retooling the definition of freedom, focusing on the communal dimension and potential of hacker practice, and anchoring hacking in activism.

Breaking with the stereotypical image of the hacker. As indicated by the theorists and study participants above, hacking does not need to have strict limitations in terms of the expertise involved. Valuing a greater diversity of expertise within the hacker movement promises to play an important role in breaking with the stereotypical idea of hackers as young white middle-class men. It makes room for different demographics including new hackers, linking hacking to more spheres of life, and helping to create a more accepting and diversified movement. For Wajcman, associating computer technology with a male-centered image of the white, young, make geeks who enjoys working long hours at the computer may pose problems for interested people do not fit that model: they may be seen as permanent outsiders, or required to sacrifice aspects of their own identities in trying to meet that ideal (Wajcman, *TechnoFeminism* 112). This identity question echoes the debate about gender inequalities in the ICT field, discussed by Eubanks in the book *Digital Deadend: Fighting for Social Justice in the Information Age.* Eubanks calls for recognition of *intragroup differences,* insisting that even between women, there are important differences to be found in their experience of ICT according to their social status, age, class, education, and background (Eubanks 29). Eubanks considers ignoring such differences an invitation to injustice. She states: “Through an intersectional lens, it

becomes obvious that a woman's experience of the information economy is very much dependent on where she stands in relation to power" (ibid.).

Opening communities up to new combinations of skills and experiences, forms of activism, fights for social justice, feminist struggles, childcare, academic knowledge, experimenting with food, textiles, digital media, music instruments, self-care, precarity and survival skills, can draw more diverse populations and knowledge into the hacker movement and offer more acceptance for people who do not fit the image of the hacker as closely as they do the hacker spirit. Diversifying hacker practice in this way can also make it applicable to more spheres of life outside hacker communities. Examples discussed by participants include providing free software to schools, assisting elderly neighbors with their communication technologies, working with community centers to assemble computers from old parts to be given away, fighting invasions of the privacy of vulnerable populations, etc.

Wajcman's idea of *Technofeminism* was shown to be pertinent in this context: the technological design field is associated with male-centered ideologies and norms. Left unchecked, these tendencies will continue to perpetuate themselves, and the field will continue to alienate women. Women and other minorities in hacking will remain "invisible" due to the fact that they do not attain recognized decision-maker positions (such as members in hackerspaces) (Wajcman, *TechnoFeminism* 45). The results of my study showed how this dynamic works itself out in the challenging life courses faced by feminist hackers: dissociation from hacking starts in a female hacker's school/college years and is influenced by later life engagements such as childcare, adult care, and more.

The technofeminist position outlined by Wajcman insists that women should be able to participate in technoscience on their terms, as neither subordinates to men nor surrogate men. Women therefore need to take an active part in developing and providing critical analyses of policy-making in technoscience fields. Furthermore, they need to be involved at all levels, not simply as customers or relatively passive users. While this ideal is laudable, and informs the ethnography and analysis offered in this study, the picture it offers needs to be further refined (see the point on "technological activism" discussed below), since the social barriers excluding women from full participation in technology intersect and interact

in practice with other powerful social barriers: the boundaries involved are what feminists call *intersectional*.

More community-based hacking practices. The non-conventional ways feminist hackers have been forced to find in joining the hacker movement, due to different life/time/space limitations and also the boundaries encountered in traditional hackerspaces, have led them to prioritize more structured meetings, more community-driven events, and more flexible venues. The resulting focus on the community dimension of hacking inspires feminist hackers to strive for more than the freedom to learn and grow as individuals. Their personal freedom is valued and pursued in relation to the freedom of the other members of their communities, including the recognition of a right to explore and hack in a non-judgemental way that considers the rights of others working toward similar goals on similar terms. Feminist hacking critiques and expands the understanding of freedom as individual choice, introducing values such as socially-conscious use, justice, and developing anti-colonialist and anti-slavery forms of hardware production, distribution, and usage. In the same way that technological artefacts must ideally not be passively accepted and treated as *black boxes* by hackers, but engaged instead as systems that involve real agency and whose users exercise real choice, an expanding vision of technological freedom is, for feminist hackers, crucial.

The feminist ideal just described creates space for different types of hacker identities and new types of community based on active mutual support, friendliness, and togetherness. Hacking together becomes from this point of view a holistic approach to life. The expertise involved becomes less about separate fields and terms and titles, and more about a community resource related to feminist techno-activists' complex lives, serving new social purposes. A socially-engaged community practice of hacking is able to anchor and inspire a critical global perspective on the world - one in which more hackers (and more types of hackers) might potentially see themselves participating. This resonates with Eubanks' finding that women in ICT tend to resonate with practices that offer more social justice, and not simply personal benefits for them. This, Eubanks mentions, is closely related to their complex lives, which commonly include caring for their families, children (or parents), and friends, and thinking about the social good (Eubanks 27–28).

Anchoring Hacking in Activism. For the feminist participants in my research, hacking represents a creative and subversive practice of critical thinking and experimenting with technology. It is also a source of pleasure and fun, since the knowledge gained leads to independence (from technicians, for example), and the confidence that comes from knowing more about the technological artefacts that surround us all. By stressing the understanding of hacking as deeply involved in building, problem-solving, software and hardware freedom, and unconventional thinking and practice in general, feminist hackers offer a critique of its traditionally apolitical vision and practice. The way that hacking relates to the life course of a feminist hacker tends to anchor it in a characteristic kind of awareness and thereby a characteristic tendency towards activism. In practice, this means actively considering and engaging struggles like the fight against sexism in the field of technology, or the protection of vulnerable groups' personal information and privacy, as part of hacker practice. For this reason, hacking is not seen by feminist practitioners as an isolated individual project or an abstract idea, but as a mode of practical empowerment and group emancipation that connects and serves people with similar ideologies, needs, and alternative visions. From this point of view, hacking cannot be isolated from all other aspects of life. Its value lies in illuminating and improving the way people relate to technology in society. Hacking from this emerging perspective represents a never-ending process of improvement and sharing knowledge around technology. It is not linked to a strict definition of hacking set as an ideal above personal understandings and unique life experiences.

The feminist hacker perspective that emerges from the interviews and analysis collected here challenges traditional definitions of hacking and asserts the need to move past the limits that present boundaries for so many. For hackers, this positive evolution necessarily involves admitting that the traditional, idealistic discourse of freedom and openness in hacking does not necessarily lead to freedom and openness for everybody in practice. The hacker movement needs to adapt to the complexities involved in actively creating an ethical techno-community. It must embrace its own most socially innovative aspects, including prioritizing togetherness, considering time and space restrictions and precarity, caregiving, artistic expression, academic tinkering, etc. Only this ethical and practical vision of hacking

can provide a better foundation for community-building, welcome a greater diversity of people, and contribute to a more holistic approach to hacking capable of applying the resources and knowledge of hacker communities to day-to-day life, activism, and problem solving.

Takeaway 3: Hacking the (Hacker) Spaces

This takeaway builds upon the first two, and summarizes the visions and hopes reported by my feminist hackers in terms of creating supportive, empowering, respectful, and inclusive spaces for hacking. Instead of focusing only on the physical particularities of space as location, feminist hackers often discuss common values as providing the foundation for getting together and creating inclusive spaces for their preferred hacking practices. For the Femhack community in particular, which for several reasons does not follow the traditional hackerspace model of owning a fixed physical space, the idea of a truly inclusive space is imagined in terms of practices of *togetherness*.

The spaces created by Femhack events are aimed at creating inclusive, collective gatherings. These transient spaces in turn shape the expression of community involved, for example in the creative challenges they bring to the implementation of installations, presentations, or demos. It became clear in my research that no matter what such spaces look like, they instantiate Femhack values and operate according to some basic community requirements. In all such spaces, some common principles are observed, as my interviews, observations, and discussions on the topic of space with Femhack and Foulab members and visitors underscored above.[174] As discussed in Chapter 5, these principles represent a mixure of feminist, hacker (F/OSS) and social justice values, including autonomy for the organization and its members (including gratuity), collective principles of gathering, and empowerment, emancipation and autonomy for participants. Such values were seen to

[174] See also Annex D: OHM 2013 - Our Dream Hackerspace. These are notes taken during a brainstorming session in the Chaos Communication Camp, Germany, led by three Femhack members with participants (hackerspace members) from all over Europe and the world.

include real care about every participant in the space - including their learning and their understanding of the conversation or workshop involved, a diversity of topics suited to more people's needs, a diversity of community (inclusive physically and socially), and the application of hacking to real-life needs. Such hacking activities transform the spaces provided by organizers, creating room for a crypto-dance workshop[175] here or a skills-sharing event there. Being conscious about space and its associated power relations, Femhack builds community in a way designed to provide both togetherness and autonomy (technical and social) to its members.

In the summary offered in this section, I have gathered a list of the characteristics of spaces deemed desirable by feminist hackers. Because the list is cumulative and imagined in terms of the dynamic and shifting spaces just described, it is better suited to serve as a list of recommendations for creating inclusive feminist spaces for hacking than a list of requirements that any one given space could or should necessarily include simultaneously. These requirements are divided into three groups: physical considerations of space, building a sense of togetherness, and an activist approach to technological freedom. The following pages unpack these three dimensions of feminist "space hacking," and refer to some key examples that were treated in more detail in the case studies presented above.

Physical Considerations of Space

The feminist hackers who participated in my study identified physical setting as an element of basic importance for participation and inclusion, which I compiled bellow in recommendations for hackerspaces. An open and inclusive space provides the basic conditions for safety and comfort needed to encourage learning through hacking. In terms of physical setting, Femhack participants thought and talked a lot about what would make a space for hacking inclusive, welcoming, safe, and empowering. Participants agreed that a welcoming, inclusive space needs to be smoke-free, dust-free spaces (accessible to people with allergies), with clean shared areas and adequate toilet and kitchen facilities. The space needs key-locked access to allow members to leave power tools and personal items, with

[175] During the crypto-dance workshop, the participants learned the basics of cryptography by participating in an artistic performance and an interpretative dance.

convenient access during the day, in the evening, and on weekends. The entrance areas should be well-lit to allow everybody to feel safe coming and going after dark. While the occasional drink is accepted there is strong opposition to what is referred to as the "beer culture" of some mainstream hackerspaces. A child-friendly environment is a must: skills-sharing and hacking should be fun for kids as for adults. Other typical recommendations involve principles minimizing "harassment, sexism or elitist cultures of meritocracy." While some of these requirements may sound obvious, they were in fact formulated in reaction to the reality of traditional spaces of hacking in which many of these basic needs are not met. Explicit, conscious discussions about the physical setup of a hackerspace are easy for *laissez-faire* hackers to ignore, but they provide the basis for a space that shows care for its visitors and their well-being. As one of the Femhack members put it, "a clean and welcoming space plays a role in opening up the narratives of inclusivity."

While Femhack members value personal freedom and space, they also insist upon the kind of behaviour that ensures an empowering and respectful environment for all members, including the need to act in a participatory, non-judgmental, open-minded way. In workshops, meetings and discussions, for example, Femhack members make special efforts up front and throughout the event to underline that participants are being invited into a space free of judgment. In this welcoming and inclusive space, people are given equal rights to speak up, and their opinions and needs are respected. The right to be seen and heard creates an "intersectional, intergenerational, anti-oppression, anti-capitalist" environment for meetings, discussions, and learning. Organizers of events prevent the concentration of perceived power in a few hands by offering maximum transparency about exactly how meetings of the feminist hacker community work, and about how anyone present can participate. Femhack operates on close to zero funding, and relies organizationally upon the personal motivation of a small number of feminists. This fact alone often pushes participants out of a passive role as their help is needed in co-organizing the event, helping with logistics, etc. At potluck events, for example, everyone is asked to bring some small thing to share, introducing a dynamic of active involvement right away.

It is interesting to note in this context that meetings often involve food, and all study participants expressed the opinion that a welcoming space involves access to a kitchen and

the possibility to make tea, eat food or hack recipes before or during the meeting. Since they are so often considered convivial, cozy and friendly matters, cooking and food represent a way of sharing, warming up in the winter, and combining activities in order to make more time for other projects. There is always something to share at a Femhack event, be it tea, cookies, or a whole meal. This strategy also addresses the consideration of precarity: not every member and visitor can necessarily afford to spend the money needed to meet in a café, bar or a restaurant for a discussion or a hacking session - particularly when they want to bring children along.

Building a Sense of Togetherness

Feminist hackers do not imagine space in purely physical terms. They approach space as a condition for building community. While the physical setting is acknowledged to be important, it is less central as a concern than the building of practices of togetherness through hacking. The feminist hacker principles of space that emerge accordingly are based on do-it-together practices, including rules and setups that are aimed to encourage inclusion, creativity, learning, and empowerment. The community strategies and requirements listed above make it obvious that togetherness is a central goal for the feminist hackers involved in this study. It comes as no surprise, then, that feminist hacker considerations of space involve building more supportive and inclusive environments, through community practices that encourage creativity, exploring, and learning. One participant put it this way: “Feminist hacking? It’s about anchoring a collective project.” The kind of ideal collectivity involved is expressed in do-it-together practices based on shared values. Once the shared values are clarified and aligned, members find ways to experiment together with their hacker identity and their hacker practice. The same hacker underlined the importance of this uniting and freeing stress on shared values when she reported that “some of us want to program, others to discuss. But it’s all feminist hacking.”

The feminist hacker ideals and practices documented in this study focus on building autonomy, personal empowerment, and learning strategic ways of dealing with technology. The skills-sharing sessions discussed throughout provide a good example of the principle in action in a DIT form: mutual help is wanted and encouraged. Because Femhack’s

founders want to create spaces in which creativity, well-being and inspiration are valued more than business or profit, their events sometimes leave the beaten track of structured hacking practices altogether. They may, as seen above, result in a dance, a walk in the forest, or the spontaneous building of a mind-map on a wall. In every case, the expressed aim is to create spaces free from the traditional hackerspace's "elitist culture and meritocracy." While individual learning is of course encouraged, mutual help is placed centre-stage, and many of the hands-on projects programmed are related to teaming up and working on a solution together with other participants.

Technological Activism and the Politics of Space

The feminist hackers observed and interviewed for this study incorporate various types of activism into their approaches to the politics of space. Forms of activism aimed at the pursuit of technological freedom *and* social justice are seen not as optional flavors of hacking, but as hacking requirements from their perspective. They are seen as prerequisites for inclusion in that they promise to create a supportive environment for learning and manipulating technology, empowering users and producers to make responsible choices about software and hardware, and offering sustainability.

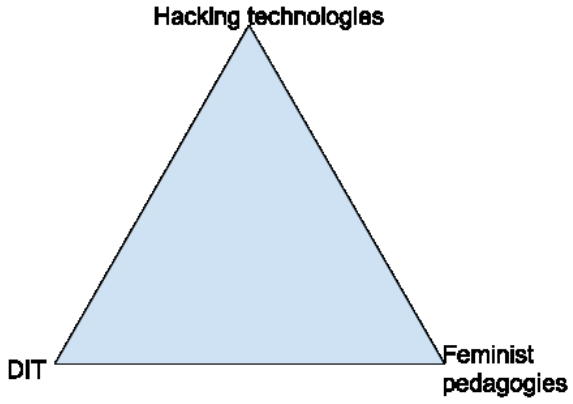
The feminist considerations of space documented above include a vision of technology as liberating. This shared vision includes software and hardware freedom, freedom from providers, and building autonomous networks and infrastructures. It has anti-capitalist, anti-oppression and anti-patriarchal dimensions. For these reasons, hacking is seen as a set of techno-practices valuing software and hardware freedom principles, but also addressing social needs like the reusing, repurposing, and repairing of old technological artefacts: the skills involved have the power to liberate users from their dependency upon marketers and skilled technicians in dealing with their own devices. This principled stress on reusing and repairing old technology is often referred to by participants as a practice of opposing the mainstream consumerist economy, since the mass consumption of new equipment so often involves the wasteful disposal of the not-so-old. Once again, the goal is to create creative, empowering and inspiring environments for politicized hackers, fostering more global kinds of thinking about the world, the environment, and the diverse needs of participants.

To sum up, the feminist hacker approach to space does not aim at making women fit into a given hackerspace culture. It encourages instead the creation of spaces by women for women, suited to women's values and priorities in terms of hacking practice, aimed at facilitating learning through and about technology, and in every case focused on creating collective hacking environments suited to changes in life course. Space is imagined in global, holistic, and experiential terms, as a dynamic element of community life that is always in transformation and always instantiated locally in line with feminist values and priorities. The goal of building feminist spaces of hacking is the creation of politicized spaces for exploration and learning but also for activism, collective action, active conviviality, and constant critical reflection on inclusion, accessibility, empowerment, and appropriate community responses to changing needs.

The feminist approach to "hacking together" foregrounds the values of inclusion, comfort, conviviality, and mutual respect. It builds spaces aimed at responding to needs, characterized by "Open-Space" environments, horizontal modes of decision-making, and clear rules for behavior, all of which must respond to the current needs of participants. From a feminist hacker point of view, these needs are practical, grounded, and urgent: as one participant said in describing the best kind of hacking, "it's feminist, it's global, it's holistic." From this point of view, a *holistic* approach to hacking entails a "hacktivist" ethic of care that includes all aspects of hackers' lives. This attention takes the form of making conscious choices together about the best ways of responding to a given need, and about which tools, policies, and technologies to use and why. The traditional hacker stress on the need to reappropriate one's own data, one's own computer, operating system, or any other technology - along with the very space one occupies - takes on a new urgency from this point of view. Feminist hackers are forced by circumstance to feel and live this urgency. This is the reason feminist spaces for hacking developed when they did, and continue to evolve.

Takeaway 4: Hacking Learning - Feminist Hacker Pedagogy

In my research for this thesis, I found a close link between hacking and learning as naturally connected activities in appropriating technologies. All hackers learn while they hack into technology. Among feminist hackers, this kind of learning is driven by collaborative do-it-together practices that reshape the hacking activities involved, including space, rules and knowledge-sharing sessions. In this way, feminist pedagogies, learning through hacking, and DIT activities take on a closely related triangular relationship. The relationships between these three elements are interdependent and multi-directional. For example, the ways of hacking and learning observed above were seen to be closely associated with the do-it-together practices involved, and the DIT collaborative sessions described were guided by their related learning sessions. In the first case, the passing on of knowledge between feminist hackers is organized around skills-sharing activities, dialogues, hands-on sessions, testing, coding, mutual help workshops, demos, and other types of collaborative activities. In the second, when feminist hackers meet to hack, they naturally turn the activities involved into mutual exchange sessions sharing skills, tools, ideas, politics of activism, or methodologies.



Building a feminist hacker community around learning and DIT ideals involves the creation of spaces and practices encouraging sustained engagement and participation. In this way, learning through hacking takes on the character of a self-motivated journey,

holistic and sustainable, and marked by a unique approach on the part of each participant. The goal becomes offering changed perspectives to people in terms of their overall relationship with technology. For example, instead of learning about specific software, equipment or hacker approaches imagined as tools for solving individual technical problems, participants are presented with hacking as a more holistic practice related to more global aspects of life, including power structures, activism, and conscious moral choices about the technological artefacts in question.

In making this attempt to hack learning itself, the feminist hackers I observed and interviewed relied, in accordance with feminist pedagogies, on a more horizontal transfer of knowledge, removing top-down power structures and aiming to meet learners' needs as opposed to imposing trainers' agendas upon the learning process. This approach to learning served the feminist hacking goals of creating spaces and relationships, actively seeking inclusion for all participants, considering accessibility, addressing language limitations, taking into account differences in the levels of knowledge, and offering more comfort and attention to participants' needs. Feminist DIT learning practices treat all participants as experts and as learners at the same time, acknowledging everyone's unique multidisciplinary expertise. This approach enables inclusion (especially for beginners), and also helps break with the elitist hierarchies of traditional hackerspaces by working for the empowerment of all.

One aspect of DIT feminist hacking that I flagged in my case study as particularly interesting is its scope. Learning is not limited to obtaining skills through hacking; learning has an agenda that encompasses an array of values, philosophies, and political actions and strategies. The values involved include the acknowledgment of the patriarchal and colonialist character of stereotyping and thereby limiting people's participation in technological development.

Feminist considerations of learning through hacking consider the close relationships between humans and technology in all their complexity, including practices and policies, opportunities and risks, histories and innovative practices, perceived freedoms and critical considerations. For this reason, feminist hacker pedagogies are rooted in technological-

critical considerations including awareness-raising for all community participants involved. There is, in other words, no one goal or one truth about technology to be reached: the goal of hacking is to enable learning through hands-on practice along with an understanding of the complex philosophies and policies grounding it.

In short, a feminist hacker approach to learning calls for the opening up of a different type of community; one that actively encourages emancipation, mutual help, creativity, and empowerment. The feminist hackers I observed and interviewed consider hacking a collective project, offering a holistic approach to technology. The result in pedagogical terms is that engaging technology takes on the character of a participatory project of collective emancipation featuring deep reflection on the learning conditions involved, including its associated spaces and human relationships. These types of feminist reflection on hacking are not widely known or well-studied. More critical considerations of hackerspaces as learning environments are needed, partly because the spaces and complexities of practice involved are largely undocumented, and partly because - as this study shows - hackerspaces a) have powerful potential in terms of the learning they can provide, and b) are not yet meaningfully accessible to the people who need it most.

Final Concluding Thoughts

In a recent conversation with Femhack co-founder Anne Goldenberg (July 5, 2019), we were trying to remember when we started using the term DIT. Anne reminded me that DIY sounded to her a bit like the RTFM guide's ideal of a heroic solo mission. "Débrouille-toi-seul" (manage it by yourself, alone) was the translation of DIY Anne offered, and then translated back to English as "Fix your own stuff." Of course, the word "stuff" doesn't suggest an atmosphere of care, and "yourself" implies a Superhero who conquers and wins alone, with the help of no one.

The hacker movement has never really been DIY in this sense. The free software hacker who score merit points with his (because he's most likely a male) contribution to a source code stands on the shoulders of many others in fixing one small patch. The hacker movement is a global community. Why then should we need to fix things ourselves? In school, Anne finished last in computer science class. She actually thought she had a physical incompatibility with technology for many years. She learned to DIY over time, but she always did so with a sense of resilience. Then she read the book Zen Computer *by Philipp Toshio Sudo[176] and began to think about repair as care. Sudo advised to honor the people who made both the material goods and the software involved in her computer, and in general, to be conscious about all the things and people that allowed her to have it in the first place. The ideal was to care for and treat all things with respect, and not just treat them like disposable objects (Sudo). It changed her whole perspective.*

In dealing with her fear of computers, Anne found that the DIT gatherings of Femhack give her the confidence needed to approach a given problem, to discuss it, to get help, and to fix it together. This process can, in her words, "recreate the magic of technology together". When we do things together, we not only learn, we also gain confidence it our attitudes towards technology. Anne uses words like demystification and emancipation when she talks about this process of learning, in which we discover and gain confidence that whatever it is, we can do it. DIT is non-hierarchical learning. In so many training sessions, Anne and I had seen highly knowledgeable experts show no patience with beginners. They had no global, holistic pedagogy. Anne put it this way: "What I learn in a Femhack workshop, no computer science course can teach me. It's not because of the knowledge transfer, but the process, the confidence, and the care that we learn, too." DIT authorizes learners to make errors, to fail, and to learn from them. DIT is in this way about curiosity and collectivity. DIT is the future of the non-disposability paradigm: to fix the things together, to share the knowledge, and to do it in a pleasant, non-violent way. DIT is a collectively discovered and used term. It is so commonly used the Femhack practice that we forgot when and where it initiated in the first place. In a similar philosophy, Anne works now in restoration. She restores many things: houses, cars, bikes, kitchen cabinets, computers - but mostly human relationships.

[176] The funny catch here is that "sudo" in the language of those who work from the terminal allows users to run programs with the security privileges of another user, becoming by default the superuser. Therefore Mr. Sudo = Mr. Superuser. (Anne's joke!)

To define hacking for a broader public, I wrote previously that it represents *a way of life* (Haralanova). This deceptively simple expression means in this context that to be a hacker you need to live it, practice it constantly, to be curious and dedicated to it with all your being - as opposed to simply enjoying a particular approach to particular technologies. There is from this point of view no one particular skill, human value or T-shirt that can make a person a hacker. Despite its multiple meanings, some of which are contradictory, mediated, and even sometimes abused, "hacking" is a complex set of understandings, beliefs, and knowledge about the world (including characteristic strategies of accessing such knowledge). Over twenty years of observing hackers, practicing hacking myself, and mixing with hacker communities around the world, I have come to realize that anyone can be a hacker. It is a matter of having confidence, desiring to demystify technology, and a belief in emancipation from given norms towards technology. Hacking is the product of acting upon one's curiosity. This process involves hard work but demonstrates that hacking is not about how much one knows - it is about how much learns in the process of hacking, a reliance on the resources available, the belief in the values involved, and the willingness to act upon these values.

In the phenomenon of widespread fast-evolving technologies, I saw an opportunity and a venue for technological practitioners, researchers and designers to oppose the prescriptive technology paradigm Franklin warns about, and in which users are treated simply as consumers who are not invited to question it. I witnessed in particular the appearance of tiny workshops called hackerspaces, makerspaces and fablabs, all over the world. These innovative spaces help to push the boundaries of hacking and tinkering, granting users' access to information about their "black box" gadgets that is not freely or easily given up by big corporations and technological producers. This goal of democratizing technology by understanding how it works along with the control over the technology that such an understanding gives militates against the market ideal of treating every user as a consumer. This critical development is hampered, though, by the curious exclusivity of the spaces involved, despite the growing interest in the hacker and maker movement. Despite its technological openness and cries for technological and individual freedom, most of those who did so were usually middle-class white men with a flair for computing.

Noticing the failure of such spaces to democratize their knowledge and resources launched the journey of my doctoral research, with a view to answering two main questions. The first question involves examining the visible and invisible boundaries formed around traditional hackerspaces spaces from a critical perspective. I wanted to find out how the processes at work in such spaces led only some hackers to join in. I have confirmed that the traditional hackerspace model tends to reproduce patriarchal structures that create barriers for many people concerning the development, use, sharing, and potential to learn through technology. Hackerspaces, consisting predominantly of male members at the moment, inherit and recreate such social boundaries subtly, by not considering space as an essential asset and pro-actively working to remove its invisible boundaries of inclusion and exclusion.

In this context, there is an urgent need to open new spaces, better suited to gathering an active community that is encouraging, supportive, and inclusive. In the midst of this urgency, feminist hackerspaces have arrived as a response to the need of marginalized hackers to gather and hack together in ways that address pressing issues. Feminist hackerspaces are an emerging current within the hacker movement, tackling not only the movement's gender imbalance but also the need to offer more inclusive spaces in general for hacker communities around the world. A gradual critical process of mixing hacker values with feminist values has begun. Part of the urgency involved has to do with claiming control of new technologies, the use of which is proliferating, and the standard consumer policies for which in terms of surveillance, ownership of data, etc., tend to deprive users of the skills they need to keep up with technological advancement on their own terms. In this context, hacker knowledge looks more and more crucial for those who oppose the blind acceptance of such new policies.

The second research question arose from encountering an emergent feminist hackerspace. The conscious counterculture it offers in terms of technology, space, community and learning shares strategies for creating inclusivity and for building healthier critical approaches to technology. Their mission, as deliberate creations of a conscious hacker counterculture, is to welcome a broader range participants and create safe, comfortable environments in which to share, hack, and learn. As indicated by the research collected in

this study, the spaces offered by these communities offer engaging human connections with like-minded individuals, and edifying alliances between hacking practices and various struggles against oppression in society.

The feminist hackers observed and interviewed in this research offer a practical critique of the traditional hacker movement in which they found no meaningful welcome. I organized their critical points into three main takeaways, all focused on one main goal: to create a movement offering truly open, collaborative spaces based on DIT-principles.

First, I analyzed what inclusivity means for feminist hackers in creating spaces, and studied how inclusive spaces are achieved in practice. The feminist perspective on space revealed in my study stresses community as opposed to territory, and accordingly stresses the consideration of details that can make a community inviting. It values care, comfort and the well-being of each member, and strives to accommodate different needs and levels in terms of knowledge, accessibility, and understanding. Feminist hackerspaces emphasize fluidity, sharing, and collaboration in their ways of teaching, learning, and participating, with the goal of creating environments that support growth, empowerment, and engagement.

Second, the feminist hacking considerations indicate that dominant definitions of hacking and the hacker ethic narrow the number of people who can take part, including only a specific type of hacker with a specific kind of knowledge, interests, and lifestyle. This definition, represented in the *Jargon File* or the earliest books describing hackers (Levy), is, according to my research, outdated and limiting. As a response to this limiting definition of hacking, feminist hackers offer a new perspective broadening the definition of the hacker and opening up discussions on space, expertise, and identity better suited to marginalized hackers and including experts that are rendered invisible by the mainstream picture of hacking. This perspective has the potential to provide an atmosphere in which all members have something to learn from one other, with no one presented as either an expert in everything or as the better or best hacker. The result is a more horizontal structure of hacker community, in which learning new things is not be related to a fear of failing, and joining a hackerspace need not be associated with intimidation and bravery. It can be marked rather

by motivation and empowerment in a community of mutual help driven by a philosophy of sharing.

The third feminist hacking consideration draws a link between feminist pedagogies, hacking, and do-it-together practices, coming from the fact that learning as an essential part of hacking and solving problems involving technology. This finding emerged unexpectedly but grew into a primary consideration of my study. The kind of learning valued by the feminist hackers interviewed made practical use of feminist pedagogies. Their approach to learning stressed autonomy, curiosity, collective problem-solving, and social engagement. It concludes that the activist side of hacking has a broader philosophical goal than technological freedom alone. Feminist *hacktivism* includes feminist and anti-oppressive struggles, but also feminist critical pedagogies of learning as opposed to mainstream, standardized, meritocratic ways of sharing knowledge with and about technology.

All three of these considerations underline that hacking practice leads to a better global understanding of the technology involved: it leads to better accessibility, control, and know-how related to a given technology, and also to a more horizontal structure of the players involved in its creation, usage, and distribution. Feminist hacking offers a more holistic approach not just to technology, but also to learning through technology. As such, it can provide more people with the tools and opportunities to open the *black boxes* of technological artefacts, to learn from them and about them, and also to improve them.

From a feminist hacker point of view, hacking cannot be treated any longer as a simple engineering pastime, or a hobby project. It offers instead a practice and a philosophy capable of gathering together a greater number of people and disciplines, communities doing things together, and anti-patriarchal, anti-capitalist practices (e.g. for some people trying to survive out of little, hacking can become a valuable tool). The learning of the skills involved is looked at as a growing project, aimed as much at passing knowledge on to others as gaining it for oneself. Hacking is from this point of view a practice of togetherness, an empowering act, something useful and also exciting - not a new form of proprietary knowledge

The overall direction of my study's conclusions pointed to an alternative conception of hacking: a do-it-together practice. The takeaways of my thesis affirm the importance of the collective character of hacker practice. Feminist hackerspaces become more inclusive precisely when they accommodate marginalized groups, including women and other minorities in the technoscience field: those who are transgendered, those who are mothers, those who are from linguistic or ethnic and racial minorities.

To put it briefly, feminist hackers are, in their do-it-together hacker practices, "connecting the dots" between different groups of people and different types of activism. They have become sufficiently acquainted with hacker jargon and ethics to infiltrate the hacker movement, and they are intent upon passing on the knowledge provided by hacking to others. This mediating role of answering needs, creating conditions for belonging, abolishing boundaries, considering comfort levels, and achieving collective empowerment requires work and persistence, which my interviewees see it as important work.

If I had belonged to a traditional hacker community only, or to an emerging feminist community only, it would have been more difficult for me to understand the full range of belonging, access, disappointment, and empowerment commonly experienced by participants in these two types of communities. I may not have been able to see the problems and the potential so clearly, if I had not enjoyed full access as a founder, organizer, treasurer, member, trainer, and learner in both kinds of hacking communities. My ethnographic action research has allowed me to record and analyze previously undocumented data about community inclusion and exclusion, while hacking in a feminist way. Conversely, completing such documentary and reflective work revealed important community dynamics that had previously been invisible to me as a community insider.

Several Unanswered Questions and Research Limitations

The goal of this exploratory study was not to answer every possible question but rather to contribute to a project of building a better understanding of the processes and practices involved in two different types of hacker culture, as they are made manifest in the

construction and creation of hackerspaces. As such, my conclusions leave some important avenues of research unexplored, and some interesting questions unanswered.

1) Understanding more about the passive, apolitical character of Foulab. Hackerspaces are often seen as more politicized than makerspaces, for example. Why is Foulab focused much on the technical, and little on the political? A comparative study of different Canadian, North American but also European hackerspaces in terms of their local context and impact, and their politicized (or not) views of technology might help answer such questions.

2) Investigating the relative absence of voices of women of color in feminist hackerspaces (Chun; Kolko et al.; Nakamura; Nakamura and Chow-White; Gajjala, *Cyber Selves*). I mentioned in my study that a number of feminist hackerspaces around the Americas and elsewhere (including Femhack) state that they function as intersectional feminist spaces. Where I have used the term here, it has been mostly in describing this stated mission. With their accessible machinery, tools, and spare equipment, hackerspaces should in theory be attractive to a wider range of people. While they offer so many opportunities for free, however, even collectives like Femhack seem to attract people with a certain level of education or professional success.
3) The next unanswered question is related. I asked some of the interviewees why the number of Femhack's members was so small. It seems that there is a downside to the collectivist requirement of being proactive and participating in the organization of events. In recent conversations with Femhack members, it was decided that a different system of membership is needed, one that is open to those who want to participate without organizing. This question is, like the previous one, well worth investigating in a truly "intersectional" way. What noticeably diverse groups that approach technology in non-conventional ways without calling themselves "hackers" exist? Can they be compared to Femhack?
4) More research is needed on the relationship between inclusive spaces and discourses of "openness" and "freedom." While I did not intend to include the notion of *freedom* in my analysis, interviewees brought it up so often that is was

necessary to address it in the end. The ways that traditional hackers and feminist hackers use the word *freedom* seem to be, like their uses of the word hacker, very different. This dissertation has only scratched the surface of this question.

5) My ethnographic action research, unsurprisingly, demanded a lot of time and resources. Early on in my research, I came to understand that I could not take on more than two case studies. To understand the processes and relationships in the spaces involved, it might not be enough to visit a space for a couple of months. Even with my knowledge of the jargon, history, and practices of these spaces, it took years for me to gather the necessary material. It would be desirable to build upon my research by visiting more hackerspaces, in a greater variety of locations.
6) In doing this research, I realize that I was, at times, perhaps too close to the subjects, the events, and the decisions made to be able to see everything clearly. It has taken me years to "step back" far enough to reflect on these spaces (my parental leave in 2017 helped this process). As the only female Foulab member, for example, it would be easy to dismiss me as being biased. I tried to look at Foulab through the eyes of visitors and interviewees and their reports served to confirm many of the issues I was dealing with as a member.
7) My findings indicate that much can be learned about feminist pedagogies in studying spaces like Femhack. It would be possible to invest comparative attention into other spaces in which members are committed to making learners comfortable, and providing an unstructured non-hierarchical relationship between trainers and learners; in which the learner's emancipation (autonomy) comes first. Such spaces may or may not be focused on technology. Here investigating feminists hacker groups (or techno activist groups) in the global south with respect to do-it-together practices would round out these examples. In previous studies on F/OSS development more collaborative attitudes seem to be at work in the in such environments than in the North (Goldsman).

Giving back to the (hacker) community

The time has come to let this project go - out of my hands and into the hands of different readers. It was an amazing journey! I hope this thesis will be an exciting read for hackers, by providing reflections on their relationships with space, technological artefacts and hacker knowledge. I hope it encourages discussions about avoiding exclusionary boundaries and leads to a rethinking how passivity can result in reproducing particular attitudes and hinder diversity. I hope feminist hackers will find it engaging. Many of the feminist practices examined here have never been documented. I hope, too, that a broader readership will find my study interesting. Participatory research from an insider perspective has been done in educational entities, and other disciplines, but not often for hacker practice or non-structured educational sessions. I hope this research will help provide people with useful examples of unstructured open learning, and "learning by doing."

In the end, it is my hope and desire that this thesis provide new insights into the existin feminist perspectives on technology, and raises further discussions about how women and feminists perceive technology, including how they can define it and engage with it. Such discussions can shine a light on debates about how to bridge social and gender gaps in the field of technology, particularly in terms of how it is designed and produced.

As I type these final lines, Femhack is reviewing a new offer for DIT collaboration with Batiment 7 - a collaborative autonomous project that has restructured an old industrial building in the Point-Saint Charles neighborhood of Montreal. The project offers space for service exchange between activist organizations interested in agriculture, technological and other types of skills, service, and product-sharing. Femhack will meet again in the Fall to revive its feminist hacking project, and maybe run it even better with the help of the lessons learned in the first phase of its existence.

Annex A. Contextual Interview Guide

Background

1. Occupation
2. Formal education and informal training in software/hardware/other?
3. Outside occupation(s)?

   Probe: Specific organizational affiliations? Online communities?

Hack/hacking & identity

1. Define the term 'hacker'? For you, what does it mean to be a hacker?
2. What are hackers' essential qualities, ethics?
3. What is a good example of a hacker project you admire?
4. How did you get interested in hacking in the first place?
5. On what project are you working in the hackerspace?
6. Have you participated in community hackathons, maker fairs, other community events?

   Probes: Internet politics? Open Source practices? Personal interests?

Hackerspace history and culture

1. How was your hackerspace found? By whom? When?
2. What are the bylaws, principles, members' rules that run in the space?
3. How many members do you have? Who are they (in terms of age, gender, background)?
4. What are the conditions for joining your space? Do you have specific rules for new members?
5. Do you have a promotion policy for inviting new members?
6. What is the membership dynamic? How do you select, invite new members to your hackerspace?
7. Why did certain members leave the hackerspace?

8. How do members contribute to these spaces in order for them to be more welcoming inclusive to other members?
9. Dynamic zones – which are they?
10. What is unique about your hackerspace?
11. Do you consider your hackerspace political? Why?
12. How important is your hackerspace for the neighborhood it is situated?

Hackerspace Involvement

1. How did you get involved with the space in the first place? Since when?
2. How does this space facilitate your evolution as a hacker and your hacking projects?
3. What does the space symbolize for you?
4. How does the collaboration and cohabitation work between the members?
5. What projects do you work on? Which ones are individual, and which are common with other members?

Internal Rules and Politics

1. How do you set up a space where you want people to come to? How do you create affective spaces, welcoming to those people you want to invite/attract?
2. What would you want to change in your hackerspace, and how would you proceed to improving it?
3. What does your space do for involving more diversified members?

Gender Dynamics

1. What is your impression about the gender dynamics of your hackerspace?
2. What can you say about the social diversity in the space?
3. Are there, according to you, unwritten rules that restrain certain candidate members from joining? Which are they?
4. Have you ever collaborated with individuals who have little technical knowledge but who have come to the hackerspace for hacking/looking for help on a project? How did it work?

Miscellaneous

1. Anything else you'd like to add to this interview?
2. May I contact you for a follow up interview?

Annex B. Interview Consent Form.

Spaces of Hacking: Feminism and Hacking Perspectives in Three Montreal Tech Communities

I understand that I have been asked to participate in a research project being conducted by Kristina Haralanova of Communication Studies of Concordia University, tel. (514) 623 8897 under the supervision of Prof. Kim Sawchuk of Concordia University, tel. (514) 299 0174, email: kim.sawchuk@sympatico.ca.

A. PURPOSE

The purpose of this research is to examine diverse practices in spaces dedicated to hacking in terms of the relationship with the place itself, with hacker ethics, political and social engagement of their members. Data from this research will be used for doctoral dissertation in the Department of Communication Studies at Concordia University.

B. PROCEDURES

You are invited to answer specific questions, related to the topic of the research. The topics are given to you in advance, and you can answer all or those you find appropriate. Your name and personal data are collected for confidential research reasons and will not be exposed individually, but in a totality of research results. The transcript of the interview will not allow to identify the participant.

C. RISKS AND BENEFITS

- There is little risk that your identity is revealed in the process of research and that measures will be taken that the recordings and transcripts are kept safe after my participation.
- There are no material or other benefits to participating in this research – you are participating with your own will.

D. CONDITIONS OF PARTICIPATION

- Your participation in this project comprises a 45-60-minute, audio-recorded interview.
- Your participation is voluntary. You may refuse to answer a question or withdraw from this interview at any time.
- If you wish, you can remain anonymous for the purposes of this research and not be identified in the presentation of results. Data obtained through this interview will remain confidential, and only the researcher will be able to match the data to your identity.
- The interview is to be audio-recorded. Should you wish it, at any time in the interview, you may ask that the audio-recorder be turned off. All interview recordings are for transcription purposes only. They will never be disseminated and, upon completion of this dissertation, will be destroyed.
- There is little risk to participating in this research project. However, if at any time you feel that any information provided might pose any risk to you (legal, political, economic), you may freely choose to stop the interview, ask that given information be deleted from the record or withdraw from the research entirely.

Knowing this, how would you like to be identified in the study?

A) Anonymity and recognition:

- I wish to be identified with my real name. YES NO
- I want to be identified with a nickname. YES NO
- I accept that the mentioned by myself names (of projects, hackerspaces, companies, colleagues) are used in the study YES NO
- I accept that the domain of my work is mentioned. YES NO

B) Further contact:

- I would like to revise the transcript of the interview. YES NO

- I would like to receive the final version of this research YES NO

C) My contact information _____

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print)

_____

SIGNATURE

_____

If at any time you have questions about the proposed research, please contact the study's Principal Investigator Kristina Haralanova, Communication Studies, of Concordia.

If at any time you have questions about your rights as a research participant, please contact the Research Ethics and Compliance Advisor, Concordia University, 514.848.2424 ext. 7481, ethics@alcor.concordia.ca.

Annex C. Feminist Definitions of Hacking

This Annex contains excerpts (quotes) from the interviewed participants on the question What does hacking represent for you? Who is the hacker?

"I guess everybody can be a hacker. The hacker is depicted in the media as such a small subset of people, mostly related to middle class, young, White men… But if you think that hacking is less of an achievement and more of a solving of problems, then more people can be hackers."

What does hacking represent for you?

"For me, [hacking] is taking different practices or different ideas or technologies and bringing them into conversation; doing something that intervenes in the normal, typical practice of technology. Or science. It is changing how people think about the world."

- An approach, a philosophy, a confidence
- Solving problems in an unusual, autonomous, non-conformist way
- It's a team of great people I got the chance to work with (rather than alone)
- I learn so much in the process that was "both inspiring and useful"
- I got to my creative side
- It was not done for profit
- "It was fun"
- I was able to take things from trash and fix them ("success");
- Stretching something to its limits
- I did something that intervenes to the typical techno-practice
- Subversion practices – making people think differently
- Playful interventions (experimented with code)
- Being authentic is more important than being extremely technologically experienced
- "My identification [with the hacker movement] is becoming a hacker."

- "If you come up with more useful pathway of solving problems in any domain than you are hacker. Often, for research I had to find ways to download videos and solve a problem."
- Something to learn in the process that was both inspiring and useful
- A creative element
- Not been done for the profit
- I enjoyed the process ("was fun")
- Making something work (and element of success in the process)
- Open source element (hardware or software)
- Stretching something to the limits
- Related to "subversion, independence, integrity"
- Applying subversive methods to "typical" techno-practices, getting people to think differently about technology.
- "Tinker around with electronics and tinker around with things and my interest in that come from many different venues in life."
- "Collective emancipation"
- "I am hacking things that are useful to me but I want to return this know-how somehow back to the community by training others or sharing a tool, a skill, or documentation for more people to use."

What is your most insightful hack that you did?

"So I got a traditional journalist domain and brought it into an open source kind of things. I feel very proud of that!"

"*I made a gift for a friend (a gadget to improve the house) which made me and my friend very happy."*

"I just installed Linux on my personal computer. It was very empowering to partition my hard disk and save all my data. So now I'm ready to migrate. I did it by myself, just followed steps on the Internet. It made me very confident in my abilities to do that."

"*For me, it's maybe taking different practices or different ideas or technologies, and bringing them into conversation; to do something that intervenes the normal, typical practice of technology. Or science. How people think about the world. Maybe reframing or rethinking things.*"

"*My type of hacking is more on the material side, fabrication of objects. Being able to take things from the trash and fixing them. Making a Frankenstein object. I like to be also part of efforts that do more of a hacktivist or hacking-oriented things that are more social and cultural around websites. Otherwise, subverting practices. Making people think differently. Getting into coding and creating an object that plays with the system - playful intervention. But for now, I guess whatever kind of hacker action I do, are very personal. And not so public and not so geared towards some critical engagement practices.*"

"*I have an issue with trying to delineate, determine my own practices. My life as a hacking person. Maybe it's also being part of so many things and practices, and never be able to cultivate those skills and mindsets and I definitely have this mindset about technology to intervening.. But there's still in practice.*"

"*I like the problem-solving of coding. Debugging things, fixing, repairing code. I get a lot of satisfaction out of that. And it often brings surprising results.*"

Meaning of *Freedom* for Feminist Hackers

"*Freedom for me means that you have the ability to change and modify and experience in the way that you choose what you own and what you contribute to. In other words that you get an ownership of what you create, and that you have the right to modify it and keep a copy of it.*"

"*Freedom to change and freedom not to be prosecuted for wanting to change the machine you own.*"

"*Balance between the community sense of freedom and the individual freedom. If you want to hack in a space of hacking, learn and explore in the presence of other people you should not feel judged by those people and choices you've made.*"

"*The mantra of openness" is often seen as an ideal that a community or an individual can reach. It has to be open, to be free. But often the ideal is not only the openness or the freedom (particularly the personal freedom), it the freedom anchored in activism, in justice, in consideration for others as much as for one-self. "It's often the case with feminism, where there are many social justice issues combined, not just openness. So, I think the priorities need to be shifted somewhere in the mentality of the mainstream hackerspace culture."*

"*I find freedom when I manage to open my computer, the black box, and discover what is under the lid. I like a lot to think about the question of the level of intimacy, and at the same time the gap we have with understanding our computers. To experiment this intimacy, and at the same time to realize that we are strangers to the objects that happen around us. This gives me insight to explore more. And the more I explore, the more I feel this freedom in me."*

Annex D. OHM 2013 *Our Dream HackerSpace Workshop* – Needs

OHM[177] 2013 Workshop Synthesized Results

Internal cohabitation rules & their enforcement

Welcoming

- ★ Foster a more significant representation of diverse groups (minorities, PoC, Women, Queer, etc.)
- ★ Kicking out policies
- ★ Access to space policy (keys)
- ★ Anti-harassment policies
- ★ Shared responsibility for governance
- ★ A place where it is acceptable not to know everything
- ★ Policies on alcohol and drugs
- ★ Non-hierarchical (horizontal) structure of governance
- ★ Collective projects vs. individual ones (do projects that include people)
- ★ Learning from those who leave as to improve the space (feedback)
- ★ A policy against people who steal & sleep in the space
- ★ Safety first (no cut fingers)
- ★ A policy against trolling.

[177] OHM (https://ohm2013.org/) stands for Observe.Hack.Make and represents an open air hacker camp. OHM was held between July 31 and August 4, 2018 in the Netherlands. The Workshop was held by three Femhack members and consisted of a brainstorming session among over 30 participants, members of different hackerspaces, regarding their needs for an inclusive hackerspace. These are the outcomes from the mini-group session, which show the priorities these hackers put regarding the space they want to build and cohabit.

Infrastructure (Special Division) & Sustainability

- ❖ kitchen
- ❖ Social connector space
- ❖ Spacious
- ❖ Properly shared toolset
- ❖ Paid staff/reliable worker
- ❖ Space for documentation (room, library, a person responsible)
- ❖ Accessible to people with disabilities
- ❖ Family friendly
- ❖ Social area
- ❖ Owning the building (or a squat)
- ❖ Toilet & sink area
- ❖ Accessible by metro, in a safe neighborhood
- ❖ Infrastructure for members (IRC, hosting, online infra)
- ❖ Multidisciplinary learning possibilities (diverse topics of workshops)
- ❖ Shared fabrication tools (that are unaffordable for a single person)
- ❖ Safety first (no cut fingers)
- ❖ Avoid depending on one funder

Responsible Persons (Committees, Ministries & Ministers)

- Documentation (library-archive) collective
- Welcoming person(s) – designating greeters – "Welcoming collective."
- Communication collective - blogs (link to the outside world – local and global community)

Personal and Collective Care, Health & Diverse Interests and Needs

- ❑ clean & tidyish
- ❑ kitchen
- ❑ Care for each other
- ❑ Nap space

- ❑ Health space (documentation, information and tools for STD and other health)
- ❑ social area
- ❑ Awareness of power dynamics
- ❑ Anonymity of members
- ❑ Believing in the human potential
- ❑ Collective projects vs. individual ones (do projects that include people)
- ❑ Learning from those who leave (feedback)
- ❑ How to defend trolls (Collective responsibility)
- ❑ Make sure it does not feel like a clubhouse

Intellectual Stimulation and Learning Life Skills

- ➢ Book exchange
- ➢ Space for a hacker in residence Space for documentation (room, library, a person responsible)
- ➢ Place where it is acceptable not to know everything
- ➢ Encourage curiosity and knowledge exchange in technology and science
- ➢ Continuously adapting and improving

Connection with Outside World

- ★ Open for community empowerment vs. a sexist, homophobic, racist environment (including jokes, remarks, etc.)
- ★ Welcoming (greeter), hospitable
- ★ Connection with the neighbourhood
- ★ Space for a hacker in residence
- ★ Owning the building (or a squat)
- ★ Demystify hat a hacker is. **Everybody is a hacker!**
- ★ Reach out and share with a broader public (blog), transparent to the public

Political and Social Engagement (Internal & External)

- ❖ Political engagement
- ❖ Awareness, discussion and taking action on power dynamics
- ❖ Anonymity of members
- ❖ Owning the building (or a squat)
- ❖ Demystify what a hacker is. Everybody is a hacker
- ❖ Collective projects vs. individual ones (do projects that include people)
- ❖ Be inclusive
- ❖ No Military (biased) funding
- ❖ Don't collaborate and let police (security companies) in
- ❖ Avoid considering a HS as an office or recruiting space.

Collective Identity and Spirit

- ★ Allow multiple identities (feminist, queer, hacker, intersectionality) to cohabit
- ★ Recognize everybody’s potential

Annex E. Report from the Autonomous Infrastructures As Feminist Practices Guided Dialogue

Produced by FemHack Collective

April 13, 2015

The *Autonomous Infrastructures as Feminist Hacker Practices: The Way Forward* was organized by the FemHack Collective[178] on April 11, 2015 at La Passe in Montreal. La Passe[179] was the perfect space to organize this gathering as it situates itself as an autonomous self-managed space reminiscent of the European social centers. 25 individuals participated in the gathering. There were university professors, PhD students, independent researchers, activists and hackers, among others and they came from backgrounds as diverse as: technology, biology, film, social work, communication, political science, literature, etc. The following report is based on the presentations and discussions that took place as well as the collective notes that were taken on a riseup pad[180] during the gathering.

Motivation - Origin of the Idea?

We started with the assumption that in the past few years more and more feminist hackers, makers and geeks have been pondering on the need to have and built autonomous infrastructures to resist the (digital) targeting of women, feminist, queer and transgender

[178] FemHack is an autonomous group from Montreal whose mission is to create an empowering and inspiring environment for politicized feminist and queer hackers (we welcome feminist men). Triggered by Do-It-Together practices, learning by doing and curiosity about how things are made, believing in the freedom of technology, privacy, and openness and sharing of common goods, FemHack identifies with the most avant-gardist elements of hacker ethics. We take an intersectional feminist perspective to what we do and think, which means that we hack patriarchy, capitalism and other systems of oppression.http://foufem.wiki.orangeseeds.org/

[179] La Passe is a printing and typography workshop, a library, a space for gathering and exchanges, a pole of reflexion and action, a rallying cry and an uproar for getting organized. http://lapasse.org/

[180] The riseup pad can be accessed here: https://pad.riseup.net/p/autonomous-infrastructures (NB! Expired link!)

individuals (in particular, but not exclusively as also targeted are migrants, refugees, people of color, etc.), the centralization of the internet and its transformation into a consumption sanctuary and a space of surveillance, control and tracking of dissent voices by governments, anti-feminists, and corporations, among others.

At the same time of the heightened consciousness, concrete projects embracing a feminist autonomous infrastructure ethos have emerged. Some examples are: The Geek Feminism Wiki and Blog, Feminist hackerspaces, feminist convergences such as the TransHackFeminist convergence held in Calafou in August 2014, the First Feminist Server Summit held in Brussels in December 2013, etc.

Autonomous infrastructures have been part of activist ethos and landscape for many decades now. Squats and Social Centres that have developed in Europe often embody this practice and the values associated it with as well as other examples such as the Zapatista. At the tech and media activists level, Indymedia was and is (IMC is still present in Africa) still embracing autonomous infrastructures by setting up Independent Media Centres (IMC) during protests and/or setting up independent web platforms. The history of autonomous infrastructures is so rich that feminist hackers, makers, and geeks have a large repertoire of practices to be influenced by.

How Do We Conceptualize Autonomous Infrastructures?

We take the concept of autonomy from radical geography scholarships and practices that understand autonomy as a desire for freedom, self-organization and mutual aid[181],[182] whereas we understand the term infrastructure in an expansive way meaning, but not limited to: code, software, hardware, design, space, social solidarities, etc. We have decided not to use the concept of "free/libre infrastructure", and rather prioritize the use of autonomous infrastructure for a variety of reasons. First, because in our imaginaries

[181] The radical geographer scholar Paul Chatterton is one example of an author has been written a lot about autonomy in the context of squats and social centres in the UK and about autonomous communities such as the Zapatista. http://www.paulchatterton.com/.

[182] The Squatting Europe Kollective (SQEK) has also written a lot about the idea of autonomy and squats in Europe. https://sqek.squat.net/

autonomous infrastructure seems to appeal more to our theoretical grounding and practice and also because we are trying to go beyond a free/libre software framework that might not appeal to a larger constituency. Free/libre software are obviously part of the tools we developed and encourage people to use, but using free/libre infrastructure did not resonate well with the project we are imagining and which aims also at going beyond computers. Moreover, we believe that autonomous infrastructures have the power to resist, inspire, build community, but also to disrupt systems in place and in certain context to bring either destabilization or destructuration.

Embracing Intersectional Feminism

FemHack embraces an intersectional feminist perspective. This is a theoretical framework that looks at the world through plural perspectives highlighting the relationship between gender, sexual orientations, geographical location, ethnicity, class, etc. Moreover, it is a stance that connects the dots between patriarchy, capitalism, racism and other systems of oppressions. By using such framework, we recognize and acknowledge that individuals have privileges in society, and that these modalities play out in the space we engage ourselves in whether they be online or offline and within the groups we gather. We therefore do not shy away from acknowledging privileges and aim at addressing them while at the same time attempting to create safe(r) spaces.

The Guided Dialogue

We organized the day according to four main themes. These themes represented what we believe is at the core of autonomous infrastructures i.e. Space, Hardware, Software and Social Solidarities.

<u>Space</u>

We understood space as the physical space we create to gather, feel safe and allow ourselves to push the boundaries of the possible by embodying practices that we believe in. In a feminist hacker, maker and geek practice these include, but are not limited to: feminist hackerspaces, feminist biohacklabs, feminist activists' spaces, Feminist tech convergences, etc. Within this theme presenters focused on: BioHackLabs, Bio and Body

hacking, Bio Art, and finally an attempt at conceptualizing what a feminist hacking "model" might look like.

Hardware

Hackers, maker and geeks have been recently involved with the development of "freer" hardware (such as 3D printers, fairphones, fair computers, mesh-networks, etc.). Some of these projects have embodied activist resistance stances while others have rather turned into commercial, lucrative endeavors, been recuperated by capitalism or have become part of a "hobbying" ethos. This theme focused on the materiality of technology and the extent to which it has a negative impact on our health and our environment. The negative impact of technology is often forgotten, particularly when it comes to the extraction of resources and how do we dispose of technology we are no longer using. Then, there was the presentation of what Feminist servers are and how we can conceptualize them[183]. Up to now, two feminist servers have been set up. These are the SysterServer and the Anarcha-server[184].

Software

We started from the assumption that behind highly controlled and secretive infrastructures (algorithmic governmentality, closed-source design of devices, mass surveillance) lies the new digital spirit of capitalism. This theme aimed at looking into the software and programming layers which help us evade the augmented capitalist reality we are all grappling with. Presentations and discussions highlighted the feminist tenets of teaching computer programming as a way not to alienate women, queer and trans individuals from learning. Also, the suggestion to participate in a worldwide feminist hackathon at the end

[183] To read about the elements that compose a feminist server please visit the Ministry of Hacking: http://esc.mur.at/de/werk/feminist-server

[184] To know more about these two servers read the TransHackFeminist (THF!) Convergence report at: http://feministhacktivism.noblogs.org/files/2015/01/THF_report_Eng_low_res.pdf and about the history behind the Anarcha Server visit:http://anarchaserver.org/mediawiki/index.php/Anarcha_section. It is presently hosting the documentation of THF!

of May was highlighted. This idea came out of the Gender and Tech Institute[185] that happened in Germany in December 2014.

Social Solidarities and Feminist Tactics

We understand social solidarities as practices that connect us, whether as individuals or as groups. Social solidarities enable us to craft feminist tactics and/or use feminist tactics to enable social solidarities. Social solidarities may mean safe(r) spaces, popular education, respecting and acknowledging the incommensurability that might exist between different systems of "values" or different registers particularly, but not exclusively with indigenous systems of "values". In this theme, the case study of greek tech and media activists was presented as way to resist the economic and social crisis that has struck Greece.

Conclusion

The objective of the day was to start a reflection and a conversation on and about autonomous infrastructures as feminist hacker practices. It aimed at gathering people who had an interest in such practices at both the practical and theoretical levels. It was also an attempt to create social solidarities between each other and ponder about ways to collaborate. Many questions are still pending such as: To which extent autonomous infrastructures enable forms of resistance and/or separation from capitalist, patriarchal and racist system of values? How do autonomous infrastructures support/empower the self-valorization of those who take part in such endeavours? What kind of contradictions emerge from the creation of autonomous infrastructures?Are autonomous infrastructures the way forward?

With this gathering, we succeeded in generating a lot of enthusiasm about and on the practice and the need for autonomous infrastructures. More activities, meetings, discussions and workshops, and maybe even a feminist tech camp or institute, have been cited as wishes to continue forward with the subject at hand. If you want to get involved or

[185] Tactical Tech Collective: https://tacticaltech.org/gender-tech-institute

want to be informed about FemHack activities please write to: femhack@lists.riseup.net
We are looking forward to hearing from you!

Other references on electronic pollution:

http://www.sabotage-hormonal.org/spip.php?article31

fil de nouvelles en anglais sur la page d'Accueil : http://www.sabotage-hormonal.org/

http://www.electronicstakeback.com/home/

http://www.greenpeace.org/international/en/campaigns/detox/electronics/

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