Feminist HCI: Taking Stock and Outlining an Agenda for Design

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ABSTRACT
Feminism is a natural ally to interaction design, due to its central commitments to issues such as agency, fulfillment, identity, equity, empowerment, and social justice. In this paper, I summarize the state of the art of feminism in HCI and propose ways to build on existing successes to more robustly integrate feminism into interaction design research and practice. I explore the productive role of feminism in analogous fields, such as industrial design, architecture, and game design. I introduce examples of feminist interaction design already in the field. Finally, I propose a set of feminist interaction design qualities intended to support design and evaluation processes directly as they unfold.

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HCI, Feminist HCI, feminism, design, feminist standpoint theory, gender, interaction design, feminist design qualities

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Theory

INTRODUCTION

As a movement and an academic discipline, feminism has been prominent for over half a century. Infused throughout many aspects of everyday life, it is hardly a surprise that feminist concerns also touch on the topic of interaction. And indeed, as I argue later in this paper, it has already affected HCI in positive ways. Yet as a field, even when we are pursuing goals that can be called "feminist," we tend not to engage explicitly with feminism. As computers increasingly become a part of everyday life for ever-increasing populations in the world—from the rise of domestic computing in the West to the rise of ICTs for developing countries—the stakes have never been higher. Digital interactions mediate people's relationships with friends and loved ones, with society, and with culture itself. As we aspire to develop more pervasive, ubiquitous, and universal technologies, we inevitably also must engage in the increasing moral and intellectual complexity of our professional activities.

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This topic is hardly new to computing: science and technology studies (STS) and social informatics have long emphasized these sorts of issues. Yet when it comes to interaction design—HCI proper—these concerns come up in a much more piecemeal and ad hoc way. For the purpose of this paper, I therefore confine my focus to the relationships between feminism and interaction design (as opposed to "computing" or "technology" more generally).

Specifically, I am concerned with the design and evaluation of interactive systems that are imbued with sensitivity to the central commitments of feminism—agency, fulfillment, identity and the self, equity, empowerment, diversity, and social justice. I also seek to improve understanding of how gender identities and relations shape both the use of interactive technologies and their design. Additionally, feminist HCI entails critical perspectives that could help reveal unspoken values within HCI's dominant research and design paradigms and underpin the development of new approaches, methods and design variations.

Likely outcomes of this agenda include contributions such as the following:

- A comprehensive introduction to issues of gender and feminism as they pertain specifically to the professional practice and theorization of interaction design
- A *generative* integration of specific feminist perspectives in HCI and interaction design, that is, ways that feminism can support creative activity and novel problem-solving approaches
- Examinations of how technologies construct and perpetuate gender and the ensuing implications for the practice of design
- Attempts to move beyond the piecemeal use of feminist ideas in HCI, so as to integrate feminism in a more intellectually rigorous way
- Contributions toward the development and legitimization of a *Feminist HCI* research agenda that encompasses both theory and design practice

While feminism is generally known as a critical strategy, which too often suggests that feminism is only applicable

after the fact, in these bullets and the rest of the paper, I stress the potential for feminism to contribute to an action-based design agenda. That is, feminist approaches can integrate seamless and productively in all stages of the design process, including user research, prototyping, and evaluation.

To clarify the goals, intentions, and resources for such an agenda, I provide in the ensuing sections a brief overview of feminism as an intellectual discipline; an introduction to feminism in cognate fields, including STS, industrial design, and game design; a summary of the state of the art of feminism in HCI today; and I then propose a set of feminist interaction design qualities to clarify and solidify the feminist HCI agenda.

REINTRODUCING FEMINISM

Portrayals of feminism, in politics, the media, and even in HCI conferences, suggest that this household word is not always well understood. In this section, I offer a brief summary of the ways feminism, as an academic field, construes itself. Academically, feminism is often seen as a domain of critical theory that examines "the ways in which literature (and other cultural productions) reinforces or undermines the economic, political, social, and psychological oppression of women." [72]. Feminism integrates a collection of theories, analytical and interpretative methodologies, ethical values, and political positions, which have evolved over the past two centuries.

A Summary History of Feminism

Summarizing historically, feminism has gone through three major phases [76]:

- First-wave feminism (1830s-1920s) refers to the suffragette movement in the late 19th century/early 20th century in the US and UK that focuses on women's rights to vote and participate in democratic government.
- The second wave of feminism (1960s-1980s) corresponds with the intellectual movement of liberal humanism and is concerned with the emancipation of women from patriarchal structures and argues against the oppression of women. It includes liberal feminism, radical feminism, and black feminism among others.
- The third and present wave of feminism achieved critical mass in the early 1990s and confronts the second wave's essentialist position on femininity. It includes postmodern feminism, post-colonial feminism, and eco-feminism, among others. For the third wave, rather than treating "female" and "femininity" as given facts, biological or otherwise, third-wave feminism explores the construction of gender in media, institutions, embodied performances, scientific discourse, and so on. The third wave builds on the famous dictum of Simone de Beauvoir, "One is not born a woman, but becomes one" [31].

By making visible the manifold ways that gender is constructed in everyday life, contemporary feminism seeks to generate opportunities for intervention, making it a natural ally to design.

Feminist Epistemologies

The transition to third-wave HCI [16,45] represents not only a turn to a different sort of computing, but also to new epistemologies better suited to our changing design practice needs. Thus we have the continued exploration of Heideggerian phenomenology [34] and computer scientists appropriating literary theory and pragmatist philosophy to offer new ways of accounting for experience [59]. One of feminism's primary intellectual achievements has been the construction of a critical strategy for developing epistemologies: feminist standpoint theory.

Feminist standpoint theory [46,43] begins with the supposition that all knowledge attempts are socially situated and that some are better than others as starting points for knowledge. Knowledge production is inevitably enmeshed in acts of power, and in patriarchal societies, women's knowledge is suppressed. Accordingly, feminist standpoint theory advocates for the use of women's viewpoints and experiences as an alternative point of departure for social science research. This theory holds that cultural expectations and conventions in patriarchal societies limit women to certain roles with differential access to resources. The result is that women hold and produce different types of knowledge from their male counterparts, and that these different types of knowledge should be recognized and utilized as a resource, rather than marginalized. Feminist standpoint theory thus attempts to reconfigure the epistemic terrain and valorize the marginal perspectives of knowledge, so as to expose the unexamined assumptions of dominant epistemological paradigms, avoid distorted or one-sided accounts of social life, and generate new and critical questions [2].

Feminist standpoint theory's privileging of alternative epistemologies simultaneously introduces a new domain of user research—the "marginal" user, which forces us to think through what that would mean—and implies a new set of strategies and methods for user research.

FEMINISM IN COGNATE FIELDS

Interaction design is increasingly positioning itself as a design discipline, comparable to product design, information design, graphic design, fashion, and architecture. At the same time, HCI has always been the human face of engineering, and accordingly it has deep ties with psychology, science and technology studies and social informatics. Though its place in HCI remains somewhat unclear and underdeveloped, feminism is relatively established in all of these related fields. Thus, as a point of departure, we can consider how practitioners and researchers in these fields apply feminism in their work and specifically how their professional practice embodies feminist thinking.

Feminism in STS

Science and technology studies (STS) investigate how social, political, and cultural values and assumptions affect technological advancement and scientific research; it also investigates the converse, that is, the influences science and technology have on society. STS theorists postulate that ideas about women and men shape science and technology, evident in the decades-long practice of more men than women studying computer science, designing, implementing, administering network infrastructure, purchasing and using Internet and digital devices. The combination of the underrepresentation of women in these domains and the universalizing aspirations about the design and use of information and communication technologies have led STS researchers to warn of a digital divide and call attention to the inequities caused by technology's troubling relationship with gender [70, 42, 75, 49, 55, 47, 74].

Some application areas in HCI with obvious potential to benefit from this kind of thinking include accessible interaction, with its aspirations for "universal" design.

Feminism in Product and Industrial Design

Feminism is also established in the fields of design research and industrial design. Commenting on the role of feminist approaches in questioning how traditional design histories are understood and recorded, Victor Margolin writes, "Feminism is the most powerful critique of design history thus far" [cited in 6]. Design critic Philippa Goodall observes, "We live in a world designed by men. It is not for nothing that the expression 'man-made' refers to a vast range of objects that have been fashioned from physical material" [37]. Feminist design critics note that women as consumers and designers of artifacts are conditioned by the dominant (i.e., male) groups. Feminist design historian Cheryl Buckley writes that the notion of patriarchy is central to understanding women's role in design (i.e., how they are omitted from design and are often only referenced in relation to their male partners and/or family members). The result, she states, is that patriarchy in design prevents women from participating fully in all areas of society as well as different sectors of design. Buckley advocates the use of feminist theory in design research to "delineate the operation of patriarchy and the construction of the 'feminine'" and urges design researchers to understand women's contributions to design as a product of a sexual division of labor [20].

Cockburn and Ormrod use feminist design criticism to examine the design and dissemination of the microwave and the associated projection of women as consumers and objects in gendered advertising. They highlight how the design of the domestic technological artifact (i.e., microwave) is shaped by gender identity, and they consider a feminist strategy of change to productively overcome the divergence in gendered subjectivities in the design and use of everyday objects and technologies [27]. Gender identity and subjectivity are also increasingly important in the study of consumers' decision processes with regard to the acquisition, collection, and disposal of communication technologies [30,7,54].

Possible application areas in HCI for this strand of feminism include domestic computing and ICTs for developing countries.

Feminism in Architecture and Urban Planning

Architecture is a discipline that is centrally concerned with the production and consumption *contexts* of the design artifact, since buildings largely determine artifacts' physical boundaries. Feminist perspectives have played a significant role in the field of architecture since late 1970s, in the conceptualization of space and the built environment [28,63]. To Weisman [78], built environments are conditioned by social, political, and economic forces, and feminist criticism can contribute to our understanding of the impact of these forces upon urban spaces and domestic landscapes.

Building upon Weisman, Rothschild et al [65] explore spatial arrangements in dwellings and neighborhoods and examine how they manifest assumptions about people's needs, family relationships, as well as home and work. Focusing on environments, such as urban landscapes, the kitchen table, and housing design, etc., they conclude that these assumptions are often the result of the dominant ideologies. Anthony [3] promotes architectural designs that are more "sensitive to the needs of a diverse population." Feminism in architecture is integrated with the field in diverse ways: influencing architectural practice in general, creating a space for women architects to work, as well as contributing to the theorization of architecture as a discipline, from artifacts (buildings) to the contexts and spaces they help create.

Application areas in HCI for these applications of feminism include ubiquitous and pervasive computing, mobile computing, and domestic computing, among others.

Feminism in Game Design

Leisure technologies, with their immense popularity and marketability, are a source of interaction design that emphasizes pleasurable and affective experiences, learning, simulation, and creativity. In game design and research, feminist concerns have long been at the forefront of the field [22, 38, 1, 39, 44]. The portrayal of the female body, for example, is a commonly discussed topic in video game and virtual world research. Of course, women and games have had a notoriously troubled history, from the domination of the game market by young men to such things as the introduction of "breast physics" in the popular fighting game *Dead or Alive* or the softcore imagery of the popular magazine, *Girls of Gaming* [36]. Such features embody a "male gaze," which makes all players spectators of the female body. Physically formidable and sexually appealing to young male players, these heroines invite players to identify with them. This hybrid idealization of traditionally male

and female characteristics suggests that the construction and presentation of gender is very much part of the design of gaming experience. A more positive example is Laurel [53], whose game Purple Moon seeks to offer gameplay appropriate for pre-adolescent girls, replacing sexualized heroines killing monsters with play that enables girls to explore their concerns about friendship and other social development issues—a strategy that presumably could be used to design games for boys as well. Another positive example is Isbister [50], who explores the linkage between a robust array of gender-based preferences and player satisfaction through improved identification and/or roleplaying/fantasy.

Application areas in HCI that might benefit from this work include affective computing, intimate interaction, and experience design.

FEMINISM IN HCI: THE STATE OF THE ART

HCI continues to expand beyond the preoccupations with how efficiently a system performs and is becoming increasingly concerned with culture [8, 9, 5], society [11], and interested in the experiential qualities of computing [59]. The discipline stands to benefit from feminism, whose theories and concepts have much to offer HCI due to its commitments to issues such as the home, the constitution of gender and the self in everyday life, the indirect effects of design, alternative epistemologies, craft, emotion, desire, embodiment, performance, surveillance/gaze, and reflectiveness, among many others.

Of course, feminism is already a part of HCI, both because feminism is a part of the fields that are inputs to HCI as well as because of work in HCI that takes on concerns traditionally associated with feminism. Bødker and Greenbaum [14] apply gender perspectives to explore informal work relationship of systems developers. In an edited anthology on information technology and office systems, Green and her colleagues explore the intersection between gendered patterns of work relations and the design of ICTs [40]. Cassell [23] questions how gender differences, in particular, a deficit model of women and technology, undermine the design and development of interactive systems. Taylor and Swan pay special attention to women's work in the design and use of home organizing systems, such as calendars and to-do lists [68]. De Angeli & Bianchi-Berthouze focus on the examination of attitudinal and behavioral differences between men and women in the perception, acceptance, and usage of interactive technologies at AVI 2006 [32]. Bell and Dourish critique the inadequate use of family as the unit of analysis for domestic technology design, because male and female members of the family use technology in diverse ways [9]. In the ECSCW 2009 conference, Rode & Bødker attempt to forge connections between gender theory and computer supported cooperative work [64]. Clearly HCI is already benefitting from and contributing to feminist perspectives. The question moving forward is how to solidify these gains and more systematically integrate them into the field, e.g., in interaction design pedagogy, textbooks, and everyday practice.

OPPORTUNITIES TO DRAW ON FEMINISM IN HCI RESEARCH

For all of the changes that have come to HCI in the past decade, i.e., the changes brought on during the so-called "cultural turn" in HCI, usability remains in many ways at the center of the discipline. Yet if usability is to evolve to meet the challenges of third-wave HCI, it needs some updating. Universality, a value traditionally associated with masculinity, continues to dominate usability evaluation (e.g., mental models, Fitts' and Hicks' laws, usability lab protocols) and design methods (e.g., design process models such as waterfall and agile, design principles). De Angeli & Bianchi-Berthouze are correct in pointing out that "while gender is routinely controlled in usability evaluations, little is actually known on whether and how differences in gender should influence the design of interactive software." [32]. The interaction design process takes place independent of gender considerations, and even today the central concept of the whole field—the user—remains genderless. Gender preferences regarding UI components is of great interest to interaction designers and researchers alike, though it can be a contentious issue that becomes entangled in cultural expectations and even stereotypes [57, 69].

The growing body of domestic technology research in HCI manifests the field's increasing concern with new kinds of accounts of human interactions. These new accounts are increasingly informed by phenomenological, rather than rationalist, approaches. Domestic lives are subjective and emotional, and the "home" is more than the mere physical space of a house or apartment; it is also a cultural construct where gender identity plays a major role. Home lives, whether or not information technologies are involved, are often dictated by gender norms [29, 26, 10]. Thus, beyond the phenomenological accounts, which excel at subjective and experiential categories of use, one could argue that feminist approaches can bring clarity to the way that subjectivity and experience with technology are gendered—and what designers could and should do about that.

Feminism could also help us engaging with difficult dilemmas such as the following: How do we simultaneously serve real-world computing needs *and* avoid perpetuating the marginalization of women and indeed any group in technology? It would seem that serving existing needs—the traditional approach to HCI—is conservative and perpetuates the status quo. Conversely, an activist stance is problematic because it seems to privilege the social values of the designer. This is a vital ethical dilemma that is central to domestic computing and ICTs for developing countries, and our field as yet offers little practical guidance on how to cope with it.

Another potential intersection of feminism and HCI is ubiquitous computing. Ubicomp continues to stand on an

updated version of Weiser's 1991 vision in which technologies disappear and "weave themselves into the fabric of everyday life" [77]. An operationalized vision of this sort not only entails speculations about future technologies and interactions, but it also forces us to imagine and even commit to conceptualizations of space and place in light of these new technologies.

Humanist geography, and its offshoot feminist geography, is productive in helping us understand the locus of social interaction and power dynamics presented in space and place as a result of pervasive technologies. For example, feminist geographers often consider the body as a place, a "location or site…of the individual" [60]. Judith Butler develops the influential concept of "performativity," regarding gender as a performance in the "stylized repetition of acts" [21]. These perspectives prompt questions such as the following: How does a culturally constituted body enact community rules, beliefs, rituals, and power dynamics through Ubicomp's new spaces? How are places (re)configured as a result of Ubicomp to enable such performances?

Feminist theory is also productive in helping us understand the phenomena of social media and the culture of user-generated content. Gender identity play, sexism, and even sexual harassment are well known phenomena of social lives online and deserve further research [83, 67]. What is the role of gender in social media and virtual worlds? How do we design for different artificial gender (i.e., virtual cross-dressing), and how does and should it shape and affect interactions online?

In sum, I see the contribution of feminist theories and methods to HCI in the following ways:

- *Theory*: Feminism can critique core operational concepts, assumptions, and epistemologies of HCI, and at the same time, open up opportunities for the future
- *Methodology*: Interaction designers and researchers can incorporate feminism in user research, iterative design, and evaluation methodologies to broaden their repertoire for different contexts and situations
- *User Research*: The notion of "the user" can be updated to reflect gender in a way that noticeably and directly affects design
- *Evaluation*: Feminism can help make visible ways that designs configure users as gendered/social subjects—and what implications these configurations bear for future design work

QUALITIES OF FEMINIST INTERACTION

In their *Thoughtful Interaction Design*, Löwgren and Stolterman introduce a set of "use-oriented qualities of digital artifacts" as a way to articulate a holistic, pervasive collection of traits that characterizes a given design artifact [56]. My approach in this section is to extend this notion of "qualities" to develop a range of feminist interaction design qualities. These qualities are not, in themselves, necessarily unique to feminism; indeed, many of them already figure in various ways in HCI literature, most noticeably in third-wave HCI, in areas such as experience design, critical technical practice, and designing for interpretation and appropriation. Rather, it is this *constellation* of qualities—all of them appearing together in a critical mass—that I argue characterizes feminist interaction. The qualities I propose as a starting point are as follows: pluralism, participation, advocacy, ecology, embodiment, and self-disclosure.

Pluralism

Feminist standpoint theory critiques Western scientific epistemology, arguing that while science presents itself as natural and universal, and in doing so it becomes normative. A key feminist strategy is to denaturalize normative conventions, both exposing their constructedness as human discourses situated in socio-political institutions and exploring alternative approaches. A related strategy is to investigate and even nurture the marginal, for here alternatives to normalizing discourses are often most visible. The *quality of pluralism* refers to design artifacts that resist any single, totalizing, or universal point of view. This may seem like an obvious point, but even today, the introduction to a major HCI textbook published in 2009 [66] has a long section devoted to "Universal Usability." Likewise, "universal accessibility" remains at least a rhetorical goal of accessible computing.

The rise of information and communication technologies for developing countries research in HCI is a fertile ground for products that exhibit the pluralist quality of interaction design. Several projects in recent years have critiqued the Western universalism in technological advancement in developing countries, most notably in [35, 19]. A timeless and universal stance in cross-cultural design is dangerous because it demotes cultural, social, regional, and national differences in user experiences and outlooks. It also quietly and usually unintentionally imposes—without transparent or rational justification—Western technological norms and practices. In other words, universalizing approaches not only violate the standards of feminism, but they also violate the standards of science itself, because they cannot offer scientifically acceptable accounts of themselves.

We can see an example of this in the failed implementation of Whirlpool's "World Washer," in which a design was based on a universalizing model of clothes washing (including the shape, weight, and durability of clothes themselves), rather than direct contact and engagement with target user groups. When this washing machine was sent to south India, use of the washing machine led to the destruction of personal property (especially Indian women's saris, a fragile garment that is typically invested in profound emotional significance), frustrating user experiences, and impediment to adoption [25].

A more positive example is the design and release of "Rangoli," a visual phonebook for low-literate users in rural India [51]. Recognizing that in developing countries language and literacy are barriers that prevent people from using simple and essential applications like a phonebook on mobile phones, the design team engaged in extensive user studies in the villages of Chinchavli and Ukarul. The design team observed and interviewed people to learn how they currently stored phone numbers and contact information on paper, using small notepads (referred by locals as "diaries"), as well as how this paper-based system was imbued with personal and cultural characteristics. The design team recorded the conventions of organization principles of contact entries (both in the case of textual entries and number entries) found in these users' diaries with regard to languages (e.g., types of languages, whether alphabet order is used, etc.) and alternative organization schemes (e.g., by locations of the contact). The situated user research led to the design of "Rangoli," a phonebook that enables low-literate users to organize contacts' phone numbers into colors and icons in nine color pages. On each page a total of nine icons are displayed in that color. A contact is associated with a color and an icon, and all contacts can be accessed by pressing only two buttons on the number pad.

The quality of pluralism rejects the claims to universalism not on dogmatic terms, but because of the practical benefits of such an understanding. Pluralist designs are likely to be more human-centered than universalizing designs simply because "human" is too rich, too diverse, and too complex a category to bear a universal solution. Pluralist design encourages an alternative sensibility to design, foregrounding questions of cultural difference, encouraging a constructive engagement with diversity, and embracing the margins both to be more inclusive and to benefit from the marginal as resources for design solutions.

Participation

In conducting user research, sketching, prototyping, and evaluation, designers inevitably establish relationships with users as subjects. In controlled laboratory experiments, such as traditional usability studies, researchers establish an objective, distant, and scientific relationship with subjects. In auto-ethnographic research, anthropologists and user researchers obviously have quite an intimate relationship with subjects. The *quality of participation* refers to valuing participatory processes that lead to the creation and evaluation of design prototypes.

This quality depends on an epistemological position, namely that knowers are *not* substitutable for one another. The scientific value of replicability is based on the notion that different scientists collecting data from similar sources or populations and analyzing that data in the same ways should come up with similar findings. Yet much of design cannot be known scientifically, and ongoing participation and dialogue among designers and users can lead to valuable insights that could not be achieved scientifically. A participatory approach is compatible with empathic user research [81] that avoids the scientific distance that cuts the bonds of humanity between researcher and subject, preempting a major resource for design (empathy, love, care). This, of course, is not an argument against usability testing or other scientific strategies. Rather, we need to complement such approaches with participatory processes, especially when considering interaction-related phenomena that are deeply personal and subjective.

The participatory design (PD) movement originated in Scandinavia in the late 1960s and early 1970s illustrate design artifacts with such multi-voiced, participative quality. Projects such as Utopia and AT [13, 15] recognize and leverage the values of workers' participation in the improvement of the quality of information system design. Relying on the principle of collective resources, different groups of stakeholders (e.g., workers and managers) were brought in during the design process as a way to explore understandings of work practices and to inform design.

Contemporary examples of PD include the involvement of museum goers to contribute to exhibition design [71]; efforts to motivate community members to contribute to the resolution of local, community problems [58]; and the engagement of patients, medical professionals, and software developers in the improvement of dental practices [24]. Each of these approaches is inclusive and collaborative. They all demonstrate a respect for the expertise of different perspectives, including non-professional ones, regardless of backgrounds, status, and technical know-how.

Advocacy

As noted earlier, design often entails an ethical dilemma. In conducting needs analyses based on empirical research, designers are focusing on and working within the status quo. If they are not careful, they may perpetuate regressive and harmful practices and structures in service of usability. Conversely, designers that take an advocacy position, seeking to offer progressive design solutions, run the risk of imposing their own values on users and other stakeholders.

The *quality of advocacy* engages with this dilemma seriously. On the one hand, feminist interaction design should seek to bring about political emancipation and not just keep up with it. At the same time, it should also force designers to question their own position to assert what an "improved society" is and how to achieve it. Participatory approaches just described are a natural ally to this quality, because they distribute the authority and responsibility for such decisions across a polyvocal dialogue among stakeholders.

We can see this quality in tools designed for improving the lives of underrepresented populations in developing countries, such as Nokia Life Tools [61] or Ishakti [62]. These devices provide tailored information synchronized with crop cycles and weather, for example, so that farmers can maximize their productivity and make informed decisions about markets and pricings. These tools not only enable

individual users to design a personalized user experience, but they also empower people in isolated communities to participate in discourses, markets, and institutions previously out of reach.

Ecology

Material ecology theory emphasizes the extent to which an artifact participates in a system of artifacts [73, 52]. This structural approach considers ways that relationships among artifacts determine their meaning in the system or ecology.

Extending this notion of material ecology, the *quality of ecology* in feminist interaction design integrates an awareness of design artifacts' effects in their broadest contexts and awareness of the widest range of stakeholders throughout design reasoning, decision-making, and evaluation. It invites interaction designers to attend to the ways that design artifacts in-the-world reflexively design us [79], as well as how design artifacts affect all stakeholders.

The "Hoosier" cabinet [48], a kitchen cabinet popular in the early twentieth century and the predecessor of the modern kitchen cabinet, is an interesting example of a design that participated in the changing ecology of the American kitchen in the early twentieth century. With the rise of industrialism, household servants were leaving domestic service and entering factories, leaving well-to-do families to take on domestic chores on their own. Marketed as "the greatest household help that womankind has ever received at the hands of science," a design that "makes kitchen work a joy" [48], the Hoosier cabinet was equipped with a pull-out counter as a large work surface, a flour bin/sifter, and dedicated, built-in storage for various cooking utensils, supplies, pots, and pans.

The design rationale behind the Hoosier cabinet was to increase homemakers' efficiency in part to compensate for the loss of the household servant. The cabinet was a success in introducing new efficiencies into the kitchen. Less welcome from my perspective was its ecological byproduct: rather than emancipating women from household work, it more completely identified them with it: the tagline in contemporary ads boasted, over a picture of a woman in front of the Hoosier cabinet, "The best servant in your house." In short, the homemaker, once the mistress in the former kitchen ecology, has become a servant in the new one.

In HCI, we see a rising interest in the concept of ecology, both from the standpoint of systems theory [52] and in the environmental sense with the rise of sustainable interaction design [11]. What remains is to continue extending these rising ecological perspectives into considerations of gender, race, social class, developing countries, and so forth.

Embodiment

HCI's early tendency to understand the user in disembodied ways (e.g., mental models, information processing theories of the user) were criticized as early as the 1980s [80]. From situated action theory to embodied interaction, the field has since made significant progress in dealing with the embodied nature of human-computer interaction. The next stage of this agenda, that is, development on the *quality of embodiment*, needs to push embodiment in the direction of gender commonalties and differences, gender identity, human sexuality, pleasure and desire, and emotion.

Much of this work is already underway: HCI's recent preoccupation with emotion [17], fun [12], spirituality [82], food [41], sexuality [18; 4], embodied interactions [34], and whole-body interactions [33] is demonstrative of the significance of focalizing the agency of interaction not on the interface or its designer, but the bodies, motivating drives, and primordial urges of users. More work needs to be done on the differential ways that women and men experience and perform interactions in these new contexts.

Self-disclosure

Every design is founded on assumptions about users. As a field, user research helps us make these assumptions in reasoned ways. A byproduct of these assumptions is that every design projects its own "ideal user." The closer actual users conform to this ideal, the easier, or more powerfully, or more pleasurably they will interact with the design. For example, a consumer tax application, such as TurboTax, makes assumptions about the kinds of things its users know and don't know; the kinds of incomes and expenses they are likely to have; the amount of time they can devote to doing their taxes; and so on. A user who falls outside of this projected ideal user—because she understands the tax code much better or worse than the software expects, or because she has a more complex or more simple financial profile than the program anticipates—could find that the software simply fails her needs. This is a situation that is hard to avoid, and it is naïve to suggest that tax software should work for all people all of the time (i.e., be "universal").

At the same time, we can also see that using software *constitutes* users as subjects; that is, it makes us become the kind of user the software is for, bracketing aside the rest of ourselves that is not relevant to the software. The software gives us an identity that we are pressured into accepting. The *quality of self-disclosure* refers to the extent to which the software renders visible the ways in which it effects us as subjects. Self-disclosure calls users' awareness to what the software is trying to make of them, and it both introduces a critical distance between users and interactions, and also creates opportunities for users to define themselves for software.

Amazon.com's recommendation service is a good example of self-disclosure. Many of us define ourselves both publicly and privately based on the kinds of media we consume, including movies, music, and books. Amazon tracks several kinds of information about our media consumption habits on its site, including purchasing habits, browsing habits, wish listing habits, the habits of people with similar profiles on Amazon, the habits of popular culture at-large,

and so on. I am positioned not only as a media consumer, but as a certain kind of media consumer.

At the same time, Amazon is transparent about how it constitutes visitors as media consumers. Recommendations often appear on the site accompanied by a link, "Fix this recommendation." Clicking the link exposes the algorithm by which the user is constituted as a potential consumer of a given item: it is because the user bought/browsed some *other* item, which Amazon associates with the recommended item. It then offers several mechanisms by which the user can do something about it: one can rate items, claim to own them, say it was a gift, and even check a box called "Don't use for recommendations."

This process became valuable to me as an Amazon user who is also a researcher of gender studies and human sexuality. Due to a series of book purchases related to my field of research, Amazon started recommending erotic fiction and photobooks on my Amazon start page with pictures. Not wanting to be visually constituted as a consumer of erotica and even pornography—especially on a computer I use in my office—I made use of these options to communicate back to Amazon what kind of subject I want the application to treat me as.

CONCLUSION

In offering this conceptualization of the Feminist HCI agenda, I have referred to analogous fields, including STS, architecture, and industrial design, and I have outlined a vision of how feminism provides opportunities for the discipline. Building on these traditions and potentials, I have articulated a series of qualities that compose my present understanding of *feminist interaction design*. My goal in doing this is not to propose a radical departure from what we already do in HCI, but rather to clarify and solidify an agenda that seems already to be underway but seldom recognized as such.

Stepping back, one can broadly distinguish among two general ways that feminism contributes to interaction design: *Critique-based* and *generative.*

- Critique-based contributions rely on the use of feminist approaches to analyze designs and design processes in order to expose their unintended consequences. Such contributions indirectly benefit interaction design by raising our sensibilities surrounding issues of concern.
- Generative contributions involve the use of feminist approaches explicitly in decision-making and design process to generate new design insights and influence the design process tangibly. Such contributions leverage feminism to understand design contexts (e.g., "the home" or the "workplace"), to help identify needs and requirements, discover opportunities for design, offer leads toward solutions to design problems, and suggest evaluation criteria for working prototypes, etc.

Critique-based feminist approaches are already influential in computing, especially in social informatics and STS. Yet HCI is an action-oriented field driven by its practitioners, who design interactions that (hopefully) improve lives. Thus, there is an opportunity for the field to develop feminism's generative contribution type. As I have argued throughout this paper, I believe that feminism has enormous potential to affect design practice directly, helping us to generate concrete new design directions and new approaches to studying users. Feminism has far more to offer than pointing out instances of sexism after the fact. Cognate fields offer models for what such contributions might look like, and existing positive examples in HCI need recognition so that they might better serve as models for us to move forward. The constellation of feminist interaction design qualities I have offered here will hopefully serve as the beginning of a conversation about how our community moves this agenda forward.

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REFERENCES

1. Agosto, D. Girls and gaming: A summary of the research with implications for practice. http://tinyurl.com/mnsho5. Retrieved: July 19, 2009.
2. Alcoff, L. and Potter, E. *Feminist Epistemologies*. Routledge, 1992.
3. Anthony, K. *Designing for Diversity: Gender, Race, and Ethnicity in the Architectural Profession*. U of Illinois Press: Urbana and Chicago, 2001.
4. Bardzell, S., & Bardzell, J. Docile avatars: Aesthetics, experience, and sexual interaction in Second Life. *Proc. of British HCI 2007*, (2007).
5. Bardzell, J. Interaction criticism and aesthetics. *Proc. of CHI 2009*, ACM Press (2009), 2357-2366.
6. Barnard, M. *Approaches to Understanding Visual Culture*. Palgrave, Hampshire, UK, 2001.
7. Belk, R., and Wallendorf, M. Of mice and men: Gender identity in collecting. In Pearce, S. (ed.). *Interpreting Objects and Collections*. Routledge, London and New York, 1992, 240-253.
8. Bell, G., Blythe, M., & Sengers, P. Making by making strange: Defamilarization and the design of domestic technology. *TOCHI 12*, 2(2005), 149-173.
9. Bell, G, and Dourish, P. Yesterday's tomorrows: Notes on ubiquitous computing's dominant vision. *Personal and Ubiquitous Computing* (2006).
10. Berg, A. A gendered socio-technical construction: The smart house. In MacKenzie, D., and Wajcman, J. (eds). *The Social Shaping of Technology*. Open University Press, United Kingdom,1999, 301-313.

11. Blevis, E. Sustainable interaction design: Invention & disposal, renewal & reuse. *Proc. of CHI'07*, ACM Press (2007), 503-512.
12. Blythe, M., Overbeeke, K., Monk, A., and Wright, P. *Funology: From usability to Enjoyment*. Springer, 2003.
13. Bødker, S., Ehn, P., Kammersgaard, J., Kyng, M., & Sundblad, Y. (1987). A utopian experience. In G. Bjerknes, P. Ehn, & M. Kyng. (eds.), *Computers and democracy-A Scandinavian challenge*. Aldershot, England: Avebury, 1987, 251-278.
14. Bødker, S. and Greenbaum, J. A feeling for systems development work. In K. Tijdens, et al (eds.). *Women, Work and Computerization*. North Holland, 1988.
15. Bødker, S. Creating condictions for participation: Conflicts and resources in system development. *Human Computer Interaction 11*, 3 (1996), 215-236.
16. Bødker, S. When second wave HCI meets third wave challenges. *Proc. of NordiCHI'06,* ACM Press (2006).
17. Boehner, K., DePaula, R., Dourish, P., and Sengers, P. How emotion is made and measured. *International Journal of Human-Computer Studies* 65, Elsevier Ltd (2007), 275-291.
18. Brewer, J., Kaye, J., Williams, A., and Wyche, S. Sexual interactions: Why we should talk about sex in HCI. *Ext. Abstracts CHI 2006*, ACM Press (2006).
19. Brewer, E., Demmer, M., Ho, M., Honicky, R., Pal, J., Plauché, M., and Surana, S. The challenges of technology research for developing regions. *Pervasive Computing*. April-June, (2006), 15-23.
20. Buckley, C. Made in patriarchy: Toward a feminist analysis of women and design. In Margolin, V. (ed). *Design Discourse: History, Theory, Criticism*, 1989.
21. Butler, J. *Gender trouble.* Routledge, London, 1990.
22. Cassell, J., & Jenkins, H. Chess for girls? Feminism and computer games. In J. A. Cassell & H. Jenkins (eds.), *From Barbie to Mortal Kombat: Gender and Computer Games*. The MIT Press, Cambridge, USA,1998, 2-45.
23. Cassell, J. Genderizing HCI. In J. Jacko & A. Sears (eds.), *The Handbook of Human-Computer Interaction* Lawrence Erlbaum, Mahwah, NJ, 2002, 402-411.
24. Cederman-Haysom, T. and Brereton, M. A participatory design agenda for ubiquitous computing and multimodal interaction: A case study of dental practice. *Proc. of PDC*'06, ACM Press (2006).
25. Chavan, A., Gorney, D., Prabhu, B., Arora, S. The washing machine that ate my sari: Mistakes in cross-cultural design. *Interactions,16,* 1 (2009), 26-31.
26. Cockburn, C. The circuit of technology: Gender, identity, and power. In Silverstone, R. and Hirsch, E. (eds). *Consuming Technologies: Media and Information in Domestic Spaces*. Routledge, London & New York, 1992, 32-47.
27. Cockburn, C., & Ormrod, S. *Gender and Technology in the Making*. Sage Publications, Ltd., 1993.
28. Coleman, D., Danze, E., Henderson, A. *Architecture and Feminism*. Princeton Architectural Press, New York, 1996.
29. Cowan, R. *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. Basic Books, New York, 1983.
30. Cowan, R. The consumption junction: A proposal for research strategies in the sociology of technology. In Bijker, W., Hughes, T., and Pinch, T. (eds.). *The Social Construction of Technological Systems*. The MIT Press, Boston, MA, 1989, 261-280.
31. De Beauvoir, S. *The Second Sex*. Vintage, New York, 1989.
32. De Angeli, A., and Bianchi-Berthouze, N. Gender and interaction: Real and virtual women in a male world. *AVI 2006* workshop (2006).
33. Dix, A. Whole body interactions. http://tinyurl.com/lhqxad
34. Dourish, P. *Where the Action is: The Foundations of Embodied Interaction*. MIT Press, 2006.
35. Dray, S., Siegel, D., & Dotze, P. Indra's Net: HCI in the developing world. *Interactions*, *10* (2003), 28-37.
36. Girls of Gaming. Fusion Publishing. Retrieved 07/19/09. http://tinyurl.com/pfvj8l
37. Goodall, P. Design and gender. In *The Block Reader in Visual Culture.* Routledge, 1983.
38. Gorriz, C. M., & Medina, C. Engaging girls computers software games. *Communications of the ACM, 43*,1 (2000), 42-49.
39. Graner-Ray, S. *Gender-Inclusive Game Design: Expanding the Market.* Charles River Media, Hingham, MA, 2003.
40. Green, E., Owen, J., and Pain, D. *Gendered by Design? Information technology and office systems*. Taylor & Francis, London, 1993.
41. Grimes, A. and Harper, R. Celebratory technology: New directions for food research in HCI. *Proc. of CHI'08*, ACM Press (2008).
42. Haraway, D. A cyborg manifesto: Science, technology, and socialist feminism in the late twentieth century. In *Simians, Cyborgs, and Women: The Reinvention of Nature* (pp.149-181). Routledge, New York, 1991.
43. Harding, S. *The Feminist Standpoint Theory Reader: Intellectual and Political Controversies*. Routledge, 2003.
44. Hartmann, T., and Klimmt, C. Gender and computer games: Exploring females' dislikes. *Journal of Computer-Mediated Communication, 11*, 4 (2006), article 2.
45. Harrison, S. Tatar, D. and Sengers, P. The three paradigms of HCI. *Ext. Abstracts CHI 2007*, ACM Press (2007).
46. Hartsock, N. The feminist standpoint. In S. Harding and M. B. Hintikka (eds). *Discovering Reality*. D. Riedel Publishing Company, Holland, Boston, London, 1983, 283-310

47. Herring, S. C., Ogan, C., Ahuja, M., and Robinson, J. C. Gender and the culture of computing in applied IT education. In: E. Trauth (Ed.), *Encyclopedia of Gender and Information Technology*. Information Science Publishing, Hershey, PA, 2006.
48. Hiller, N. *The Hoosier Cabinet in Kitchen History*. Indiana University Press, Bloomington, IN, 2009.
49. Hubbard, R. Science, facts, and feminism. In Wyer, M., Barbercheck, M., Giesman, D., Öztürk, H., and Wayne, M. (eds.). *Women, Science, and Technology.* Routledge, New York, London, 2001,153-160.
50. Isbister, K. *Better Game Characters by Design: A Psychological Approach.* Morgan Kauffmann, 2006.
51. Joshi, A., Welankar, N., BL, N., Kanitkar, K., and Sheikh, R. Rangoli: A visual phonebook for low-literate users. *Proc. of MobileHCI* (2008).
52. Krippendorff, K. *The Semantic Turn: A New Foundation for Design*. CRC Press, Boca Raton, FL, 2006.
53. Laurel, B. *Utopian Entrepreneur*. MIT Press, 2001.
54. Lerman, N., Mohun, A., and Oldenziel, R. Versatile tools: Gender analysis and the history of technology. *Technology and Culture 38* (1997), 1-8.
55. Longino, H. Can there be a feminist science? In Wyer, M., Barbercheck, M., Giesman, D., Öztürk, H., and Wayne, M. (eds.). *Women, Science, and Technology.* Routledge, New York, London, 2001, 216-222.
56. Löwgren, J. and Stolterman, E. *Thoughtful Interaction Design*. MIT Press, 2004.
57. Marcus, A. Human communications issues in advanced UIs. *Communications of the ACM 36,* 3 (1993),101-108.
58. Merkel, C., Xiao, L., Farooq, U., Ganoe, C., Lee, R., Carroll, J., and Rosson, M. Participatory design in community computing contexts: Tales from the field. *Proc. of PDC*'04, ACM Press (2004).
59. McCarthy, J. and Wright, P. *Technology as Experience.* The MIT Press, 2004.
60. McDowell, L. *Gender, Identity, and Place: Understanding Feminist Geographies.* Minneapolis: University of Minnesota Press, 1999.
61. Nokia Life Tools. http://tinyurl.com/n4atc9
62. Patel, S., Bataveljic, O., Lisboa, P.J., Hawkins, C., Rajan, R. iShakti: Crossing the digital divide in rural India. *Proc. of IEEE WI'06* (2006).
63. Rendell, J., Penner, B., and Borden, I. *Gender Space Architecture: An Interdisciplinary Introduction*. Routledge, London and New York, 2001.
64. Rode, J. and Bødker, S. Considering gender in ECSCW. ECSCW 2009 workshop (2009).
65. Rothschild, J. *Design and Feminism: Re-Visioning Spaces, Places, and Everyday Things*. Rutgers UP, New Brunswick, New Jersey, and London, 1999.
66. Shneiderman, B., and Plaisant, P. *Designing the User Interface*. Addison-Wesley, 2009.
67. Taylor, T. L. Multiple pleasures: Women and online gaming. *Convergence: The International Journal of Research into New Media Technologies, 9*, (2003), 21-46.
68. Taylor , A., and Swan, L. Artful systems in the home. *Proc. of CHI'05*, (2005), 641-650.
69. Teasley, B., Leventhal, L., Blumenthal, B., Instone, K., and Daryl, S. Cultural diversity in user interface design: Are intuitions enough? *SIGCHI Bulletin 26,* 1 (1994), 36-40.
70. Turkle, S. Computational reticence: Why women fear the intimate machine. In C. Kramarae (ed.), *Technology and Women's Voices*, 1988, 41-61.
71. Taxén, G. Introducing participatory design in museums. *Proc. of PDC'04*, ACM Press (2004).
72. Tyson, L. *Critical Theory Today: A User Friendly Guide.* Routledge, New York and London, 2006.
73. Verbeek, P. *What Things Do: Philosophical Reflections on Technology, Agency, and Design*. Penn State University Press, University Park, PA, 2005.
74. Von Hellens, Annikki, L., Nielsen, S., Kaylene, C., and Beekhuyze, J. Conceptualizing gender and IT: Australians taking action in Germany, 2005.
75. Wajcman, J. *Feminism Confronts Technology.* Penn State University Press, University Park, PA, 1991.
76. Waugh, P. *Literary Theory and Criticism.* Oxford, UK: Oxford UP, 2006.
77. Weiser, M. The computer for the 21st century. *Sci Am 265*, 3(1991), 94-104
78. Weisman, L. *Discrimination by Design: A Feminist Critique of the Man-Made Environment*. U of Illinois Press, Urbana and Chicago, 1994.
79. Willis, A.M. Ontological designing. *Design Philosophy Papers.* #02/2006 (2006).
80. Winograd, T. and Flores, W. *Understanding Computers and Cognition*. Addison-Wesley, Norwood, NJ, 1986.
81. Wright, P. and McCarthy, J. Empathy and experience in HCI. In *Proc. of CHI 2008*, ACM Press (2008).
82. Wyche, S., Hayes, G., Harvel, L., and Grinter, R. Technology in spiritual formation: An exploratory study of computer mediated religious communications. *Proc. of CSCW 2006*. ACM Press (2006).
83. Zanbaka, C., Goolkasian, P., Hodges, L. F. Can a virtual cat persuade you? The role of gender and realism in speaker persuasiveness. *Proc. of CHI 2006*, ACM Press (2006), 1153-1162.