

Curious Cycles: Feminist Probes for Cultivating Curiosity of the Menstrual Cycle

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ABSTRACT

Curious Cycles responds to the tensions that arise when designing technologies for menstruation and menstrual cycles, touching upon notions of curiosity, noticing, sharing, taking or making space, and our relationships with our bodies and their fluids. The project follows a Research through Design approach, guided by Soma Design and feminist research methods. Curious Cycles are a set of cultural probes; objects and interactions designed to gather experiences and insights from five people who menstruate, throughout the duration of a cycle (approximately one month). The objects are meant to "cultivate curiosity", provoking reflections on the ways we currently relate to our bodies and bodily fluids and speculating on how we might relate to them in the future. This work seeks to approach the design method of cultural probes from a feminist perspective and contributes through the concept of "cultivating curiosity", a way to design menstrual cycle technologies by attending closely to the changing social and material experiences of the body, which in turn can challenge the cultural taboos surrounding menstruation.

KEYWORDS

menstruation, menstrual cycle, curiosity, feminist hci, feminist probes, cultural probes

1 INTRODUCTION

The menstrual cycle is the set of monthly changes in the body, orchestrated by different hormones produced by the brain, preparing the uterus for the possibility of pregnancy [55]. The cycle begins on the first day of menstruation and lasts until the day before the next one. Understanding the menstrual cycle is vital to a full understanding of the body. People can experience a wide variety of changes throughout the cycle, including differences in mental health, mood, or the way they experience sex [3], differences in skin, hair, pain, smell, taste or sight [36], or differences in how their bodies respond to food and exercise [46]. Ultimately, menstrual cycles change the way we experience and move about in the world.

Although menstruation and menstrual cycles have slowly infiltrated pop culture and mainstream media in the past decade, the experiences of people who menstruate are still commonly ridiculed, dismissed or trivialized [21, 56]. Menstrual product advertisements have only recently switched the blue liquid in their commercials to the more accurately blood-resembling red liquid, yet most visual portrayals of menstruation lack imagery of actual blood [58]. Other representations play on the fear of being discovered as menstruating, and the embarrassment and shame behind an "unhygienic, dirty or unfresh" stain or leak [47]. By using lexical and visual euphemisms and not naming and showing menstruation how it is, the idea is reinforced that it *should* not be named or shown.

In the tech industry, with the rise of FemTech and products and services focusing on women's health [50], a trend to frame menstruation as a problem has been identified in recent HCI research [15, 38, 61]. From menstrual cups that send notifications to your smartwatch when they're full [61], to period tracking apps featuring gendered aesthetics and terminology that assumes the only reason to track cycles is to conceive [17, 20, 38], people who menstruate have shared stories on how some of these technologies seem to treat their bodies as if there was something wrong with them, distant and decoupled from the rest of them, in need of concealment and constant surveillance behind layers of technology. Consequently, the way we design and depict menstrual products and services critically impacts and further socially stigmatizes the experiences of those who menstruate.

The social meanings surrounding menstruation have varied and still vary widely across cultures, depending greatly on the history of distribution of power within a society [49]. This work takes place in the context of Sweden, where menstruation is frequently discussed in politics, art and other contexts of the public sphere, yet still sparks controversy when brought to attention by public figures or institutions [44]. Since this work is deeply grounded in a political and cultural subject, I am positioned as a subjective researcher with my own biases and conditions [33, 60]. I identify as a cisgender heterosexual woman, I menstruate, and I have grown up within a mix of North American (USA) and European (Spanish) cultures. Therefore, my biases and personal connection to the theme shaped this work greatly. Throughout this work, I use the term *menstruators*, as opposed to women, emphasizing that menstruating is not tied to gender, and some women do not menstruate while using hormonal contraceptives or due to menopause, stress, disease or a hysterectomy.

Despite attempts to hush and hide menstruation, we are intrigued by it and eager to understand it. This work approaches menstrual cycles as curiosities in themselves, as something odd but wondrous, something worth exploring and designing for. With this work I aim to contribute to the growing collection of instances of feminist perspectives in HCI by investigating how we might design menstrual cycle technologies that allow menstruators to cultivate this curiosity and, in turn, put an end to further stigmatization.

2 BACKGROUND

In this section, I provide an insight to the groundings and theories supporting this work, as well as reflections on previous design instances that draw from these theories, and how these relate to and permeate this work.

2.1 Feminist HCI

In Curious Cycles, the design space of menstruation and menstrual cycles has been approached from the start with a feminist HCI lens, revisiting the questions and the design qualities outlined in the agenda introduced by Bardzell nearly a decade ago [9]. Since then, an increasing amount of contributions have used this lens to stress the importance of designing with and for the experiences of marginalized people, providing both critical accounts and generative insights. In this work, I make use of feminist HCI to contribute with generative knowledge within the design space of menstrual cycles. Feminist HCI has been used as a guide for approaching diverse women's health topics apart from menstruation, notably including motherhood and breastfeeding [4, 19, 43], menopause [8, 39, 65], pelvic fitness [1], sexual intimacy [5], and abortion [53], amongst others. From these contributions, the HCI community benefits from alternative and novel methodologies, and from the reappropriation of traditional ones to fit feminist outlooks. For example, [43] and [26] discuss reclaiming hackathons and hackerspaces, or [57] provides discussions on how crafting and computing intertwine. In this work, I begin to explore how an existing HCI method, cultural probes, might be reworked and amended to fit within the feminist HCI agenda.

2.2 Menstruation in HCI

This work builds on a growing body of literature considering the design space of menstruation in HCI. Bardzell et al. provide knowledge on menstruation through a Research through Design (RtD) approach by critically examining artist Sputniko!'s Menstruation Machine, an art performance and device allowing non-menstruators to experience menstruation [7]. PeriodShare contributes with a similar RtD approach, making use of feminist speculative design combined with humor to challenge taboos surrounding menstruation [62]. Søndergaard's approach to designing intimate technologies is centered around feminist technoscience scholar Donna Haraway's "staying with the trouble" [34, 61]. In this approach, women's health matters are framed as troubles to engage with and design for, but not as problems to solve. In this work, I have adopted an analogous attitude towards menstruation, and rather than dismissing the trouble of menstruation, the pains and annoyances it brings, I design by acknowledging the menstruating body, without concealing it, inciting curiosity and awareness for the menstruator as well as for the non-menstruating people in their surroundings.

PeriodShare explores social concerns surrounding menstruation, speculating what would happen if menstruation was shed of its taboos and treated as the regular health signal it is, to then be tracked and shared on social media [62]. From a similar angle, in Homewood's work, a designed lighting artifact changes color throughout the menstrual cycle, exhibiting this data in a shared and public space [37]. Other contributions to the social aspects of menstruation concern menstrual hygiene and maintenance, focusing on themes of individual vs collective responsibility towards menstrual care [27]. Furthermore, there have been approaches that have reviewed or rethought current menstrual technologies, specifically, tracking applications, which have been examined critically or redesigned as a tangible artifact [20, 24]. When dealing with cross-cultural or inter-generational discussions on menstruation, efforts

have been made to include concepts such as hacking, making or means of self-education [63, 64], and digital fabrication techniques [52].

Curious Cycles explores the bodily changes taking place during the full menstrual cycle, engaging with the menstrual blood itself and with other transitions happening close to the body, contrasting with data-driven and self-tracking approaches. While these tracking approaches can often facilitate self-reflection and self-knowledge of things we are more in control of [51], in the context of menstrual cycles, they often hesitate to adapt to the transitioning bodies of menstruators by relying on generalizing assumptions and averages [20]. In this work, I argue for designing technologies that enable curiosity and in turn, self-knowledge, by observing the body, but also by moving, touching and feeling it.

3 METHOD

Previous Research through Design (RtD) cases, such as [7, 62] have contributed to the field of HCI by providing knowledge about menstruation through critically attending to a designed artifact or prototype [30]. Following a similar RtD approach, this work aims to contribute with knowledge on designing for the full menstrual cycle, encompassing the luteal, follicular and ovulatory phases [55]. In this case, the collection of designed prototypes or artifacts are key to locating and understanding this knowledge.

This work is centered around the design of a set of cultural probes, which have been informed by methods of Somaesthetic Interaction Design.

3.1 Soma Design

Soma design, as put forth by Höök (2018), draws from *somaesthetic* philosophy [59], where an emphasis is put on the body (*soma*) and our sensorial appreciations (*aesthetics*) as fundamental to our ways of acting, thinking and experiencing the world. By engaging with methods fostering bodily awareness, we can cultivate our perception and appreciation, which is essential to designing movement-based interactions [40].

Höök and colleagues argue that a potent way to design for the body is "*through thoroughly living your own designs, experiencing them on a profound level, empathically engaging with the somatic experiences of your future users*" [41]. In this work, I use Soma Design both as a method for designing with and for the body, but also as theory which informs my design process and decisions.

3.1.1 First-person perspectives. In the early stages of the project, I engaged myself as both researcher and participant, exploring the design space through small autobiographical experiments, and seeking partnerships and collaborations within the Interaction Design and Soma Design group at KTH. At the start of the project, I decided to stop taking birth control pills, after many years of uncertainty and curiosity to understand my body's cycles as they were. I made the decision to notice the changes in this transition and to find ways to increase awareness of my newfound cycle.

A research partnership was formed with my thesis supervisor and colleague, Marie Louise Juul Søndergaard, who invited me to explore different bodily activities conducted in Soma Design processes. We explored Feldenkrais, yoga and breathing exercises,

followed by discussing and documenting our experiences in different ways. Marie Louise kept a small diary and I kept several notes on our sessions, and we attempted to document how we experienced our body after each activity through quick illustrations. The illustrations tended to capture our bodies in strange and perhaps even "monstrous" ways (see figure 1), as opposed to templated body maps which are often used in Soma Design [40]. We complemented each shared illustration with a counter-drawing of something we weren't willing to share. Those drawings were crumpled up and set aside in a box on our desk, as a small gesture of acknowledgment to those private and sensitive things. The crumpling acted as a small bodily relief and a bit of an absurdity, which was inspired by methods used in the prompt generation of Andersen's Making Magic Machines workshops [2].

After a two-week exploration phase, we shared the explorations with the rest of the menstruators on the Soma Design team. We conducted an informal internal workshop around the theme of "bodily transitions", expanding the discussions from menarche, the first menstruation, to menopause, the last menstruation. We invited our colleagues to draw their menstrual "monster" or "creature", as a way to metaphorically explain their experiences, and searching for ways to express the immense diversity of menstrual cycles.

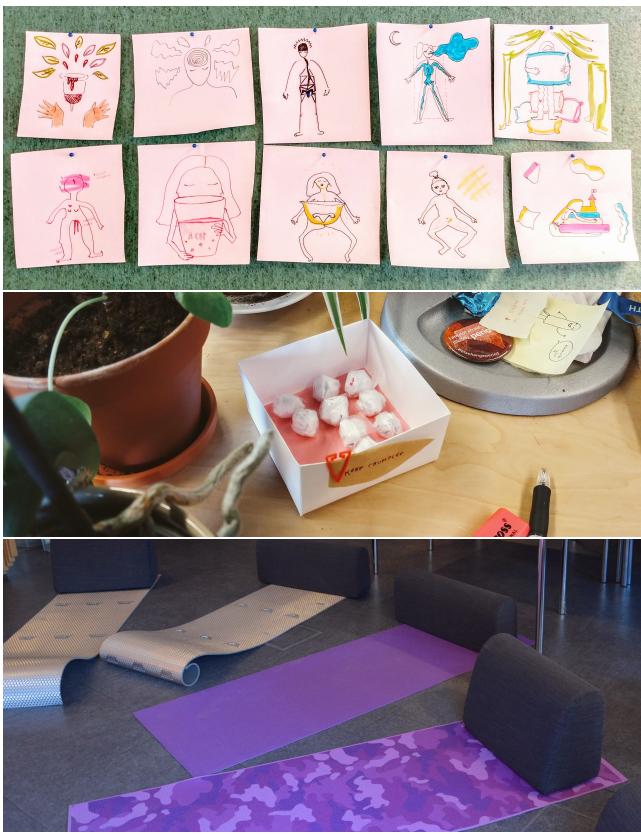


Figure 1: From top to bottom: drawings of our menstrual monsters, crumpled drawings on our desk and yoga mats laid out for body explorations.

In the following weeks, we were visited by a reproductive health expert and holistic practitioner, who guided us through breathing exercises and expressive movement explorations tied to different reproductive transitions (menarche, fertility, and menopause). She was what Höök refers to as a *somatic connoisseur*: "*someone who is skillful in an embodied, movement-based practice and who guides, mentors, and shares his or her insights with codesigners and participants, guiding collaborators in what to attend to, how to move and feel*" [40]. She introduced us to Fertility Awareness Methods, which are methods that rely on tracking or measuring the fluctuating physical signs of menstrual cycles, such as basal temperature or cervical mucus, which can determine the day of ovulation and indicate an approximate fertile window [54].

These initial first-person perspective explorations supported my understanding and approach to the design space of menstrual cycles. By spending a full cycle becoming sensitive to the transitions in my own body, it became clear that designing for the whole menstrual cycle required more than just a few mornings of bodily exercises, but required a full month of noticing. Therefore, becoming an expert on my own menstrual cycle was essential for designing and interpreting the experiences of others.

3.2 Cultural probes

Cultural probes, introduced in HCI by Gaver et al., are collections of objects and activities, from disposable cameras to diaries or post-cards, which are given to participants as a way to spark inspiration in a design process and gain a deeper and closer understanding of the participant's lives and values [29, 31]. The set of objects is usually packaged and delivered to volunteers, allowing them time to live with the prompts and questions they pose. After they are interpreted and completed, they are returned to the designer. Since their introduction to the field, cultural probes have evolved and been interpreted and employed in many different directions [12]. Particularly, Wallace et al. point out that there are not many frameworks detailing how probes are designed or used and how the existing work tends to leave out the design decisions made while creating them, or the questions prompted behind their forms [66].

3.2.1 Cultural probes for the menstrual cycle. This work makes use of cultural probes as a way to prompt participants to be curious about their menstrual cycle as a whole, to attend to the changes of these monthly phases, to understand the role of technology in their cycles, and to speculate and provide design opportunities for the future. This way, the Curious Cycles probes respond to Wallace et al.'s interpretation of design probes, where they are seen as "tools for design and understanding" [66], but also as tools for these individuals to gain knowledge about themselves, and in this case, their bodies. As indicated by Gaver et al.'s initial vision, the probes themselves should be considered as design instances to be explored by the participants, fostering reflection and inspiration, rather than a means to obtain analytical data [31].

The use of cultural probes in this work intended to allow participants to dwell with questions and prompts during a full menstrual cycle, which amounts to approximately 28 days. The use of probes also allowed participants to complete their reflections at home, enabling a sense of intimacy and control over their own bodies, decentering myself, as a researcher, from their experiences.

3.2.2 Participants. Five sets of cultural probes were crafted and given to five participants. A call was posted online and distributed on various social media platforms, encouraging snowball recruitment. The call invited anyone living in Stockholm who menstruated and who was not currently using hormonal contraceptives to participate. The description specified that volunteers should be willing to look at and touch their menstrual blood, cervical mucus, and saliva.

The call received around twenty interested menstruators, where five were selected based on diversity in age, cultural background, and living situation. The participants were five cisgender women, aged 22 to 37, and considered themselves to be from one or several countries, including Spain, Germany, Sweden, Moldova, Switzerland, and Canada. Two participants who were recruited simultaneously knew each other prior to the study, and one participant was a recent mother. The fact that two participants knew each other challenged the traditional approach to user testing or user participation in design, where it might be advised that participants should not influence one another during a study. In this case, the decision was made that discussions between participants would not be directly harmful to it, but rather enable more conversation and comfort surrounding a taboo topic.

By involving volunteers in sensitive work, important ethical concerns arise, related to the informed consent of participants, the researcher-participant power differential and the presentation of data in research [14]. Volunteers in the study received consent forms prior to their participation and were informed they could withdraw at any moment. Participants were also encouraged to keep the probe kit after the study and to communicate their experiences through pictures and interviews. This decision was made in order to address the risk of taking the given objects away from the participants, after encouraging them to dwell with them for a month and form initial attachments to them and to appropriate them in their own ways. Therefore, the probes were designed in a way that their return was not necessary and participants could continue to explore them and reflect on their answers even after the study.

4 THE CURIOUS CYCLES PROBES

In this section, I describe the crafting, design decisions, and reflections that emerged when designing the Curious Cycles probes, and the instructions provided to participants on how to use them. The probes were designed to revolve around several themes and tensions that emerged during the initial explorations and have also previously been indicated in HCI work concerning menstruation [15, 38, 61] and concerning the design of probes [31, 66].

4.1 The probes

Each participant received a set of probes, which consisted of two parts: a tote bag holding physical objects, and an individual Instagram account. The tote bag included five tangible objects, an A2 poster, five envelopes with drawing or writing prompts and a zine (see figure 2). The five designed objects were named: *the blood bank*, *the curious eye*, *the egg*, *the reflection*, and *the warmth*. Below, I provide a summary of each probe and what I asked participants to do with them and in the next section I discuss the themes and concepts used in the designs.

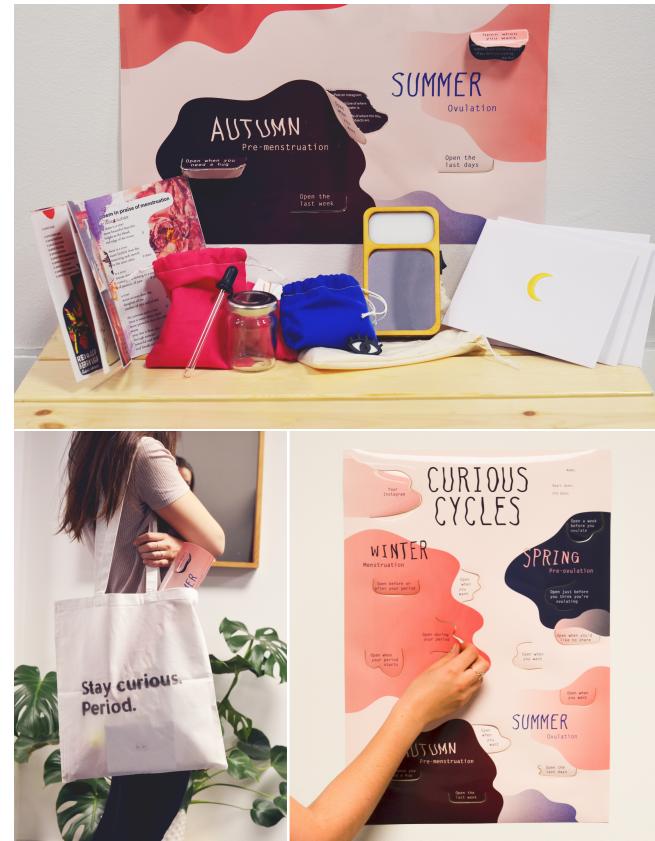


Figure 2: The Curious Cycles probes, the tote bag they were in and the poster with flaps.

4.1.1 The poster. Much like an advent calendar, the poster was designed with laser-cut flaps and prompts printed underneath. On top of the flaps, it was indicated when to open them, with messages like "open before you think you're ovulating" or "open on the first day of your period". The message under each flap delivered instructions on what to do with the physical objects, the envelopes or the Instagram account.

4.1.2 The Instagram account. An individual username and password were provided for each participant, under a flap on the poster. I suggested participants use Instagram as a diary or blog or to appropriate it how they wished. Several of the poster's flaps asked participants to take pictures of specific things, such as their menstrual hygiene products, or their bathroom. The instructions for each probe also invited participants to post pictures when they used them.

4.1.3 The blood bank probe. A transparent glass container with a lid and an eyedropper/pipette. I asked participants to use the container and (optionally) the eyedropper to collect and manipulate their menstrual blood.

4.1.4 The curious eye. This probe was a small microscope (140X augmentation) that attached to the camera lens of a smartphone (figure 3). The microscope consisted of a 3D-printed shell shaped

like an eye and a small glass sphere, acting as a lens. Participants were invited to observe three bodily fluids under the microscope: menstrual blood, cervical mucus, and saliva.

4.1.5 The egg. A plastic egg containing informational charts and instructions on how to predict ovulation. During ovulation, if collected and allowed to dry, cervical mucus and saliva will form fern-like patterns observable under a microscope [32, 45]. Participants were asked to observe the changes in these fluids with the curious eye, and to observe changes in the texture of cervical mucus by stretching it between their fingers, which is also an indicator of ovulation [11]. Glass slides for collecting samples were included with the curious eye, which allowed for the samples to dry before observing. Participants could use *the reflection probe* as a backlight for observation.

4.1.6 The reflection. Apart from a warm LED light, this handheld wooden probe included an embedded mirror that prompted participants to look at themselves between their legs (figure 3). I asked participants to open an envelope and write what they experienced on the paper inside.

4.1.7 The warmth. A small fabric pad filled with rice and lavender, which retains heat when warmed up in the microwave or oven, emitting a pleasant smell, and provided an interesting sensation of weight when moved around the body. I asked participants to explore the sensations the heat provided and relate them to their cycle. They were asked to open an envelope and to illustrate the experience through a body map that was inside, reflecting on what sort of somatic sensations could be desired during the cycle. Participants were asked to use this probe "when they needed a hug".

4.1.8 The rest of the envelopes. One envelope asked participants to draw their "menstrual monster", and was to be opened "when they wanted to share". Towards the end of the study, another envelope asked participants to write briefly about their experiences of trust, related to trusting a menstrual tracking app vs trusting their body, and a final envelope included a drawing activity to summarize the full cycle.

4.1.9 The zine. Zines have previously been used in HCI as a means of co-publication and to elicit activist aesthetics, as pointed out by Devendorf et al., "*making space for marginalized opinions to flourish outside of standardizing bodies*" [18, 25]. In this case, the zine acted as an inspirational probe with no determined goal or required input from the participant, containing oblique and evocative imagery of previous art and design work on menstruation, outcomes of the internal workshops, poems, and Internet memes.

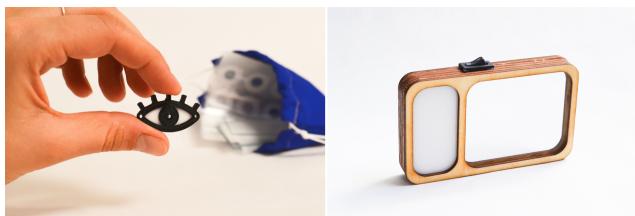


Figure 3: The curious eye probe and the reflection probe.

4.2 Design process and themes

4.2.1 Curious, strange and messy. The term "curiosity" is commonly defined as a strong desire to understand, know or learn something, to be inquisitive, eager. "A curiosity" can be described as an unusual or odd item, a peculiarity, a strangeness, an anomaly, a wonder or even a monstrosity. The Curious Cycles probes involve both definitions by encouraging menstruators to curiously attend the transitions or the "curiosities" happening to their bodies. Menstruation and menstrual cycles are therefore framed as curiosities themselves, as interesting and odd phenomena willing to be explored, and as strange and unusual processes that do not seem to fit into our society's norms.

Our bodies are both familiar and unfamiliar to us: they are always there, but we might go without noticing or attending to certain processes or movements on a daily basis. *Estrangement*, or particularly, *bodily estrangement*, is the act of "*disrupting or destabilizing a conventional bodily experience*" [67] as a means to "re-learn" how to look at the world. This method, also called *defamiliarization*, as many other methods that draw from the arts, has been appropriated and used extensively by the HCI community, amongst other humanist approaches to HCI [6]. Observing bodily fluids under a microscope, viewing intimate body areas from a different angle, and sketching menstrual experiences as a "monster" were all ways in which the Curious Cycles probes delivered prompts to view the body and its fluids from strange and unfamiliar perspectives.

The recent rise in the use of menstrual cups supposes an increased amount of menstruators who are comfortable and familiar with engaging directly with their menstrual blood, yet, similar to other bodily fluids [35], it is scarcely explored in design research. As opposed to excretion, menstrual blood is not toxic or harmful even after it has left the body unless the menstruator carries a blood-borne illness [22]. In my initial explorations, I questioned my own relationship with my menstrual blood. In order to observe it better and to visualize how it changed, I needed to collect and store it, which made me seek different types of containers or instruments to manipulate it. *The blood bank probe* intended to similarly inspire participants to reflect on their relationship with their blood. The probe invites menstruators to touch and "get messy" with their blood in order to put it in the container, which can later be observed under the microscope probe, *the curious eye*. This way, the "messiness" of the body is appropriated in a way suggested by Søndergaard, facilitating an "*intimate and reflective relation between people and the materiality of their designed artifacts*" and also challenging dominant minimalist design aesthetics [61].

4.2.2 Temporality and pace. Menstrual cycles are one of the body's only rhythmic monthly transitions, where the average adult's cycle lasts from 24 to 38 days [28]. However, variations from cycle to cycle are normal [23]. Menstrual tracking apps aim to quantify these lengths and occurrences, providing knowledge of past cycles and predictions of the upcoming ones. By collecting daily data from users, menstrual tracking apps allow monthly visualizations of a person's cycle and will be more accurate and complete the more data supplied [20]. Viewing the cycle at full allows for attending to the body continuously, rather than just during menstruation. The aim of the probes was not to substitute menstrual tracking apps

and therefore relied little on daily input from the participants. Similarly to self-tracking though, the probes aimed to enable reflections on the full cycle, and the changes within it. Participants dwelled with the probes for a month, which approximated the duration of the average menstrual cycle. However, participants were encouraged to decide themselves when their cycle was over and therefore determining the end of the study.

The flaps in the poster intended to be both an amusing way to experience the activities the probes prompted and a way to set a relaxed pace to the experience. Some simple activities under the flaps would be quick to complete, therefore providing a sense of *boundness*, a security that the probe could be completed [66]. The poster also differed from conventional calendar-like linear or circular ways to represent the menstrual cycle, and instead presented overlapping clusters of different situations that take place during the cycle (see figure 2), which are not defined by a specific day, but could be defined by the participants at the moment they opened the flaps.

4.2.3 Sharing and privacy. Menstruation is often treated as a private and secret matter, and the design of menstrual technologies has commonly mirrored this perspective [20]. However, the most common way to gain knowledge about menstrual cycles is by sharing experiences, often with family and friends, and making menstruation part of our daily conversations can help destigmatize it. Menstruation has also recently gained much attention in mainstream media and pop culture, yet often disregarded in public spaces, such as restrooms [27]. This tug-of-war between sharing and hiding menstruation is a tension that has been explored in HCI research concerning menstruation [15, 37, 62].

In the Curious Cycles probes, the poster served both as a guide for timing the probes as well as a probe in itself. The size and format of the poster conveyed affordances for hanging it on a vertical surface and displaying it in the home. Therefore, the choice of hanging the poster and where to hang it was embedded within the probe, being it somewhere within the view of cohabitants or guests or somewhere occluded and personal, such as a closet. To further address this tension and create a space for participants to express their experiences at a more personal level, each participant received a previously set up Instagram account and password, with a closed privacy setting which enabled follower requests. This probe is in many ways akin to Gaver et al.'s disposable camera probe [29], however, by leaving out the unexpectedness of analog film, it was intended that participants could feel more ownership and control of the probe, which is crucial for sensitive or body-related data.

4.2.4 Close to the body. The Curious Cycles probes were embedded with questions surrounding somatic awareness and closeness to the body, such as how might menstrual technology designs incorporate these preferences? As previously explored through first-person perspectives, the kit included a probe that prompted participants to take some time and attend to their soma. Firstly, the warmth probe was a way to explore the sensations heat technology could provide, and whether moving and orchestrating this heat across the body, as done in previous Soma Design work [16, 40], might provide compelling sensations during the cycle. Secondly, this object also concerned the acknowledgment of pain and relief during the cycle, which can often be experienced in the form of menstrual cramps,

but also concerns psychological troubles as well. Participants were prompted to use this probe when they were "in need of a hug", and they were invited to share reflections on any form of pain experienced during the cycle.

The material decisions and crafting of cultural probes are essential to differentiating provocative and playful probes from more craft-focused completed objects [66]. In this case, the materiality of the probes lies within the first context, where provocation and reflection on broader topics were prioritized, as opposed to only focusing on highly customized experiences. In the initial phase, I explored what could be the qualities of materials that are close to the body, testing with soft pillows, blankets, rice, or wood, and what it meant to use digital and electronic technologies in close proximity to intimate areas. To make participants reflect on these questions, I asked them to imagine substituting *the reflection* probe for their smartphone, and how that would affect the perception of trust and intimacy towards the object.

4.2.5 Future menstruators. The probes were permeated with evocative and speculative prompts which intended to provoke participants and encourage reflection on topics they may have not stopped to think about. These speculations were derived from questions I had noted during my initial exploration phase. By looking at the participants' current uses, what are the current practices that might perpetuate menstrual stigmatization? And, with a significant trend in biohacking, mobile health and smart medical technologies used in the home, how might we design future technologies that adapt to these medical advances? Startups like NextGen Jane aim to build services allowing endometriosis diagnosis by analyzing the menstrual blood from tampons, or preserving the DNA information from the endometrial cells shed during menstruation [48]. How would this self-diagnosis and collection kit look like? As designers, it is necessary that we consider how to design technologies that do not further perpetuate stigmas. *The blood bank probe* and *the curious eye* were small steps towards speculating about these future practices.

5 FINDINGS

The five participants reported finishing the probes a month after receiving them. I asked them to bring their drawing and writing exercises and had a conversation with each participant individually. The conversations lasted from 40 minutes to 1 hour and 20 minutes where I encouraged participants to refer to their use of the objects and their Instagram posts. The data from the probes and the conversations was analyzed using inductive thematic analysis [13]. In this section, I discuss the findings from the probes, providing four themes. Participants are anonymous and are identified by the pseudonyms Maria, Julia, Laura, Hannah and Emma.

5.1 Attending to bodily fluids: blood, mucus, and saliva

Participants expressed surprise and positive reactions to being asked to attend to their bodily fluids. They referred to the interactions as "strange", "silly" and even "alien", and as "*what people don't see: what we have to deal with*", as Maria pointed out. They reflected on the different meanings and taboos they associated these fluids with, and questioned themselves for doing so:

"Funny enough, posting a picture of my blood was more uncomfortable than posting a picture of my cervical mucus. Blood is a way more common thing, but getting cervical mucus is a more intimate experience." (Emma)

The way participants collected, stored and observed their fluids varied, depending also on their menstrual hygiene products. In order to adapt to the affordances of the probes, participants ended up creating new practices:

"I would put it on the plate [slide with sample] and take it back to my room, maybe sit on the floor with it, the light is better there." (Julia)

When collecting blood, Hannah recalled that she took the eyedropper and *"put it up inside and used it to get the blood"*. Collecting the fluids became a silly and entertaining experience, turning them into something valuable:

"I got a blood sample on my toilet paper... and since it got so precious to collect blood, I ran to the bedroom to put it on the clean slide. Because I was like... (laughs) this is a good thing!" (Hannah)

All participants expressed some degree of frustration with detecting the changes in the fluids throughout the cycle. However, after several days of failed attempts, Emma and Julia managed to successfully observe the ferning of their saliva samples with the curious eye probe. Emma affirmed that *"the saliva tests worked really well. [...] I had no idea about this and I thought it was SUPER interesting... I really enjoyed it."* Viewing the fluids with the microscope also facilitated a new sense of appreciation as seen in Maria's picture in figure 4 and as Emma recalls: *"I thought it was very aesthetically beautiful, and seeing that gave me a new appreciation for it."*

These recollections point out that by designing activities focusing on central aspects to menstrual taboos, predominantly menstrual blood, their existence becomes appreciated and even cherished, which ultimately plays a part in destigmatizing the whole experience of menstruation.

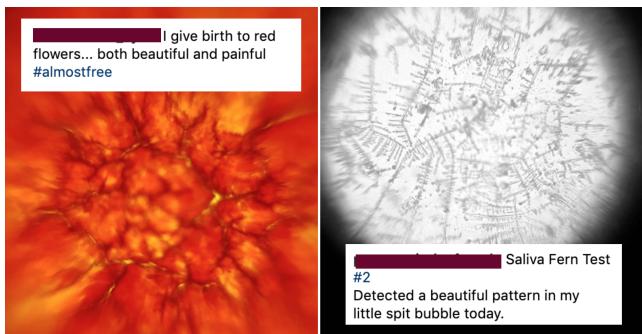


Figure 4: Left: Instagram post and caption from Maria. The image shows a sample of dried menstrual blood under the curious eye microscope. Right: Saliva observation and caption from Julia using the curious eye, indicating fertility.

5.2 Curiously learning and noticing the body

When given the probes, participants went home and curiously explored them, some were *"tempted to look at everything"* (Laura) and

others checked under the flaps of the poster in order to prepare themselves for the coming month. Throughout the month, participants claimed that they began noticing changes throughout their cycle, especially related to their bodily fluids:

"I notice the mucus textures all the time, but I didn't associate it with this, I never connected it." (Maria)

"I never noticed premenstrual symptoms, but now I have a headache that comes two days prior, that's a link I never made" (Julia)

Several participants recalled their own education on the menstrual cycle, *"I don't think I ever learned this in school, definitely not the ferning stuff"* (Hannah) and spoke about these experiences as new. When talking about the reflection probe, Laura said she had never looked at her vulva in a mirror before, and Julia remarked that it was an interesting and refreshing perspective: *"you forget, you don't observe it that much... but it's also kinda familiar."* Participants also expressed how they explicitly revisited online resources with educational content and expressed the usefulness of the Internet and tracking apps for these purposes: *"Technology can really help with this awareness, in small information chunks... not in being an expert, but just having an idea about what's going on"* (Hannah).

The reflection probe also inspired thoughts on the importance of getting to know one's body, as highlighted by Maria, *"I need to know because... it's my body, that's why I need to know"*, and when reflecting on the warmth probe, participants spoke about the connection they had between physical and psychological sensations:

"[My period] is never gonna be [exactly] on time... my body is very reactive to how I emotionally feel [...] Maybe sometimes I want my body to not affect what I do and how I do it. But of course, everything is related... emotional... it's not separated. So sometimes I would want it to be separated [...] the mind and body, sometimes I wish it could be separate." (Maria)

The warmth probe also prompted conversations about taking time to attend to these physical sensations, although Emma expresses how it did not help to inform her of anything new: *"It made me take the time that I normally wouldn't and it made me pay attention to parts of my body I normally don't, but I didn't learn that much from it"* (Emma). Similarly, some participants expressed difficulties connecting their emotional experiences with their cycle, as opposed to Maria's connection in the previous quote: *"I don't have very strong conditions. It's hard to connect my mood"* (Julia).

These conversations similarly sprouted when referencing the "draw your menstrual monster" activity. The monsters were a way for participants to embody (or not) their menstruation or menstrual cycle. Three participants chose to express their monster as a playful cartoon, which possessed qualities that reflected the signals participants experienced, such as menstrual cramps, weakness or relief. Hannah's monster was depicted in different states, as a constant presence but dynamically evolving throughout the cycle. Maria could see clear connections between her mind and body, referring to her monster as *"it's not like it's something else, it's still me, it's part of me"*. For Laura, the monster was more an abstract darkness and sensation of fear, not taking any specific form. Julia rejected the notion of a "monster" and compared her menstruation towards another creature:

"My feelings towards my menstruation could be compared to those I have towards bees. I don't enjoy being around them but I appreciate the services they do." (Julia)

When reflecting on their menstrual cycles in full (see figure 5), some participants had a very clear idea of how to express their experiences, and others found it hard at the beginning, but managed to enjoy their results and the whole process: *"It was really nice to spend some time with the topic, and I'm not planning to go on any contraception soon"* (Julia).

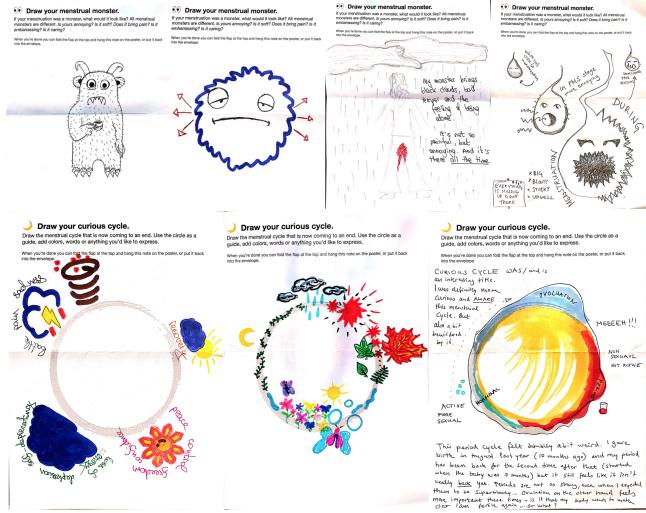


Figure 5: Top: Menstrual monster drawings from Emma, Maria, Laura and Hannah. Bottom: Full cycles from Maria, Emma, and Hannah.

5.3 Fostering relationships

Reflections on social aspects of the probes revealed that the tension between public vs private covers much more than just two levels or meanings, and comprises a fluctuating spectrum of desires, going from sharing with partners or keeping information to themselves, to sharing with friends and communities, or sharing with connected technologies, but being aware (or not) of the possibility of surveillance.

5.3.1 Social media community. The individual Instagram accounts were embraced and used by all participants, and within the first week of the study, participants unexpectedly requested to follow each other. One participant reached out to me personally and asked if it was OK, and I let them know it was completely up to them to decide. Emma recalls how she unexpectedly enjoyed following the others:

"When it suggested that I follow them, I was like, ah, what a great idea, so I requested to follow all of them [...] I got inspired by the others, I didn't expect to enjoy it. I was thinking ah it's probably gonna be awkward, I'm not gonna post much." (Emma)

For 4 out of 5 participants, the Instagram network was the highlight of their experience: *"the sense of community was important for me"* says Julia. Laura pointed out how they even seemed to sync up during the study: *"We all had our periods at the same time! (laughs) Just like on a sports team. [...] I liked following the others a lot."* The four participants expressed how they enjoyed liking and commenting on each other's posts, giving advice on how to use the probes, and on what tracking apps were best:

"It felt so nice to have the Instagram, I didn't know who those people were, but we started to bond and I was frustrated about the microscope, but the others were giving tips... I always wondered "ah do they like my pictures" (laughs) It was nice to not be alone. [...] I put the bloody panties picture up which was really not planned, and others commented and that was so nice and supportive!" (Hannah)

"One girl posted bloody underwear and I was like what! that's so cool!" (Emma)

"I've never had any [menstrual tracking] apps, but I saw another participant posted a picture of her app, and I thought that was really interesting" (Laura)

Laura even took the initiative to post her *'curious eye'* menstrual blood pictures on Facebook, eagerly asking her friends to guess what it was. She explained her motivation: *"I saw on a Facebook group one of these typical meme images saying "now feminists tell you to free bleed" and everyone was criticizing it in that group."* Laura explained how she was upset by that and wanted to provoke her Facebook network a bit: *"I posted a picture of the blood on Facebook asking "What is it?" [...] But I was disappointed, nobody said anything, there were only likes from other women. I hoped to have a response."*

However, social interactions weren't welcomed by all participants. Maria chose not to accept the follower requests from the others, and in the interview she mentions *"I was like "no", because I felt I would be influenced by them... like I would look and see it and be like "ah, I haven't done that" [...] I wanted to do it by myself and not be influenced by their experience."* Maria also referred to herself as a non-active person on social media, which she thought was reflected in her feed.

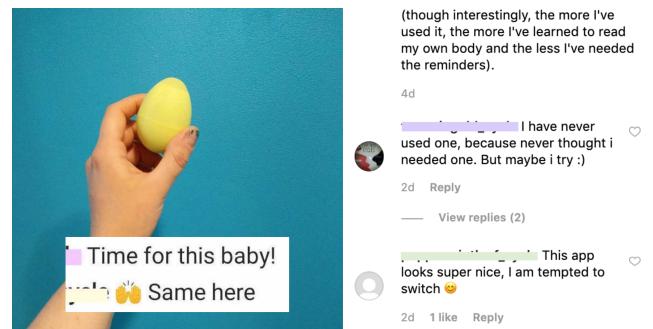


Figure 6: Screenshots from participant's interactions on Instagram

5.3.2 In the home. Participants commented on the visibility of the poster and the probes in their homes, and performing some of the tasks the probes prompted, referring to their different living situations:

"The poster was in my room... I told my flatmate about the project... she was curious why I had the little plates with blood (laughs)." (Julia)

"I live with my partner. We talked about it quite a bit... I'd be like, come look at this under the microscope!... or like I have some stuff drying on this table, don't touch it! [...] He's very open, but that's not new, we've always been open about it." (Emma)

"It was fun to share it, but he didn't really feel the excitement. It was funny how those things [the probes] were existing in our home. [...] I tried to do the things when I was by myself, or when she [her baby] was asleep. My partner didn't have much to do with it. [...] I put them [the probes] on a tray so I could put them away when we had guests." (Hannah)

Despite the overall welcome of the probes, Laura emphasized that her partner was "grossed out by the experiments", and how it took her two days to use the reflection probe: *"Every time I was home and could do it, my partner was home. I wanted to do it without him, because... I'm not embarrassed, but he didn't feel comfortable (laughs)." She encountered the same attitude towards the fluids samples: *"I'm offended about this about my partner... he made faces at me when I was doing the probes (laughs). He said, "I see it". And I was like "yeah I know you see it". And he said, "Yeah but you know it bothers me a bit". [...] I asked him to make an effort."**

5.3.3 Privacy. When the probes prompted questions of sharing intimate data through technology, participants agreed that the anonymity of the Instagram accounts was what made them feel free and in control. But when prompted to think about using a phone for taking pictures of intimate body parts or sharing sex-related data with their apps, there were mixed opinions. Emma explained what she shares with her menstrual tracking app: *"With stuff like cramps and things that just happen... like OK, I have a body and it does things. But with more vulnerable info, I don't add it to the app."* Julia similarly said that *"with digital devices connected to everything... it doesn't feel like I could maintain control."* On the other hand, Hannah mentions how she has been using tracking apps to track her period for almost seven years, and now she often tracks sex as well. Laura expressed: *"My partner is very aware of privacy, but I don't really care, maybe I just worry less about it, or don't know enough, but if a random person saw a picture of my genitals, it would be very cold and distant, right? For me it wouldn't mean much".* Hannah tried using the camera on her phone to look at herself but did not take a picture, *"because it automatically gets uploaded to the cloud."*

5.4 Reflecting on social constructs

5.4.1 What is normal? A common reflection among participants involved questioning what was normal, what was the normal cycle, or the normal body, leading them to compare themselves with the other participants or with other menstruators or women in general. Participants sought reassurance from these comparisons:

"I thought, is something wrong with my cervical mucus? Am I doing it right? But not everything was picture perfect for the others either." (Julia)

Maria showed me the different results she has stumbled upon after searching for *"are all vaginas different"* on Google, and Emma told me about what she did after using the reflection probe:

"I have a book by a photographer with close-ups of different vulvas... I ended up looking at that afterward [...] Looking at how diverse people are and seeing yourself represented in some of them, like oh yeah we're actually similar... that was nice." (Emma)

Laura admitted that she thinks society sees women's bodies as "either sexualized or gross" and Emma also pointed out how *"we're constantly told our bodies are gross, unhygienic... this was something I really internalized"*, but she felt it was very important to *"take time to look at yourself and say, this is a normal way to look, yeah, this is me and that's cool (laughs)"*.

5.4.2 Being productive. The probes enabled reflection on broader topics concerning expectations we set on ourselves and on each other. Maria started explaining how she felt like a lesser version of herself on her period:

"Similar to the feeling of getting a sprained ankle... your whole life depends on you walking somewhere... you feel like you live at a slower pace. [...] Like... I don't go training [on my period] [...] You have to continue being the same, but you're not. [...] Before, I would judge other women when they would stay home... like, I feel pain but I still come! But of course, I don't know how much pain she has... Even other women expect you to carry on as normal."

Hannah related these concerns to ideas we construct in society about what is normal and what is the "correct" way to function as a person:

"It's not just about menstruation, it's about so much more [...] This has been an eye-opener for me, really looking at the cycle as a circle, as a whole, and not like, this is one week every month. [...] It is very connected to being a functioning person... which is very weird in a way... that you only have this one purpose in society, to make a baby... and it's an expectation."

6 DISCUSSION AND CONCLUSION

The experiences of these five menstruators and my own reflections as a designer, researcher and menstruator have contributed to a deep exploration of the design space of menstrual cycles. The following section dissects the conversations enabled by the probes and outlines implications and opportunities for future design.

6.1 Towards feminist probes

The Curious Cycles probes were designed with a feminist perspective in mind from the start, and after the unexpected social interactions between participants, I have reflected on what it might really mean to design *feminist probes*.

The experiences of menstruation and menstrual cycles are complex and dynamic, changing from person to person but also from

cycle to cycle. Medical experts are faced with the challenge to come up with solutions for menstrual "symptoms", framing menstruation as a medical condition one can extract objective and universal data from. The intention of the probes was to oppose a medicalized view of menstruation, exploring this deeply subjective and situated knowledge. Therefore, by working with five different experiences, who's menstruation is being designed for? Who is represented in the findings and who can these findings be generative for? During this study's recruitment, I reached out to two non-binary people who kindly declined participation for different reasons. When designing, we can acknowledge that the experiences of our participants are just a small part of the extensive breadth of menstrual experiences. Therefore, this work builds on the quality of *pluralism* by recognizing that the findings are only representative of the participants themselves, rejecting the rhetorical single universalizing solution for all users.

During the deployment of the probes, I questioned my own role as a researcher. By using social media in a different way than what it was designed for, I might have unintentionally initially encouraged an isolated and individual experience, constrained within each participants' own space. When Instagram's recommendation features suggested participants follow each other, they unexpectedly embraced this possibility. Therefore, the sharing and intertwining of their experiences provided a deeply situated account [33, 60], acknowledging the social and cultural groundings of menstruation and its stigmatization.

From the way the Instagram part of the study was set up, I might have been perceived as an objective and omnipresent researcher, observing and monitoring participants from a distance through my own Instagram account. In Feminist HCI, the quality of *participation* is encouraged in designs, facilitating dialogue between designers and users, leading to "valuable insights that could not be achieved scientifically" [9]. Therefore, by the end of the study, I switched from the plan to conduct structured interviews to one of informal conversations, forming affective partnerships to harness empathy [10], rather than designer-user relationships with strong power differentials.

The Curious Cycles probes can therefore be understood as a step towards including notions of feminism in cultural probes studies. These feminist probes aspire to be a design method embedded with notions of pluralism and subjectivity, built upon partnerships with participants, fostering situated design knowledge.

6.2 Making time and taking space for cultivating curiosity

The experiences of menstruators are indeed curious, strange, and amusing. From the participants' recollections, we can acknowledge that there is no right way to menstruate, and it is nearly impossible to live a carefree and trouble-less period. When designing, accepting the messiness and awkwardness of our bodies is key to presenting menstruation as it is, disbanded of any taboos and negative connotations. The participants created their own set of values and attributed their own subjective meanings to their menstrual experiences. By presenting the messy menstrual bodily fluids as they are, and centering experiences around attending to them rather than avoiding them or trying to make them less messy, they

are perceived as something of value, something to be collected and observed. Menstrual blood does not necessarily become something of practical medical use, but it is transformed from waste into something aesthetically appreciated, nurtured and cared for. Therefore, I argue that a *somaesthetic* experience of attending to the materiality of menstrual blood and other bodily fluids can challenge their culturally stigmatized connotations.

Through the participant's stories, they have expressed many ways the probes have facilitated making time and space for noticing their cycles. Participants felt encouraged to relearn and revisit educational resources or to seek new ones. This highlights the importance of generating a dialogue or negotiation towards accepting one's body and oneself and accepting the awkwardness of it is key to this self-knowledge [1]. Participants claimed their own virtual and physical spaces through the probes, and by linking their experiences to each others', these perceived spaces grew even more. The poster and objects take space in the lives of those who menstruate but also spill over the borders into the spaces of those who are nearby. Participants shared stories of how they perceived and approached these boundaries themselves, curious to test their strength, wondering what their networks would say about their pictures, or why their partner was reluctant to accept their menstruation as part of their shared space. By providing the beginning of a space for menstrual experiences through design, menstruators can claim it and stretch it, uniting it with other menstruator's spaces.

In our conversations, participants reflected on how menstruation is entangled and analogous with many social constructs related to their unruly bodies. They exposed how their bodies are supposed to be "productive" and "fully functioning" at all times, making them feel weak and vulnerable during menstruation. Participants then acknowledged that, in fact, it is a societal condition imposed on menstruators and not a failure on behalf of the individual. We even perceive fellow menstruators as weak if we don't achieve society's standard productivity. This brings back questions of designing for menstrual cycles. As designers, it is essential that we pay attention to how we frame these technologies: they may appear to have good intentions, empowering women to carry on with their lives as "normal" and carefree, but they instead might be perpetuating the idea that we have to be productive at all times, forsaking the fact that our bodies are always changing and cycling. Ultimately, the way we frame menstruation when designing, as a space to explore and to be curious about, rather than an issue or problem to solve, greatly influences not only the experience of menstruators but also the people surrounding them.

To conclude, I argue for the concept of "cultivating curiosity" of the menstrual cycle when designing technologies. Cultivating curiosity can be understood as a *strong concept* in formation [42]: dynamic intermediate-level knowledge that can be appropriated by other interaction designers in similar contexts. Cultivating curiosity is to nurture an eagerness to know and understand the menstruating and cycling body, which can be done by designing for making time and space for somatic engagements with menstrual blood and other fluids, challenging our cultural and societal beliefs, and in turn, influencing the experiences of many.

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