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Introduction

In many Western countries, cycling is a male-dominated activity (Pucher and Buehler 2008). Although transportation research is increasingly investigating the causes of this phenomenon and of the associated gendered differences in cycling practices (Aldred et al. 2016; Heinen and Handy 2012), it could benefit from integrating theories developed within the field of feminist geography (Law 1999). Furthermore, there has so far been little consideration of gender issues embedded within the material aspects of cycling and the life cycle of bicycles.

To understand cycling mobilities - and the inequalities that arise within them – we must look at the relationships that cyclists develop and maintain with bicycles as objects. Following its use by French cycling activists, the term “velonomy” is used as an ideal for cyclists to achieve (Mundler and Rerat 2018). Here velonomy is defined as the ease shown by a cyclist in repairing, maintaining and adjusting their bicycle.

The term velonomy considers bicycle riding, bicycle repair and maintenance as interrelated and complementary. In this chapter, I develop a study of gender inequalities in cycling which also includes considerations of gender dynamics in bicycle repair and maintenance. Previous research has shown the struggles met by women learning manual trades (Mosconi and Dahl-Lanotte 2003), and female professional bicycle mechanics are not an exception to this (Laker

2018). The appearance of women (and women and transgender) specific programming in community bicycle workshops¹ is an indication of a growing awareness of the gender discriminations that may arise in spaces of bicycle repair and maintenance. However, despite this, no study has yet been conducted on how gender mediates bicycle repair and maintenance practices. This paper is intended to contribute to the field of mobility justice (Sheller 2018) by focusing on gender inequalities in velonomy. Based on a feminist phenomenological approach (Young 1980), I argue that the patriarchal background in which bicycle repair and maintenance practices occur limits women's involvement, and willingness to engage in, bicycle repair.

Survey and interview data was collected from cyclists and bicycle mechanics in Lyon (France) and Melbourne (Australia), two cities where cyclists are predominantly male. Based on these data, I identify the characteristics of patriarchal society that relate to bicycle repair and maintenance. Then, following Young (1980), I show how this environment produces the specific conditions of feminine velonomy. In the final section of this chapter, I highlight four different individual strategies developed by women as they engage – or attempt to engage – with repair and maintenance activities.

Theoretical framework

Velonomy

When cycling, an individual engages with a material object: the bicycle. The bicycle-cyclist relationship is at the heart of cycling practices (Spinney 2006). Bicycles age and decay; they require regular maintenance and sometimes break down unexpectedly. Illich argues that, in order to control the way they express their meaning in society, individuals must be able to repair

¹ Community bicycle workshops are non-for-profit spaces that provide bicycle repair and maintenance services. The most widespread model of such workshops in France are spaces where anyone can get assistance in repairing their bicycle with the help of volunteers or qualified mechanics.

and maintain the tools which they use (Illich [1973] 1975). This applies to the bicycle, a highly repairable object (Whitwham and Trebesses 2016). Graham and Thrift argue that cities are constituted by constant processes of decay and maintenance (2007); similarly, processes of bicycle repair and maintenance underlie all cycling practices. Developing repair skills transforms the way cyclists relate to their bicycle (Abord de Chatillon 2019). Most obviously, satisfactory repair and maintenance practices – either performed by the cyclist or by a professional mechanic – are key to the empowerment of cycling practices.

One way to describe this empowerment is the term “velonomy” (*“vélonomie”*), coined and regularly used by French-speaking cycling activists. Most definitions of velonomy put an emphasis on autonomy related to bicycle repair and cycling practices more generally (Batterbury and Vandermeersch 2016; Mundler and Rerat 2018). I choose here to define velonomy as follows: *“Velonomy is the level of autonomy of an individual with their bicycle, that is to say the ease they show in repairing, maintaining and adjusting it”*. Here, I approach velonomy not as a threshold to be achieved but as a skill to be increasingly mastered by cyclists.

This chapter focuses on cyclists’ personal engagement in the repair of a bicycle but also includes some discussion of cyclists visiting bicycle shops since, in the right conditions, these visits can contribute to a cyclist’s velonomy.

Feminine Motility and Feminine Velonomy

In her paper “Throwing like a girl”, Iris Marion Young (1980) extends Merleau Ponty’s work in developing the basis for a feminist phenomenology. Merleau-Ponty talked about the essence of human consciousness being based not so much on thoughts but on the movement and perceptions of the body (Merleau-Ponty 1976). This focus on the body allows redefining the specificity of women’s condition in a patriarchal society. Women move and behave differently to men, not because of a mysterious feminine essence but because of the material and social

contexts they find themselves in. Furthering de Beauvoir's (1986 [1949]), Young describes the specific conditions of living as a woman in a patriarchal environment. According to her, women face domination imposed on them by culture and society. They are constantly reminded of, and therefore internalise, the idea that they are other, inessential, a mere object and immanent, that is to say limited in their possibilities and actions.

Woman is thereby both culturally and socially denied the subjectivity, autonomy, and creativity that are definitive of being human and that in patriarchal society are accorded the man.

Young (1980:31)

According to Young, this patriarchal context constitutes an impediment on the way women's bodies move and contributes to the production of a 'feminine motility' that she describes as the 'particular style of bodily comportment that is typical of feminine existence' (Young 1980:31). She argues that within society, women are constantly reminded of the possibility of being looked at, touched, even harassed or raped, and this inhibits their intention and movements. It leads to a permanent self-awareness that impedes the naturalness and thus the "efficiency" of their movements². Consequently, women, who experience themselves as fragile, often show hesitancy and uncertainty when engaging in physical movement, and thus lack of confidence in their own skills. This 'feminine doubt' (Casselot 2018) is therefore anchored in the specific conditions of existence of the feminine body, and restricts the scope of women's movements and actions³.

² According to Merleau-Ponty, to be transcendent and act efficiently on its environment, a "body must not belong to the realm of 'in-itself'" (Young 1980:38)

³ Following de Beauvoir, Young uses the term "femininity" to describe the typical way in which women experience the typical situation they find themselves in a particular society. "This understanding of "feminine" existence makes it possible to

In this paper, I follow Young's argument on feminine motility through and apply it to velonomy in order to show how the environment in which bicycle repair occurs transforms the way women engage with repair and maintenance practices and produces what could be called 'feminine velonomy'. To this aim, in a first step I review the existing literature regarding gender issues in cycling and in male-dominated areas of employment.

Gender issues in Cycling

Women are less likely than men to cycle, especially in countries where cycling modal share is lower such as France or Australia (Pucher and Buehler 2008). This indicates that cycling is not exempt from the gendered domination exerted by patriarchal society. Since riding a bicycle blurs the lines between transportation and physical activity, one aspect of this domination is the sexism widespread in sports (Barbusse 2016), included in competitive cycling (Djepa 2019). Gender norms around cycling are common starting from a young age (Sayagh 2018) and date from the early days of cycling (Cox 2015; Jungnickel 2015). This domination can also endanger women physically: for example, when passing, cars leave less space for female cyclists than for male cyclists (Evans, Pansch, and Singer-Berk 2018) and women are more frequently victims of incidents and near-misses (Aldred and Goodman 2018). While cycling, women tend to be less confident (Akar, Fischer, and Namgung 2012; Dill and McNeil 2013) and less willing to ride on their own (Gardner 1998). Female cyclists show higher preferences for off-road and protected bicycle infrastructure (Aldred et al. 2016) and higher concerns over traffic safety and personal security (Heinen and Handy 2012).

say that some women escape or transcend the typical situation and definition of women in various degrees and respects.”
(Young, 1980:31)

These discussions point to the ways that women's experience of riding a bicycle can be different from men's. This is likely to impact women's engagement with bicycle repair and maintenance and thus on the constitution of feminine velonomy.

Women and Technical Work

Another matter to consider in order to understand the gendered aspects of repair and maintenance practices is the common obstacles faced by women engaging with manual labour, tools and technology.

Most cultures have had in common through time the monopoly of men on the fabrication and repair of the productive tools used by women (Tabet 1979:54). Feminist studies of science and technology have tried to describe and deconstruct this 'taken-for-granted association of men and machines' (Wajcman 2010). Women are excluded from manual and technical activities from a young age (Mosconi and Dahl-Lanotte 2003). In male-dominated areas of employment, they often have to deal with everyday sexism, harassment and must negotiate between gendered expectations (Cassell 1997; Smith 2013b, 2013a). Clarsen argued that scientific research should bring some attention to manual trades as spaces where 'a particular kind of masculine culture [...] is used to justify the exclusion of women' (2019:15). Bicycle shops are not an exception to this and the rare women employed as mechanics often face many struggles (Laker 2018). However, the gendered aspects of bicycle repair and maintenance environments are yet to be discussed in scientific literature, and so are the effects that these environments may have on women's ease with bicycle repair.

In this chapter, I follow Young's argument of feminine motility in order to discuss the environment in which women engaging with bicycle repair find themselves, and the effects that such an environment has on women's repair and maintenance practices. The next section develops the data and methods used for this aim.

Data and Methods

The remainder of this chapter dwells on the specific experiences of women regarding repair and maintenance as a key aspect of feminine velonomy. I base the arguments brought here on data collected in 2018 and 2019 in the cities of Lyon and Melbourne. Both cities face a gender imbalance with regards to urban cycling. Recent studies have shown that 40% of cyclists in Lyon were female (Adam 2018). In Melbourne, the share of women who stated they had ridden a bicycle in the previous week was half of the men who stated they had done so (12% of women compared to 22% of men) (Anon 2017).

This study used a mixed-methods sequential explanatory design approach (Ivankova, Creswell, and Stick 2006). I used quantitative data in order to paint a general picture of gender differences in repair and maintenance practices. Then, qualitative data was gathered to understand the underlying causal mechanisms and shape that these differences take in the everyday lives of women involved in repair and maintenance practices, whether as everyday cyclists or as volunteers or mechanics in a bicycle shop.

Firstly, I designed a survey which I distributed to cyclists in each city, in person as well as online via Facebook groups. This survey, completed by 920 people, included questions about the cycling habits and bicycle repair experiences of the respondents. I then contacted respondents with diverse levels of experience in repair and maintenance for further interviews. The 13 people who identified as neither “male” nor “female” were omitted in the following analysis since this sample of the respondents was not large enough to be able to infer any conclusions⁴.

⁴ Furthermore, analysing results for gender non-conforming people itself would be complicated since this term does not refer to a homogenous category but is an umbrella term which includes a wide range of gender identities (Richards et al. 2016).

Gender split of survey respondents:

	Melbourne	Lyon
Man (total = 493)	235 (50.3%)	258 (57.2%)
Woman (total = 412)	223 (47.8%)	189 (41.9%)
Other	9 (1.9%)	4 (0.9%)

Table 1

For the qualitative section of this study, I conducted 37 semi-structured interviews with female cyclists or members of a bicycle repair organisation. Ten of these women were professional bicycle mechanics, including two owners of a bicycle shop. The interview grid included the issue of how women perceived their gender to affect their repair experiences. For clarity, in this paper, I translated into English the extracts of interviews conducted in French.

Also of note, and having some operational value in the study, is my gendered experience of participating in bicycle repair and maintenance as a woman. This enabled my situated insights into the embodied experiences of the women I interviewed. In addition, some of the conversations documented would certainly not have happened had I been a man. I therefore follow Harding's feminist standpoint epistemology (1992) in considering that my identity as a researcher is a resource in producing more objective knowledge.

Bicycle Repair and Maintenance as a Patriarchal Environment

This paper aims to follow Young's argument according to which the general context of patriarchal society produces in women specific ways of using their body, and to investigate whether this can be observed in the specific case of bicycle repair. In this section, I describe the

general environment in which bicycle repair occurs and show that it is not only very masculine, but also patriarchal. Indeed, it is an environment where women frequently receive inappropriate attention and see their expertise denied.

The Masculinity of Repair

One first result of the repair and maintenance survey is that women tend to be less experienced with bicycle repair and maintenance skills. As shown in Figure 1, they are overwhelmingly less likely to agree or strongly agree with the statement ‘when I have access to the right tools, I find it easy to repair most problems on a bicycle’.

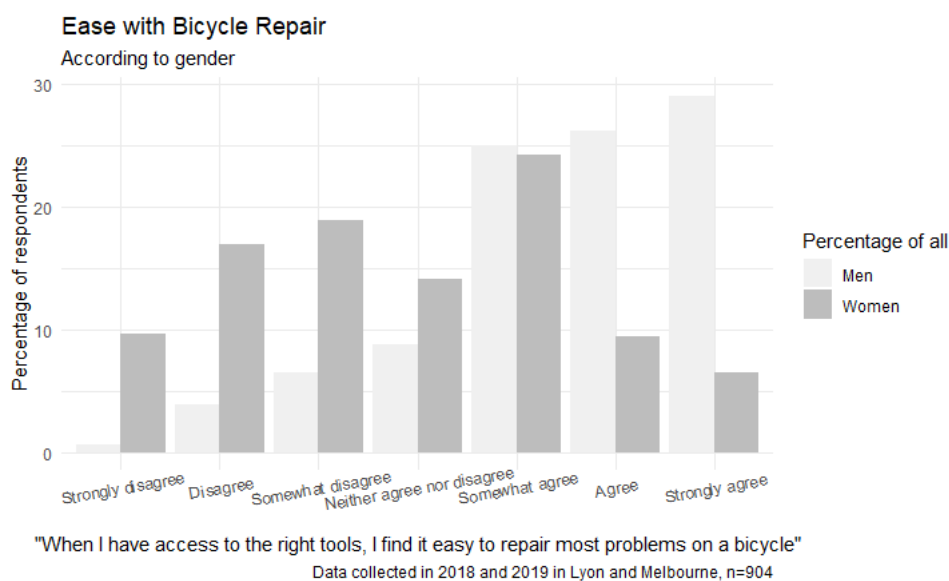


Figure 1 — Stated overall ease with repair according to the gender of respondents

Men reported greater ease in general, but also with each specified repair and maintenance operation. Figure 2 illustrates the difference in reported ease with one of these operations, performing brake adjustment, by male and female cyclists. We can see in the figure that women were more than three times more likely to have never performed this operation on a bicycle.

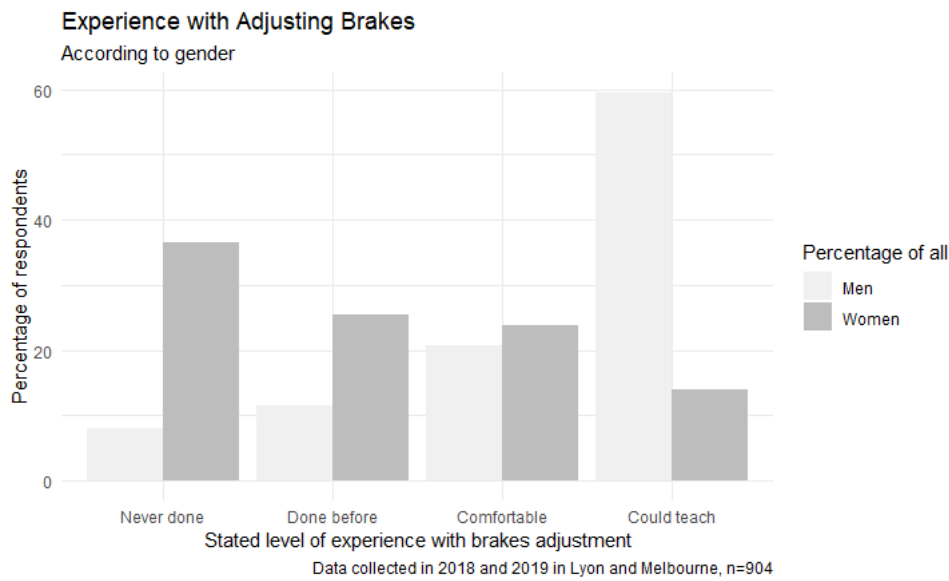


Figure 2 — Stated experience with adjusting bicycle brakes according to the gender of respondents

This repair skills gender gap is also visible in a task considered by many to be the most basic of repair, namely puncture repair. 12% of the women surveyed had realised this operation less than once, whereas this was only the case for 2% of male respondents (98% of men felt “comfortable” with this operation).

Overall, a first enquiry into spaces of bicycle repair and maintenance shows that these spaces are overwhelmingly masculine. Most professional mechanics and volunteers in community workshops are men (Jose 2012; Laker 2018).⁵

A first element of the context women find themselves in when engaging with repair or maintenance is thus a relative lack of experience and skills, and a general association between repair and masculinity. This lower experience with bicycle repair is probably the reason why,

⁵ There are so few female professional bicycle mechanics in both Lyon and Melbourne that I ended up interviewing every single one of them. Based on observation, it is likely that women constitute less than 10% of all professional mechanics.

when faced with a bicycle breakdown, women were more likely to take it to a shop and less likely to bring it home to repair it or to go to a community workshop.

Action taken the last time the respondent's bicycle broke down (according to gender)

	Brought it to the shop	Community workshop	Fixed it on the spot	Brought it home to fix it	Did not do anything
Men	33% (157)	13% (61)	20% (93)	44% (208)	4% (18)
Women	49% (190)	8% (30)	16% (61)	32% (124)	3% (12)

Table 2

Furthermore, women were more likely than men to solve a bicycle breakdown with someone else's help (83% of women compared to 55% of men). This includes people going to a bicycle shop, but also applies to help received from a friend or acquaintance (30% of women compared to only 7% of men).

The general environment where bicycle repair takes place is therefore a very masculine one: men are often more experienced in repair, more likely to repair their bicycle themselves and without help. For the repair of their bicycle, women are more likely to depend on professional mechanics (who themselves tend to be men), or on friends and acquaintances. Women engaging with repair thus find themselves in a very masculine environment. This masculinity alone does not make the environment of bicycle repair patriarchal; however, as argued by Clarsen, it derives from active mechanisms of exclusion of women: 'those workplaces are not accidentally or coincidentally male-dominated' (Clarsen 2019:34). Bicycle repair and maintenance spaces are not only masculine but also patriarchal as defined by Young: that is, they constitute an

environment where women are denied their subjectivity, autonomy and creativity. The next two aspects of the repair and maintenance environment, inappropriate attention and denial of expertise, contribute to these patriarchal mechanisms of exclusion.

Inappropriate Attention

Women often experience inappropriate attention in spaces of bicycle repair and maintenance. By 'inappropriate attention', I include many different expressions of sexism and sexual interest towards women, which include exaggerated help, unrequested advice and unwanted flirting. Although this behaviour does not always qualify as sexual harassment, it always encroaches upon women's private space and initiative.

Lisa, who created an association that teaches and supports female road cyclists in Melbourne, recounts an example of this:

I walked into the mechanics area, and there were porn calendars on the workshop wall! [...] In the end I went, took it down, I put it in the bin and I said: 'You wanna have women customers in here, you cannot have that calendar.' Next day, back up. And they were all laughing, saying, 'Lisa doesn't like the titties.'

Lisa, 48, Melbourne

Although the general atmosphere of repair spaces is rarely as extreme as the one depicted by Lisa, they are often spaces where women feel objectified, deprived of their own subjectivity and autonomy. For instance, in community workshops, where the interaction between volunteers and visitors is less formal than in bicycle shops, volunteers often show an excessive interest in helping women, sometimes without being requested to do so. Although this seems harmless and women do not always complain about it, it also contributes to constituting spaces of repair as spaces where their subjectivity is denied. As Pauline, an experienced bicycle mechanic, describes:

The last time I set foot in a community workshop [...] I believe that at least 6 to 8 guys came to me during the evening to suggest that I would go home with them. [...] Seriously, it was the theme of the evening! The place I would sleep in!

Pauline, 32, Lyon

This frequent inappropriate attention contributes to gendering space, making its lived experience different for men and women (Massey 1994). When men regularly encroach upon women's personal space, it contributes to making the activities of repair and maintenance feel intimidating or challenging to women.

Denial of Expertise

A third characteristic of bicycle shops and community workshops as a patriarchal context for repair and maintenance is the denial of expertise faced by women when engaging in repair and maintenance practices. When walking into a bicycle shop or a community workshop, women often feel that the employees or volunteers make assumptions regarding their repair and maintenance skills. Often, women see their expertise denied at the same time as they experience inappropriate male attention. An example often mentioned in community workshops is male volunteers who, when a woman asks them for help with a repair, take the tools she was using and do this repair themselves.

Amanda, an experienced road cyclist and cycling coach in Melbourne, said she once walked out of a bicycle shop where the employee made the assumption that she wanted a flat bar bicycle. Since such bicycles are not used for racing, this showed an assumption that, as a middle-aged woman, she could not race, something that deeply offended her.

The denial of women's expertise is most blatant in the case of female professional bicycle mechanics. These women, even after years of experience, frequently face customers who do not trust their skills.

Juliette, a qualified e-bicycle mechanic in Lyon, experiences this frequently. She recounts daily interactions where customers do not take her seriously.

Some guy comes into the shop to ask a technical question, he will see me but not go and ask me directly even though I am standing at the workshop next to the sign saying 'workshop'. And he goes and asks my colleague instead. This happens to me every day.

Juliette, 31, Lyon

Visible signs of their status, such as the position in the bicycle shop – in the workshop area, with tools in hand – often do not suffice for customers to treat female mechanics as skilled. All qualified female mechanics told similar stories of customers not talking to them directly and ignoring obvious signs that they were in charge for a specific repair. According to Juliette, customers sometimes refuse to believe she is responsible for a successful repair. In some extreme cases, customers even refused to see a woman in charge of repairing their bicycle or, while on the phone, requested to talk to a male mechanic. Several female mechanics who were formally trained as such also recounted of managers asking them to work as a salesperson. It is thus both customers and sometimes colleagues of female mechanics who frequently deny their expertise. The denial of women's expertise often derives from the strong association between masculinity and an area of employment (Cockburn 1991), and similar observations were realised in the study of other manual trades (Smith 2013b). Once again, it contributes to denying women's autonomy and skills and making spaces of repair and maintenance unwelcoming to them.

In this section, I argued that spaces of bicycle repair and maintenance constitute patriarchal environments. Indeed, they are not only overwhelmingly masculine, but they also allow this masculinity to reproduce itself through frequent inappropriate male attention and denial of female expertise. To follow Young, they are spaces where women are denied their subjectivity

and autonomy. The next section dwells on the ways this patriarchal environment inhibits the engagement of women with bicycle repair and maintenance and their velonomy.

The Production of Feminine Velonomy

I described earlier the patriarchal environment repair and maintenance practices take place in. Young's argument is that women's bodily experience is transformed by the patriarchal society their everyday life takes place in. In other terms, the sexism widespread in society – and among others in spaces of repair and maintenance – does not only affect women in terms of the opportunities that are given to them. It also transforms 'the modalities of feminine bodily existence' (Young, 1980:30), here understood as the ways women feel and move their bodies. The following section focuses on the consequences that the patriarchal environment of repair and maintenance has on women's bodies, movements and actions. The patriarchal environment described above is not only the background against which feminine velonomy occurs, but it is what produces the conditions for a feminine velonomy characterised by an inhibition in repairing and maintaining bicycles.

This section follows the outline of the previous one; I examine each of the three characteristics of the patriarchal environment discussed earlier for the ways in which it transforms feminine velonomy. Feminine velonomy appears as a condition of inhibition, discomfort and lack of confidence detrimental to the engagement with bicycle repair and maintenance and to the acquisition of new skills.

Masculinity of Repair and Feminine Velonomy

I discussed earlier the overwhelming masculinity of bicycle repair environments. Women often do not have as much experience as men in bicycle repair, and that they rarely meet other women who are experienced in it, let alone female professional mechanics. As a result, women often

feel that bicycle repair is not something that applies to them and lack self-confidence when engaging with it.

The first effect of the masculinity of repair environments is the feeling that repair is ‘not for them’. One woman I met in Lyon had never engaged with bicycle repair, she had never even inflated her own tyres, something she left to her husband. She was, on the other hand, very involved with many DIY projects such as fabricating pieces of furniture for her home and for her child. When the situation led her to replace a brake cable, which her husband suggested they could do together, she was surprised to find it extremely easy. In this case, it is possible to think the association of bicycle repair with masculinity had a role in this woman never imagining that she could inflate her own tyres or replace her own cable. Despite considering herself ‘very crafty’, she did not envision bicycle repair and maintenance as a sphere she could use this craft in.

Another example of thinking of repair as not for them are the many women who expressed some worry at the idea of walking into a bicycle shop. For instance, Ellie confessed feeling uncomfortable because of the outfit she was wearing: ‘I remember it feeling weird that I was walking into their shop, in a dress, without a bike.’ Another cyclist, Mary, described not feeling comfortable in a bicycle shop which felt ‘very boysey’ to her.

[It felt] that they're really only there for, you know, for the dudes that wear Lycra. And you know, I wear Lycra when I ride for long rides but I kind of feel that I wasn't really their key market. I just want to ride a bicycle, it is just a bit different from what they're all about.

Mary, 54, Melbourne

Cyclists often experience a feeling of illegitimacy (Aldred 2013). In Mary’s example, this feeling is related to the masculinity that she associates both with repair and with cycling itself,

as illustrated by the image of ‘dudes who wear Lycra’. The discomfort expressed by Ellie and Mary illustrates how the masculinity of cycling and of repair can overlap, making women feeling doubly unwelcome in bicycle shops.

A second effect of the assumed masculinity of repair and maintenance is women lacking self-confidence when engaging with repair. Many women expressed their worry, or even the fear, of not doing things right when repairing their bicycle. One of these women, Susan, describes how the fear of doing something wrong made the repair difficult and unpleasant:

So, hum, the time that I did change the flat tyre after going to the workshop was like really exciting. But it also took me like [laughs] you know, over an hour, because, you know the expression ‘like riding a bike’? This wasn’t like riding a bike. It all felt strange and it felt scary because if I did something wrong it would be really, really inconvenient for me.

Susan, 38, Melbourne

Consequently, Susan did not engage further in repair after these experiences. Other women showed similar attitudes to repair, stating that, as their main mode of transportation, the bicycle was too important to experiment with it. The bicycle’s centrality in their life justifies extra caution and therefore is a reason not to attempt to repair it by themselves. Through the many interviews conducted, no man has demonstrated such a position towards repair.

These examples show how the fear of failing can inhibit action, as argued by Young through the concept of feminine motility. This lack of confidence is not only an issue of discomfort but also an impediment to learning. Indeed, repair and maintenance skills are often learnt by doing (Barber 2003): being willing to try repairing something is often the main step in repairing it, and this requires some self-confidence in one’s ability to succeed. As shown in Figure 3, women are less willing than men to try repairing something unfamiliar.

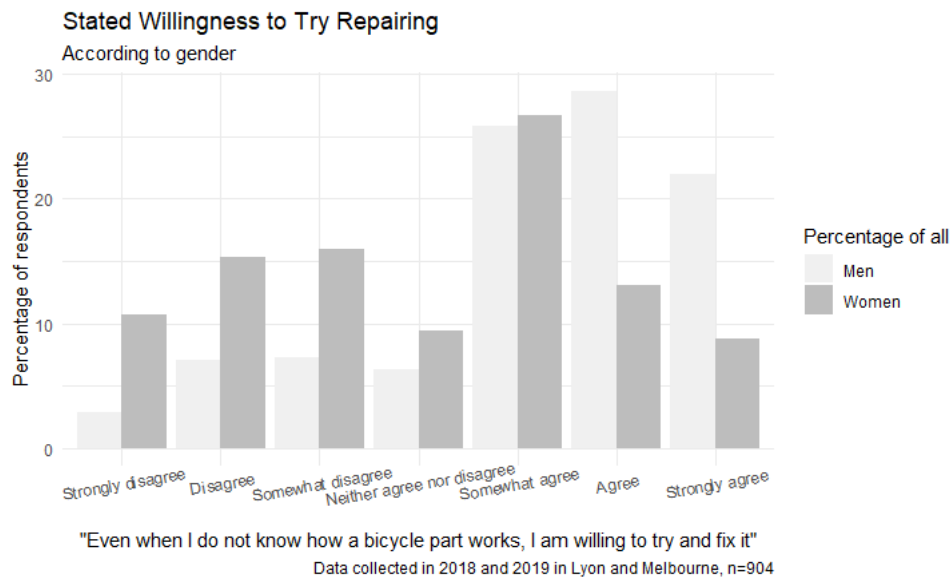


Figure 3 — Willingness to try repairing according to the gender of respondents

The masculinity of repair and maintenance thus constitutes a major impediment to feminine velonomy. Indeed, women sometimes feel uncomfortable in repair spaces; they sometimes lack self-confidence when engaging with bicycle repair. This inhibits women's ease with bicycle repair, and with acquiring new repair and maintenance skills.

Inappropriate Male Attention and Feminine Velonomy

A second characteristic of the patriarchal environment of bicycle repair is the frequent inappropriate attention experienced by women. These experiences affect feminine velonomy and inhibit women while engaging with bicycle repair and maintenance. They make women feel like they do not have the same status as men in spaces of bicycle repair and maintenance and restrict their ease with engaging with repair.

When given unrequested advice and help, women often feel uncomfortable and disempowered. Sexist remarks and harassment tend to be a reason for them to stop going to the bicycle shop or community workshop where they experienced them. Several women interviewed mentioned a sexist atmosphere as a reason for not coming back to a community workshop or a bicycle shop. When remaining in the spaces in which they experienced this inappropriate attention, it can be

detrimental to the quality of their work. One mechanic described the consequences that the sexist remarks widespread in a previous work environment had on her self-worth.

As a result I lost all self-confidence, so I wasn't repairing bikes like I should, I wasn't doing a good job any more... actually it did a lot of harm to me.

Karine, 25, Melbourne

Inappropriate attention can also affect the ability of women to learn new skills, as shown by the interview of Jeanne, who recounts her early years of being a member in a community workshop in Lyon.

I felt like... flirting was kind of mandatory and everyone seemed okay with it; I don't remember feeling very happy with my repairs there, I could not even tell you what I repaired.

Jeanne, 36, Lyon

The inappropriate attention Jeanne received in the workshop was powerful enough to limit the benefits she got out of volunteering there. This hostile environment obscured the memories that she has of the time she spent there and it is likely that this discomfort was an impediment to her developing new repair skills.

The second aspect of the patriarchal environment of bicycle repair and maintenance, inappropriate attention, contributes to restricting feminine velonomy by limiting the ease that women feel in spaces of maintenance and repair and reducing their opportunities to learn and acquire new skills.

Denial of Expertise and Feminine Velonomy

The last patriarchal aspect of repair and maintenance spaces is the denial of women's expertise in bicycle repair, even when their peers consider them experts. This general atmosphere inhibits

feminine velonomy by feeding women's low self-confidence. It also is an impediment to learning and improving technical skills.

One example of such a case is Rosa. As an apprentice in a bicycle shop, she is not very experienced yet but she also feels very exposed as the only woman in her environment since, to her view, if she fails at her job she will reinforce stereotypes about women and mechanical work. She has internalised this pressure, which she describes as an obstacle that prevents her from enjoying her job and getting better at it.

I don't... I have some skills but I'm really learning on the job. And I wanna learn to kind of show people that women can do it but the reality is that... I can't [laughs]. So that's a challenge.

Rosa, 27, Melbourne

Like all other female mechanics, Rosa regularly sees her expertise denied, which makes her feel that she constantly has to prove her worth. In the following example, she describes the way the pressure exerted by a customer affected her ability to demonstrate her technical proficiency unhindered:

I was the unfortunate person who had to build this tiny kid's bike with tiny wheels, which is not a complex build but it's really fiddly and annoying... after 20 minutes he came and just stood next to me watching me as I did it, which, I cope terribly with this kind of stress... So half telling me what to do and half watching me. The first thing he said was 'What qualifications do you have, and what experience do you have?'

Rosa

Rosa's tale shows that the regular denial of women's expertise does not only impact the way they feel, but also their bodily movements. What she describes as a simple task became a real

chore as an angry customer was closely watching her and commenting her work. The pressure that she describes was not only psychological, but it also transformed her bodily engagement with the bicycle she was working on. It reduced her ease and was detrimental to the quality of her work. Once again, the regular denial of female expertise occurring in spaces of bicycle repair and maintenance restricts feminine velonomy. It makes these spaces uncomfortable to women and limits women's ability to engage with, and learn about, bicycle repair and maintenance.

The patriarchal context of repair and maintenance produces the conditions for feminine velonomy, namely for women to feel inhibited and less confident with bicycle repair. By making them feel uncomfortable in some spaces of repair and maintenance, it contributes to their exclusion from these spaces. Furthermore, it limits the opportunities given to women to try and experiment with bicycle repair and maintenance, and thus to acquire new skills.

The Struggle for Legitimacy: Strategies of Feminine Velonomy

From the above, we understand that the general context of patriarchal society, and more specifically of bicycle repair and maintenance spaces, produces the conditions of a restricted feminine velonomy. Awareness of these issues is growing, and several activist groups and spaces⁶ have appeared in the last year in order to address them. Some of these groups offer collective alternatives to male-dominated spaces when it comes to acquiring repair and maintenance skills and engaging safely with repair and maintenance⁷. Besides these collective initiatives, women also designed individual strategies in order to assess their legitimacy in repair and maintenance spaces. In this last section, I dwell on four strategies developed by

⁶ In France, one of these organisations is the national network of feminist initiatives for community workshops, *Enclume à Clavette*

⁷ See for instance the excellent documentary "Le moment des forces" by Constance Brosse, 2018, about a bicycle repair and maintenance class for women and non-binary people in Lyon

women in order to overcome a central aspect of the patriarchal environment of repair and maintenance that we discussed earlier: the frequent denial of their expertise. These strategies are *practising to perfection*, *didactic demonstration*, *leaning on male peers* and *selective interactions*.

The first way women sometimes deal with the frequent lack of recognition of their skills is *practising to perfection*, that is developing their skills to a certain level that it is impossible for others to doubt they are qualified. This is for instance the case of Sam, a Melbourne shop owner who prides herself in being the person people go to for complicated operations, frame building and ‘when stuff gets stuck’.

They go ‘I heard good things about you... oh you’re female!’ So it works for the positive as well.

Sam, 47, Melbourne

Whereas for Sam, being known as an expert may not have been an intentional strategy to counteract the sexist interactions she might face, it was a different case for Clarisse. Employed as a mechanic in very high-level competitive races, this woman recounted practising the replacement of a broken bicycle chain for hours and hours at home so that she could then do it in 34 seconds. She described this impressive performance as allowing her to gain respect as a serious mechanic in a place where she, as looking ‘blonde and girly’, initially did not feel trusted. ‘The fact that I was working for a very good athlete also helped a lot’, she added.

Didactic demonstration was another strategy followed by women skilled in bicycle repair and maintenance. Indeed, demonstrating skills, in practice or verbally, is a way that female mechanics can assert their legitimacy when facing customer distrust. This is the strategy adopted by Juliette; This mechanic recounted her pleasure in contradicting customers who think they know more than she does, while remaining polite since her employment is at stake. This

is also the attitude favoured by some female cyclists as customers of a bicycle shop, as illustrated by the situation of Louise, an experienced road cyclist:

I wait until the person explains everything to me in detail. [...] He explains everything, I let him talk, but I will place in the conversation a couple details that show that ‘Oh well actually she knows what she is doing.’ [...] and this way, they are more impressed by a striking little detail. [...] Several women told me that they do exactly the same.

Louise, 35, Lyon

Female mechanics sometimes receive assistance from their male colleagues in situations where customers challenge their legitimacy – this is what I call *leaning on male peers*. For instance, Rosa, a mechanic in training whom I quoted earlier, mentioned how helpful she found her male colleague who made a point of always introducing her to new customers as ‘Rosa, our mechanic’. Other female mechanics praised the support brought to them by male colleagues who intervened when a customer behaved inappropriately.

Lastly, *selective interactions* was another strategy. For instance, some female cyclists admitted to preferentially use bicycle shops where the staff knows them and their competences. This is the case with Amanda, previously described as feeling extremely offended by an interaction in a bicycle shop. Amanda explained that this hurtful experience convinced her to only visit shops where she is well-known, such as the one sponsoring her cycling club.

Another form that this strategy can take is the one adopted by Olivia. This woman explained that, while in a bicycle shop or a workshop, she often behaves very coldly in order to limit the expectations that people may have when engaging with her: she calls this behaviour, ‘putting a hard shell on’.

I feel I have to put on this really confident kind of, and strong, almost rude energy about me when I walk into a bike shop and I ask questions, or like I’m buying things. Because

[...] it's already thought that women don't know anything so you could just do anything you like.

Olivia, 26, Melbourne

This overview of strategies adopted by women in order to be perceived as legitimate in a bicycle repair and maintenance environment shows that women may react in diverse ways to the patriarchal circumstances they find themselves in. It also shows that Young's theory of feminine motility, besides highlighting the patriarchal environment's ability to transform women's bodily engagement with the world, still leaves room for women's agency. These strategies rely on diverse resources that women can use in order to develop velonomy. However, these resources do not solely depend on the women executing them; some of them, like supportive male peers and the existence of more inclusive spaces of repair and maintenance, reside within the environment. This implies that developing strategies of resistance is easier in less patriarchal environments.

Conclusion

This paper has attempted to contribute to research on gender equality and cycling by exploring the gender issues present in a less commonly discussed area of cycling practices, bicycle repair and maintenance. Relying on Young's theory of feminine motility (1980), I show that it applies to velonomy, that is to the ease shown by a cyclist in repairing, maintaining and adjusting their bicycle (Mundler and Rerat 2018). Bicycle repair is an activity at the intersection between cycling and manual labour, two very gendered practices (Aldred et al. 2016; Smith 2013b), and is itself very male-dominated. Indeed, its masculinity reproduces itself through several mechanisms of exclusion (Clarsen 2019), among which regular inappropriate male attention and the frequent denial of female expertise. The latter is even more obvious in the case of

bicycle shop customers not taking qualified female bicycle mechanics seriously. In turn, this patriarchal environment transforms the bodily conditions of women when engaging with repair and maintenance. It produces the conditions for feminine velonomy, a bodily experience characterised by low self-confidence, discomfort in spaces of repair and maintenance and an inhibition regarding bicycle repair. As a result, women often do not feel legitimate and distrust their own abilities when it comes to repair and maintenance. This is not only a deterrent against engaging with repair and maintenance, but also against acquiring new skills. I highlighted four strategies executed by women in order to overcome some of these restrictions.

These discussions demonstrate that the gendered issues present in cycling and in repair and maintenance are intertwined and should be considered jointly for a better understanding of both these practices. Besides, this research puts an emphasis on the role of the environment of bicycle repair and maintenance in producing feminine velonomy as well as in reproducing itself – without denying women’s agency in elaborating strategies in order to assess their legitimacy regarding bicycle repair. By doing so, it may be a basis to assess the relevance of initiatives aimed at transforming this environment, such as gender-inclusive bicycle workshops or women-only bicycle repair skills courses. It should be noted that this chapter, by focusing on gender, leaves aside the experiences of velonomy produced by the belonging of individuals to diverse minorities of race, sexuality or abilities and the multifaceted intersections between these identities. Indeed, ‘an intersectional feminist perspective is crucial for an inclusive urban cycling revolution’ (Lam 2016:12).

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