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A Historical View of Studies of Women's Work

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Abstract.   This paper places observational studies of women's work in historical perspective. We present some of the very early studies (carried out in the period from 1900 to 1930), as well as several examples of fieldwork-based studies of women's work, undertaken from different perspectives and in varied locations between the 1960s and the mid 1990s. We outline and discuss several areas of thought which have influenced studies of women's work - the automation debate; the focus on the skills women need in their work; labour market segregation; women's health; and technology and the redesign of work – and the research methods they used. Our main motivation in this paper is threefold: to demonstrate how fieldwork based studies which have focussed on women's work have attempted to locate women's work in a larger context that addresses its visibility and value; to provide a thematic historiography of studies of women's work, thereby also demonstrating the value of an historical perspective, and a means through which to link it to contemporary themes; and to increase awareness of varied methodological perspectives on how to study work.

Keywords: Women, Work, Field studies, History, Skill, Technology, Health, Feminism, Gender

1. Introduction

In 2017, a group of (women) scholars held the 3rd of a series of workshops at the annual CSCW conference, in order to discuss feminist approaches to computer supported cooperative work (Fox et al. 2017). They viewed the workshop as an opportunity to develop feminist research and practice generally, and an intersectional feminist approach specifically - one that goes beyond understanding 'women' as a single monolithic category, and offers more than single axis frameworks for under-standing oppression, and instead recognizes that the effects of oppression cannot be understood in isolation from one another. They suggested that 'CSCW has come to embrace several forms of feminist thought' (Fox et al. 2017, p. 388).

At around the same time, based on our longstanding interest in studies of women's work which dates back to the 1980's, we thought about how to bring the large body of studies of women's work to the attention of the CSCW community. There are long traditions of studying women's work which remain little known in the CSCW community, yet rich in detail. As Star's (1990) work so often illustrated, studying those who are 'othered' and invisible can lead to great insights about the nature of work and human interaction. Also, studying populations that have been neglected as

subjects of study can yield insights from which the entire population can benefit. Finally, examining varied epistemological traditions which have informed fieldwork-based studies of women's work serves as a rich backdrop through which we can explore often implicit assumptions about how people act and interact at work. Arguably, this can help us develop useful and meaningful CSCW systems.

Like Fox et al. (2017), we seek to contribute to the dialogue about feminist research and practice within CSCW. In contrast to their forward-looking efforts, here we look back. We seek to provide an historical, methodological and epistemological context which can help guide contemporary CSCW researchers as they explore the roots of their field of study. Additionally, through our historical account we hope to demonstrate to contemporary readers that while theory and method are sometimes treated separately in fieldwork, addressing both while exploring broader questions of context can lead to rich approaches and fresh insights. We are specifically interested in making varied intellectual traditions which have supported observationally based studies of women's work in the past visible—particularly the work of non-anglophones, as these bodies of work have often remained invisible outside of the regions and language groups which have supported their development, yet they have much to contribute to CSCW practitioners.

1.1. Narrowing our focus

As CSCW as an area of inquiry has grown and evolved, so too have the topics it addresses, the methods of inquiry it has drawn on (which themselves have changed over time), and the theoretical insights which have informed research questions, research methods and analyses of results. Having both been engaged in early studies about women and computing, and observed changes over time in theory, methods, the topics explored within CSCW and of course the study of gender (which now includes, but is not limited to the study of women), we are compelled to both look back at past contributions which focus on women as subjects of study and what these contributed to CSCW, and to explore the context of those contributions in relation to what they can contribute to contemporary studies within CSCW.

Given this rich and varied body of research, we faced the challenge of deciding which of the many studies of women's work to present in this paper and on which grounds. From the perspective of CSCW research, our main criterion was to focus on studies of women's work which had a significant fieldwork component and on research that describes the work women engage with at some level of detail. We chose this focus largely because observational work undertaken from an anthropological perspective was a key element of the evolution of CSCW. However, (arguably), as observational methods gained acceptance within more mainstream computer science, the link between the theoretical bodies which gave rise to the use of these methods within CSCW have fallen from view, leaving more recent entrants to the field of CSCW lacking awareness of some of the rich traditions of the past, and how those traditions, when combined with a focus on women as subjects of study,

led to insights within CSCW which remain salient today. Methodologically, this proved an interesting challenge, as norms of scholarship have evolved over time, and many early studies lacked details about methods used.

A second criterion in choosing studies to consider here was that work we have included provides insight into the wider context in which women's work takes place. Our idea was to look for research that takes account of women's waged work but also the reproductive work done in the family, and that, most importantly, addresses the key issues of the larger debates feminist scholars have contributed to with the intent to 'document the importance of women workers while establishing women's roles as active and autonomous agents in labor's history' (French and James 1997, p. 3).

These two criteria—studies which were based on fieldwork, and which, through their focus on women's paid and unpaid work documented women's active roles, gave rise to the three aims of this paper:

- to make this diversity of studies visible and with it the topics/issues researchers of women's work engaged with in the past, and highlight the relevance of those topics for contemporary CSCW research;
- to assume an historical perspective with the aim of providing a thematic historiography of studies of women's work, thereby also demonstrating the value of an historical perspective, and offering a means through which to link it to contemporary themes; and
- to increase awareness of varied methodological perspectives on how to study work.

Our selection of studies is guided by a decision to focus on what may be considered pioneering studies in the field which are either representative or exemplary of the tradition in which they were carried out, and which serve as a means through which issues common across many studies of women and work can be explored. Our work here shares characteristics with scholarly genealogy, one of Foucault's key concepts. We seek to not simply tell another story, but rather to bring the different lenses through which women's work has been viewed historically into clearer focus, in order to set out new conditions of possibility: what Kate Soper (1993) has described as enabling 'an insurrection of subjugated knowledges… not by setting aside legitimating documents, but by proliferating them; not by removing the allegedly rightful heir, but by standing up for bastards' (Gillette 2018, p. 24). Although genealogical pieces have been much maligned, like a good map they can help us trace our path, and find our way. In the case of studies of women's work within CSCW, following Lorenzini's (2020) notion of 'a possibilising genealogy' we hope that by looking at the past we contribute to alternative histories that may be of interest to the CSCW community.

A project to engage with the 'history and historiography of technology' has been suggested by Soden et al. (2019) as this 'may surface alternative, or forgotten, design pathways. Such "paths not taken" can expand our sources of design inspiration and increase our capability for critique and reflection' (p. 518). We also seek to contribute to a discussion of how investigating the past can inform the design, critique and

conceptualization of technology, however, within the context of studying women's work. Soden et al. (2019) suggest that 'the design and evaluation of technology, as practiced in CSCW and HCI, tends to focus on the immediate present and near future' (p. 518); and while they acknowledge that a focus on the present and future (of technology) is necessary in the context of CSCW and HCI, they also argue that 'the lack of historical view threatens to leave out a wealth of resources that can inspire design, provide exemplars for comparative analysis, and help develop a deeper understanding of [technology] development' (p. 518).

While Soden et al. (2019) focus on historical studies of technology, we have cast our backwards glance at historical studies of women's work and, specifically, those studies in which observational fieldwork was undertaken, hoping to contribute to discussions about the interplay of theory and method in the context of ethnography used for design. Our interest is in demonstrating that women's visibility is important for the field of CSCW and we seek to foreground how issues addressed in the past – such as the importance of debates about technology and skill; why a global perspective is not only important, but imperative; and why a wide methodological repertoire may be necessary to address these issues – may enhance CSCW research. We know our efforts are just a beginning and there is much more work to be done.

Our exploration begins with a few early and almost forgotten observational studies (Bernays, Butler, Donovan) because they are astonishingly 'modern' with respect to the underlying political motivations and issues (section 2.1). We then go on to discuss what we now consider classic studies of women's work undertaken in the period from the late 1960s to the mid 1990s (although in some intellectual communities questions about women's work and the relationships between unpaid and paid work, etc., were addressed already in the 1950s and 1960s), when feminist scholarship developed and extended to women's work (Section 2.2).

Section 2 provides a chronologically organized narrative highlighting the issues that some of the pioneering studies addressed, their political background and motivations (Sections 2.3, 2.4 and 2.5 each explore different intellectual traditions), with the intent of demonstrating the variety of these studies but also the fundamentally global outlook feminism and the women's movement brought to the study of women's work.

While the studies we describe portray examples of women's work as it was decades ago, the issues that were discussed, which we explore thematically in Section 3, are still relevant today. After outlining key themes which emerged in feminist scholarship of the era, we go on to situate studies of women's work within the larger debates of the time which they reflected and contributed to (Section 3.1). For example, much of the research about women's work was motivated by the ambition to demonstrate the 'invisible skills' in women's work, as well as the different valuation of different types of skills (e.g., recently taken up in Rosner et al. 2018). Work undertaken between the 1960s and 1990s also contributed to an understanding of labour market segregation (which has continued), and highlighted the flexibility of gender attributions on the one hand but also examined the

intersection between women's paid work and their work at home, on the other hand. Studies concerned with working conditions and their implications for women's health were frequently undertaken during this period, and remain a significant focus of studies of women's work. Finally, feminist scholars debated the nature of technology and, from the 1980s onwards, discussed issues around 'women, work and computerization' with a focus on design[1].

In the concluding section of the paper, we discuss the relevance of the material covered here to CSCW. Our main argument focuses on how looking at work across multiple contexts - as it was practiced in the classic studies of women's work which we outline here - may add to the ways collaborative technologies are designed and implemented in real work contexts. We also suggest that new insights may be gained from review and utilization of methods previously used to study women's work.

As Steinhardt et al. (2015) have noted, 'CSCW has recently seen a resurgence of interest in gender and feminist approaches' (p. 304). Hence, it is a good time to capitalize on what they have identified as a revived momentum, by providing opportunities for 'interested scholars and practitioners to pragmatically reflect on the gains and challenges of a feminist approach to CSCW scholarship' (p. 304). We couldn't agree more. We hope that the methodological richness with which women's work has been studied in the past in varied linguistic and national settings will resonate with those pursuing the study of women's work in the CSCW community today, in varied settings.

2. Feminism and the value of women's work – an overview

The type of studies we have come to think of as studies of women's work which have been undertaken as a basis for improving the design of computer supported cooperative work systems are part of a long and rich tradition of empirical work. And, like many similar studies undertaken today, past empirically grounded studies of women's work- like today - explored women's work in diverse settings, and across multiple contexts. Like today, such studies were often also politically motivated and often had a global perspective.

2.1. Early studies of women's work

The early examples of women studying women's wage labour are not feminist in the way we understand feminism today, but they were all motivated by a commitment to improving womens' professional education in order to advance their chances on the labour market. In Germany, at the end of the nineteenth century, Minna Wettstein-Adelt

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[1] For example, the advent of robotics which has revived the automation debate in a new form (driven by the visions and promises of engineers and industry) may draw inspiration from the work of feminist scholars in the 1980s and 1990s which not only provided detailed accounts of how technologies changed the skill requirements of work; they also demonstrated the effects of policy decisions on the opportunities for women to upgrade skills and access to new kinds of work.

entered four different factories in order to immerse herself in the (working) lives of ordinary women workers. Her political and religious commitments made her focus not only on the working conditions, on 'ignorance' and exploitation, but she strived for an understanding of the women's milieu and their moral standing. In her book *3 ½ Monate Fabrikarbeiterin* (*3 ½ Months as a Factory Worker*) she wonders about some of her observations, in particular about the fact that:

> Many of these girls take pleasure from their work, in particular those who are weaving smaller carpets or single, tailored curtains and are able to follow a pattern's progress. They love their machines like you may love a dog; they polish them so they are shiny, attaching colored ribbons, pictures of saints or other frippery their lovers gave them on the fairground to their rods (Wettstein-Adelt 1893, p. 20).

She also remarks on appalling working conditions and is amazed at the level of skill some of the work, such as weaving complex patterns, requires. Her main concerns, however, are as the chapter headlines show, the women's moral standards, 'thrift and honesty', marriage, living conditions, religion, and 'pleasures'.

In England, Beatrice Webb, who did not study women's work per se but collaborated in Charles Booth's research, had a more work-related and also more systematic approach. The first chapter of *The Problems of Modern Industry*, (1898) which she wrote together with her husband Sidney Webb, is called *Diary of an Investigator*. Here she provides extracts of notes, for example:

> There is a general Babel of voices as each 'hand' settles down in front of the bundle of work and the old tobacco or candle-box that holds the cottons, twist, gimp, needles, thimble, and scissors belonging to her. They are all English or Irish women, with the exception of some half-dozen welldressed 'young ladies' (daughters of the house), one of whom acts as forewoman, while the others are already at work on the vests (Webb 1898a, p. 5).

Webb (1898b) emphasizes the importance of note taking and the need to engage in an inductive movement from data to claims, as in her study *How to Do Away With the Sweating System* where she comments: 'First, we must decide what we mean by sweating and the sweating system; and secondly, we must determine the cause of these evils' (p. 139).

Marie Bernays was a trained economist who in 1908, under the supervision of the Weber brothers Alfred and Max, undertook a comprehensive study of the 'selection and adaption among the workers in large, self-contained industrial enterprises, based on conditions in the Gladbach spinning and weaving company in Mönchen-Gladbach'. Marie Bernays' research, which included both female and male workers, was inspired by the bourgeois women's movement of her time. She stressed the necessity for women to receive professional training, which would not only ensure their means of subsistence

and economic independence but also foster the development of a new culture of women's work.

In 1908 Elizabeth Beardsley Butler carried out a survey of the working conditions of women in nearly 400 companies as part of the so-called Pittsburgh Survey. A year later followed a study of *Saleswomen in Mercantile Stores* in Baltimore, which was published posthumously (Butler died from tuberculosis at the age of 26). Also Butler, who was a declared feminist, saw women as confined to repetitive, often physically exhausting dead-end jobs. She was convinced of the necessity of training for skilled jobs and collective organization.

Frances Donovan, published three books between 1919 and 1939 (the last one about women teachers), all based on participant observation, which are ethnographic studies of the occupational experience of women in the labour market, of a highly personalized character, which seemingly diminished their academic value. Celarent (2009) writes about *The Woman Who Waits* (1920):

> What makes this book a classic, however, are the fine details. Donovan tells us that her wedding ring loses her tips, that winning large tips becomes an irresistible game, that 'girls' steal each other's setups, that they eat leftovers off diners' plates, that they point out customers known (from experience) to have strange sexual tastes. She tells us about the rats gorging themselves in the kitchen of the pleasant, home-style neighborhood restaurant. She allows herself numerous diatribes on women customers. She chronicles the sex games of waitresses in great and often hilarious detail (Celarent 2009, p. 986).

In 1937 Marcelle Capy, a journalist and political militant, published 'Avec les travailleuses de France[2] (With the women workers in France)' which was based on work in factories as an *incognito*, arguing that this is the only way to get to know the work situation:

> Given the ravaging spying, the punishments, the menaces, it is easy to imagine that the workers keep silent. Since the women are scared, since the labour inspectors have no influence, how are we to conduct enquiries? There was only one possibility, to enter this workhouse, work there, suffer yourself the hardships inflicted on the workers. See and understand. Hence, no denunciations, no sanctions after my leaving. I decided to enter the enemy's territory in order to find out precisely what happens to our prisoners. I went there. I have seen (Capy and Valette 1984, p. 108).

A famous book is Weil's (1951) 'La condition ouvrière' in which she reports on her observations in several factories. Weil's physical fragility made the heavy work almost unbearable for her. She describes the physical hardship as well as the deep fear of

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[2] Translation of quotes from French and German to English by the authors.

committing errors, causing an accident, breaking a tool, or not being able to cope with the imposed speed of production:

> The slightest admonishment is a harsh humiliation, since you do not dare to respond. And how many things can lead to a reprimand! The machine has been badly adjusted by the fitter; a tool is made of bad steel; the workpieces are impossible to place appropriately: you are being yelled at. You cross the workshop to ask your boss for a job, you get blocked off. If you had managed to arrive at his office, you would also have been yelled at. You complain of a job that is too hard or a piece rate impossible to follow, you are brutally reminded that you occupy a place that hundreds of unemployed people would be eager to take. But daring to complain really requires that you are unable to continue (Weil 1951, p. 146).

Taken together, these authors addressed several key issues which remained of interest to contemporary feminist scholars and CSCW practitioners. For example, Webb brought a focus to observation as a valid empirical method, and the role it could play in developing insights about the day to day realities of women's work. Bernays' research was undertaken within the context of then contemporary concerns about working conditions (moral concern), and the desire to elevate women as workers- recognizing both their need for training and their skills. Butler's work presaged a concern about the nature of women's work (that it is often repetitive and viewed as lacking in a skill requirement and hence lacking in value). Donovan's study linked women's everyday work experiences in the paid labour force to the broader context of women's lives—as objects of male desire (1929). Her work demonstrated how work activities are often part of informal cultures and implicit belief systems. Weil, the philosopher, and Capy, the journalist, were exceptional in their determination to get to know the situation of workers from inside and their motivation to do so was clearly political (Vigna 2015).

2.2. The rise of feminism in the 1960s

While these studies were exceptional pieces of research and in many ways singular, the rise of feminism in the mid to late 1960s brought women's work into the focus of attention of (women) sociologists and labour historians. The spread of American and French feminist writing inspired multiple debates crossing national boundaries. Feminism, from its very beginnings, had a global perspective. The key themes of this debate were gender relations and what French philosophers, such as Julie Kristeva and Luce Irigaray, saw as the 'distinctive female experience'; the relationships between paid work and the family; as well as the relation between the public and the private, or the political and the personal. Feminist scholars started criticizing the male bias in the social sciences as well as in the natural sciences laying the grounds for women's studies programs. Researchers again examined women's

workplace experiences. Although they continued the commitment to improve women's working conditions and chances in the labour market, their work brought additional issues and points of attention.

Most (but not all) of the studies were political in that they arose out of the workers' movement in different countries and combined a Marxist analysis with a feminist position that was highly critical of both patriarchy and capitalism. Female scholars, prominently Dalla Costa and James (1973), argued that it was not sufficient to look at women's work but that it was necessary to account for women's reproductive work in the home which they defined as a form of exploitation distinct from and complementary to wage labour in production. In the words of Benería and Roldan (1987): 'The specificity of real life does not present itself in a dualistic manner but as an integrated whole, where multiple relations of domination/subordination – based on race, age, ethnicity, nationality, sexual preference – interact dialectically with class and gender relations' (p. 10). In particular women researchers in Italy formulated a radical critique of Marxism, arguing that 'capitalism is not identifiable with waged, contractual work, that, in essence, it is un-free labor, and revealing the umbilical connection between the devaluation of reproductive work and the devaluation of women's social position' (Federici 1975/2014, p. 5).

Hence, studies of women's work were framed within a larger context, looking at the ensemble of women's work at home and their work in the factory, in agriculture or as domestic workers, analyzing gender relations in the home and at work, and also documenting women's participation and their particular roles in organized labor struggles.

Another important strand of work that influenced scholars studying women's work at that time was the 'Third World Women's Alliance' (1968–1980) which originated in New York, as the Black Women's Liberation Committee, opposing racism and sexism, and bringing the working conditions and struggles of women in Latin America, Asia, Africa, and the Middle East to the forefront.

A wide body of research emerged, looking at women's situation in different parts of the world, such as for example Carolyn Sachs' (1996) account of rural women in the US and in Africa, based on rural women's writing and in-depth interviews with rural women; or the studies of Latin American women working in textile factories, the meat packing industry and in fruit packing, some of which have been included in an anthology edited by French and James (1997) *The Gendered Worlds of Latin American Women Workers*. Apart from pointing at the gendered division of labor and at deplorable working conditions, these studies also investigate how women and men, their employers and legislators deal with sexuality, job sociality and flirting, aiming 'to control male sexuality while policing women's honor' (p. 9). Included in this anthology is a part of Lobato's (2001) history of labor study of work in the meatpacking industry in Argentina – the 'catedrales del corned beef' - from 1904 to 1970. She studied women and men, most of them from a migration background, using an oral history approach, enriched with photos, newspaper clippings and other memory objects, with a focus on the gendered division of labor. She points at the

permanent devalorization of the female body due to hideous working clothes and ugly smells but also at the space for sociability and development that women gained – to enter the factory meant escape.

Another example is Tinsman's (2004) history of labour study of women agricultural workers in the Chile of Pinochet in the 1980s, where she looked at the situation of seasonal workers who earned miserable piece rates for up to 16 h a day and became sick from appalling working conditions, including the chemicals that were used. One of her conclusions is that while rightly emphasizing the crudely exploitative nature of female wage work, 'there has been little room for an exploration of how wage work impacted women's understandings of themselves, negotiating power with the family, or willingness to challenge labor exploitation or authoritarianism' (p. 264).

2.3. The Anglo-American context

Despite the relative decline of focus on the sociology of work in the UK between the 1960s and early 1980s (when, arguably, the first wave of computerization of industry captivated the attention of the labour movement), a handful of sociological studies of work were undertaken. These included Eldridge's (1968) *Industrial Disputes*, Oakley's (1974) *Sociology of Housework*, Glucksmann's (aka Cavendish) (1982) *Women on the Line*, and Pollert's (1981) *Girls, Wives, Factory Lives*.

Academic Marxism had emerged by the 1960s in English speaking countries, and by the late 1960s, the invisibility of women's economic contributions within Marxist theory were a source of debate. Following its earlier circulation as a pamphlet, in 1969 Margaret Benston's 'The Political Economy of Women's Liberation' appeared in *Monthly Review*, and was subsequently translated into several languages including Spanish, French, Italian, Swedish, German and Japanese, and widely anthologized (Luxton and Armstrong 1991). As Miles et al. (1993) wrote about Benston's piece:

> Dominant opinions of the time were that men do the productive work of society, providing for women and children, and that women's economic dependence on men simply reflects the fact that we are unproductive... In the 1960s, when women began to reflect on our lives as we actually experience them and not as they are defined by the dominant culture, we began to see that housework is actually enormously skilled, demanding, and time consuming. Women are economically dependent on men, not because we don't work, but because most of our work is not paid (Miles et al. 1993, p. 31).

At the time, both mainstream and Marxist economic theories supported the cultural invisibility of women's work and its value (Miles et al. 1993). A decade later, Hartman's (1979) *The Unhappy Marriage of Marxism and Feminism* appeared, alongside numerous other works which, like Benston's earlier work, sought to make the value of women's work—both the unpaid work in the home and paid work

undertaken in varied workplaces including factories—visible. It was against this backdrop that scholars such as Sallie Westwood and Cynthia Cockburn undertook ethnographic field studies of women's work.

Miriam Glucksmann's work stands out as an early exemplar of research which used ethnographic observations to explore the complexities of work from a feminist perspective. Reflecting on her work for nine months on the assembly line of a large motor components factory in London (1977–1978), she wrote:

> The stimulus to do this emerged directly out of my involvement in feminist and socialist politics in order to explore one of the major issues exercising the Women's Movement at the time: why organized feminism appeared not to be relevant to or not to involve working-class women. I did it for political reasons rather than as sociological research and did not think of it as ethnography or participant observation (Glucksmann 2012, p. 168).

She wrote a diary that she started only several weeks into her time at the factory. The themes that dominated her descriptions of work were the physical strains the women had to cope with, which resulted in 'neckache, tiredness, inability to move'; time 'from the disjuncture between objective clock time and how it felt subjectively, to the many overt conflicts with supervisors over "ownership" of the few minutes or seconds at "finishing" time or daily questioning over the speed of the conveyor belt'; as well as 'emotions, sociability and "everyday" morality' (Glucksmann 2012, p. 169).

Among the influential studies that were carried out in the Anglo-American context are the study of clerical work by Glenn and Feldberg (1977) which used observations in 'organizations, discussions with managers and intensive interviews with thirty clerical workers' (p. 52) or Webster's (1996) study of technology and clerical work. Part of what Evelyn Nakano Glenn and Roslyn Feldberg's work showed, which was echoed in the work of other feminists as well as some of their later work (Feldberg and Glenn 1983b), was that you could only make sense of women's work when you looked at it across a multiplicity of contexts.

2.4. German industrial sociology

German Industrial Sociology, which has its roots in the theory tradition of Marxism, as well as in the sociological industrialization and modernization theories, 'rediscovered' women's work as an area of research in the late 1970s. Women researchers started criticizing the male bias in industrial sociology which focused almost exclusively on traditional areas of men's work in the main industries, such as manufacturing or the automotive industry, and also ignored the work women did in the home. Based on her study of female industrial workers (Eckart et al. 1979), Christl Eckart criticized the dominant normalizing notion of what constitutes a 'work

contract' ('Normalarbeitsverhältnis') which excluded the life situation of women. She argued that both spheres follow different organizing principles:

> The daily switching between work in the family and at work requires women to synthesize what cannot be simply adapted unilaterally. Reproductive work cannot be organized according to the time economy of rationalized work processes. These reproductive activities also require social considerations which, in the person of the woman, highlight the limitations of planning the human capacity for work (Eckart 1992, p. 2).

Numerous publications that examined the relationship between women's engagement with gainful employment and the home appeared. Most of these studies were primarily interview-based, investigating women's subjective experiences and their strategies of coping with the exigencies of the two spheres (e.g. Ostner 1978; Eckart et al. 1979; Becker-Schmidt et al. 1984); with a few exceptions. From 1972 to 1977, Lothar Lappe and Ilona Schöll-Schwinghammer conducted a study of women working in areas of industry with a high percentage of female workers. Their research focus was on how women experience their work situation and how this influences their attitudes and orientations towards work, the family and society. Questioning the still prevalent assumption that women are predominantly oriented towards their family, they took up a concern of industrial sociologists with what was called 'workers' consciousness', in particular their openness towards politics and their willingness to engage in trade union-led action. Lappe and Schöll-Schwinghammer (1978) sought to study empirically what Beck-Gernsheim (1976) formulated: 'It is not that women lack professional engagement—rather particular types of work do not offer any reference points for subjectively meaningful engagement' (p. 127). Their aim was to ground women's 'consciousness' in the work realities they were facing. While how the women understood these realities, how they coped with them and how this affected their thinking was subject to extensive interviews, the researchers also set out to 'measure' the characteristics of their work (see section 3.2.2).

2.5. Francophone ergonomics

In French sociology, in the 1980s, (mainly) women researchers started a discourse on men's and women's work with a strong feminist agenda. Examples are Haicault (1982) who positioned her study on piecework done by women in their homes in relation to the women's movement and a general critique of capitalism; or Laufer's (1982) *La Féminité neutralisée? Les femmes cadres dans l'entreprise* (Femininity neutralised? Women executives in the company) where she showed that professional women were mostly employed as experts but not in higher management positions which limited their career opportunities. Margaret Maruani and Chantal Nicole (1989) in their book, *Au labeur des dames. Métiers masculins, emplois feminins* (Women's work. Masculine professions, female employments) (with

Chantal Nicole), discussed interview-based findings on office automation and part-time work arrangements. In the 1990s she, with Jacqueline Laufer and others, founded the research group 'Marché du travail et genre' (MAGE) which focused on issues concerning inequality on the labour market. Although many ergonomic studies dealt with the work situation of women, there was a lack of attention to gender issues and the work of feminist researchers was largely ignored (Teiger 2006). According to Chappert et al. (2014), one of the reasons for this situation that seems to persist even today is the absence of a social demand for studies that examine gender issues, even a resistance to discuss gender:

> However, we have to state a problem as regards the application of feminist studies in ergonomics – the absence of social requests to examine gender issues at work. In Europe, like in North America, ergonomists contribute to transforming work, but without explicitly interfering with the position of women and men at work. One can even observe a resistance to discussing gender in the work environments targeted for ergonomic intervention (Chappert et al. 2014, p. 49).

What women researchers carried out at that time was not what we now think of as work practice studies. Their aim was to understand the 'genderedness' of work, i.e. the relationships between the kinds of work women did (or had access to) because they were women, organizational and labour market policies, and the concomitant occupational changes. At the heart of nearly all of the work — even the early studies undertaken — was a desire to simply make women's work visible. Later work challenged ideas about the value of the work (which is often tied in with how it is or is not like unpaid work, whether unpaid work is valuable, etc.), and, with women becoming increasingly busy in the paid labour force, issues of work life balance.

2.6. Methodological and intellectual diversity

Studies of women workers undertaken as part of the rise of feminism in the 1960s were methodologically and intellectually diverse, though unified around a concern about the relationship of women's paid work to women's unpaid reproductive work. While much of the scholarship of the time was rooted in or responded to the limitations of Marxist perspectives of work and, compared to today, cultural under-standing of how class, race, age, ethnicity, nationality and sexual preference interact with class and gender relations were nascent, many of the studies undertaken during that period (e.g., Benería and Roldan 1987) sought to address issues which remain salient today. As was the case with the very early fieldwork-based studies of women's work, those which emerged subsequent to the 1960s explored women's lives within the context of gender relations at home and at work. Anglo-American scholarship provided particularly compelling examples of the value of fieldwork-based studies in developing nuanced accounts of women's paid work (and its relationship to reproductive work), and supported debates about topics such as skill.

German industrial sociology and Francophone ergonomics (in contrast to the majority of fieldwork-based studies of women's work undertaken in Anglophone countries) both incorporated elements of quantitative sciences into field-based studies of women's work. Additionally, these two traditions had a greater focus on the health of women workers than was the case with most fieldwork-based studies undertaken in Anglophone traditions. Of notable interest, Francophone Ergonomics contributed methodological insights about how to understand work while trying to change it.

3. Key themes and influences

These and other studies were part of an extensive discourse about 'gender at work' (the title of Ruth Milkman's 1987 book) to which a wide circle of (women) researchers in different parts of the world contributed. It had an enormous influence on several generations of sociologists and feminist scholars some of whom had links to the CSCW and PD (Participatory Design) community. Debates about the value of women's work undertaken during this time period addressed a number of interrelated issues (Figure 1).

Several larger debates shaped the studies of work in general, and women's work in particular. One was about the influence of technology on the workplace and the organization of work, with the question of whether automation gradually replaces skilled human work or whether it allows for new forms of skilled work to develop, at its center.
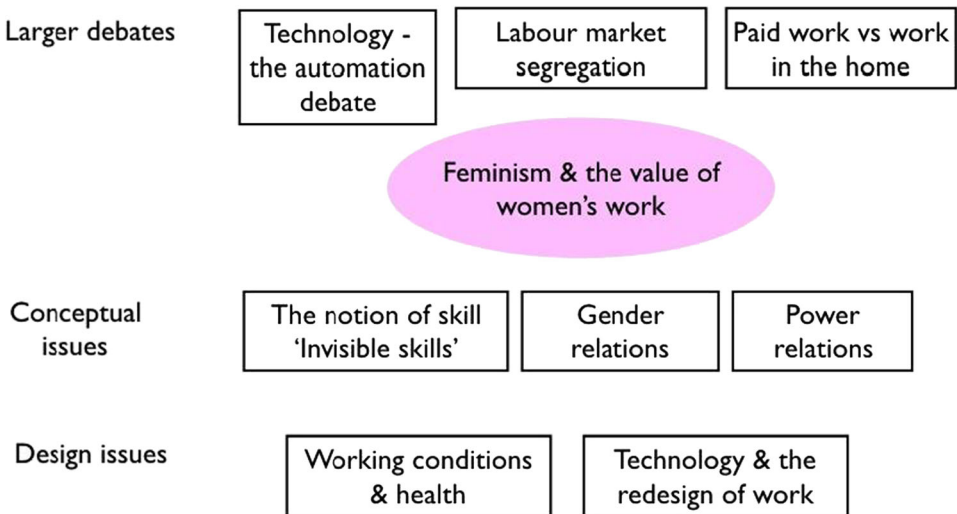

Fig. 1. Overview of issues connected to the debate on 'gender at work'

Connected with this, researchers tried to empirically assess and also theorize about the enduring division between men's work and women's work. In particular feminist researchers examined the intersections between paid work and work in the home. They argued that 'gender relations are embodied in the sphere of production, as well as in the sphere of reproduction (Wajcman 1991a, p. 33).

Feminist scholars contributed to the understanding of skills as not only technically but socially determined and many of their studies sought to make the invisible, undervalued aspects of women's work visible. Finally, studies of women's work also addressed and contributed to design issues. Notably Francophone Ergonomics focused on the analysis and improvement of working conditions, as did German Industrial Sociology, and on workers' health.

Alongside these debates, ideas about the nature of technology and technological change were evolving beyond simplistic deterministic views of technology, to what we now refer to as social constructionist views of technological change. Among other things, the evolution of theory about the nature of technology and technological change processes reflected desires to identify strategies which allowed workers—both women and men—to exercise agency in relation to technological change.

In the remainder of Section 3, we provide an overview of some of these key themes and influences on field-based studies of women's work. We end the section by highlighting the relevance of this work to contemporary CSCW studies.

3.1. Positioning women's work in the larger debates on work

3.1.1. *Technology - the automation debate*

In the 1970s the sociology of work was dominated by the so-called 'automation debate' which referred to how automation of work would change workplaces and the organization of work. It took somewhat different forms in different countries. In North America, Braverman's (1974) *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century* was influential. Although Braverman, a Marxist and political economist who worked as a metal smith before becoming a writer and editor has been credited with christening 'the emerging field of labor process studies' and reviving 'the study of the work process in fields such as history, sociology, economics, political science, and human geography', his work did not escape scrutiny in the United States, Canada or the United Kingdom (Friedman 1987); and in some contexts—for example, amongst German industrial sociologists—criticisms of his work fuelled scholarship which had a significant impact (Palmer 1999, p. 33). German industrial sociologists, among them Lappe (1988), developed an empirically substantiated argument against Braverman's deskilling thesis:

> It is generally agreed that the various strands of development in the capitalist work process need elaboration so that questions about downgrading and de-skilling can

be answered for specific, definable, empirical areas and manageable time periods rather than continuously being treated in a general fashion. […] Only when specific production areas are taken into consideration can one really understand and interpret the forms of human labour linked to the varied technological levels of the production process (Lappe 1988, p. 234).

This close empirical look at the particularities of a branch and/or company as well as the details of work processes distinguished German Industrial Sociology after WWII when a group of researchers around Heinrich Popitz and Hans Paul Bahrdt in the 1950s conducted extensive studies of industrial work in the German iron and steel industry. A series of in-depth studies of work undertaken in the 70s and 80s painted a highly differentiated picture of the effects of automation (e.g. Kern and Schumann 1974; Mickler et al. 1976; Baethge and Oberbeck 1989). In the focus of these studies was the influence of technology on the workplace, how it affects the division of labour and what the consequences are for workers in terms of skill requirement, stress, opportunities for learning, wages, and job security.

In spite of its critical reception (e.g. Thompson 1989; Randall et al. 2007), Braverman's (1974) work was influential in the Anglophone world. It helped shape debates about the nature of skill, the nature of women's work, the nature of technological change, and how concepts such as skill were inextricably intertwined with gender. In the US and Canada, Braverman's (1974) work helped focus attention on technology as a component of labour processes. Subsequent work often took issue with what many (e.g., Noble 1984; Zimbalist 1979) argued was an overly deterministic view of technology that was also gender blind (Benston 1983a, b; Feldberg and Glenn 1983b; Cohen and White 1987; Linn 1987; McNeil 1987), and overly focussed on material aspects of technology rather than cultural aspects (Karpf 1987).

In their paper 'Degraded and deskilled: the proletarianization of clerical work' Glenn and Feldberg (1977) began using an approach which examined changes in women's work associated with technological change (and concurrent work organization/ managerial changes) by distinguishing between three foci, all of which they argued had to be explored in order to make sense of changes occurring in women's work. They distinguished between changes which occurred in work processes (similar to what we now think of as work practices—which refers to how the work was carried out, what activities it includes, what artifacts were used, etc.); changes which occurred in the organizational structure (how work was organized, with organizational changes often evident in changes over time of the ratio of one group of workers (e.g., clerical workers) to another (e.g., managers)); and changes to the occupational structure (e.g., the disappearance of some categories of work such as teletype operator, and the emergence of other categories of work, such as work processing operator or web designer). The case outlined in their 1983a paper 'Incipient workplace democracy among United States clerical workers', examined work processes in four areas of work—a data entry pool, a

payroll office, ward secretaries in a hospital, and secretaries in a university department—emphasizing 'the unique aspects of clerical work—its femaleness, place in organizations and varying degrees of interaction with managers, professionals and clients'. Their aim was to show how these unique aspects 'have influenced the development of more democratic work organization in each setting' (Glenn and Feldberg 1983a, p. 47).

Feminist scholars, such as Cynthia Cockburn, contributed to the automation debate with nuanced analyses of the impact of technology on workers' skills, arguing that skill has a class *and* gender dimension. In *Brothers: Male Dominance and Technological Change* (1983)*,* Cockburn noted that in the printing industry technology has not produced work degradation in a technical sense but has resulted in a sense of subjective degradation of male workers. She also observed that in medical technology the increasing use of Computer Tomography (CT) generated new contradictions in the gender hierarchy of physicians, radiographers, and nurses: 'As women radiographers begin to master the new technology, they are met by physicians and physicists keen to reduce their job to that of technician' (Ong 1987, p. 617). Hence, a key aspect of automation was not necessarily deskilling but a tendency to keep women out of the new skilled technical jobs. With reference to Cockburn's findings, Wajcman (1991a) stated:

> It has been more common for women to enter new jobs requiring new skills than to break into traditional male preserves. However, even the allocation of these completely new jobs, where no gendered custom and practice has been established, is a fundamentally gendered process. In new 'high tech' jobs, such as programming, women tend to be segregated into positions at the bottom of the occupational hierarchy (Wajcman 1991a, p. 33f.).

A similar observation was made by Liliana Acero, who did fieldwork in the textile industry in Argentina and Brazil, between 1984 and 1986. She found that in reducing the skill components of assembly-line jobs, new technologies made these more accessible to women; but she also observed an increasing demand for technical and managerial expertise and for 'polyvalent skills'. Acero's work highlighted the social and educational factors that excluded women from the opportunities to upgrade their skills, so as to have access to these new jobs. Still, the new technologies contributed to some autonomy for women and extended work and training possibilities. For example, while the new machines were initially all operated by men, some firms also developed the policy of employing young female machine operators.

Hence, while Braverman's work helped give rise to debate and study about the role of technology in women's work, topics which were addressed in early anthologies about women and technology, feminist researchers also forwarded a more nuanced interpretation of technological change examining the dynamics of gender relations in the allocation of new forms of skilled work.

3.1.2. *Gender stereotyping and the sexual division of labor*

One of the main topics that the women and men who studied women's work addressed was labour market segregation. Milkman (1983), in an influential paper on 'women's place' in auto and electronic manufacturing, argued:

> While suggesting a functional explanation for the existence of job segregation by sex in general, this early Marxist-feminist analysis failed to explain why particular jobs are labelled 'female' and others 'male'. Instead, the most familiar idioms of sex typing, relying on analogies between domestic labor and women's work outside the home, were uncritically accepted as an explanation for the location of women in the paid work force. However, since housework consists of an almost infinite variety of tasks, such analogies can be extended to virtually any job that women happen to be doing (Milkman 1983, p. 161).

In fact, stereotypes concerning the 'natural' allocation of women to jobs that fitted their specific skills acquired in the home dominated much of the discussion about men's and women's work. In Germany, until the 1980s, women's work was considered 'easy' work, independent of the stress and hardship it entailed, and women were clustered in so-called 'Leichtlohngruppen', meaning that they were paid lower wages since their work was thought to be less demanding (Jochmann-Döll and Krell 1993). Moreover, in the 1950s the male breadwinner model still prevailed in many countries.

The feminist debate about sex stereotyping and women's work was dominated by two strands of thought. On a political level, feminists saw the confinement of women to certain types of work as deeply connected with their responsibilities in the home, against which they revolted. In Italy, feminists engaged in polemics against housework:

> We must refuse housework as women's work, as work imposed upon us, which we never invented, which has never been paid for, in which they have forced us to cope with absurd hours, 12 and 13 a day, in order to force us to stay at home (Dalla Costa and James 1973, p. 41).

> They say it is love. We say it is unwaged work. They call it frigidity. We call it absenteeism. Every miscarriage is a work accident (Federici 1975/2014, p. 1).

Many of the women that engaged in the feminist movements of the 1970s also asked for wages for reproductive work in the home (Bracke 2015).

Another strand of arguments concerned the relationship between women's reproductive work and their paid work outside the home. In particular German feminists emphasized the contrasting requirements of work in the family and work in the factory, office or hospital, insisting on the need to study their relationship. An explanation of labour market segmentation that was popular among many

German feminists was that companies tend to employ women in areas of work with skill requirements that are similar to women's reproductive work in the home, supporting the compatibility of both forms of work. More than that: 'Companies exploit this "negative fact of a specific female capacity of work" when they, for example, limit career opportunities by connecting them to requirements that are difficult to meet for women' (Friedmann and Pfau 1985, p. 164). This argument is not unproblematic, when a seemingly 'specific female capacity of work' is taken as an empirical fact (rather than an ideological construct). It also contradicts Milkman's observation that as 'housework consists of an almost infinite variety of tasks, such analogies can be extended to virtually any job that women happen to be doing' (Milkman 1983, p. 161).

Discussing gender inequality on the labour market from a historical perspective, Karin Gottschall demonstrates the flexibility of gendered attributions in the interest of preserving gender hierarchies (2010). Also work undertaken in the Francophone ergonomics tradition in Quebec and elsewhere in Canada has shown that work organization in part reflects perceptions held by managers and workers about the characteristics of work (e.g., whether it is classified as 'heavy' work or 'light' work), which often corresponds to formal and informal ideas about gender. Historically, the distinctions between men's and women's work have shifted again and again and some professions have changed their 'gender' (Dumais et al. 1993). In spite of studies such as these, attribution of specific skills on the basis of gender remained a widespread practice.

In contrast to this, Lappe (1981) in his study of women's work, referred to the sexual division of labour as resulting from restrictive practices of allocating work. He saw gender as being used by companies as an indicator of a particular set of dispositions: easy to find and cheap, also easy to lay off and send back home. He pointed at the multiple sources of labour market segregation: tradition, personnel strategies on the level of the company, practices of collective bargaining, social policies, education and training, and economic (labour saving) measures. To give an example, in the clothing industry labour market segmentation can be seen in a massive deskilling process of women's work at that time. This meant that also the highly skilled tailors among the women were allocated jobs that had all the characteristics of the secondary labour market: low pay, high levels of stress, low job security and lack of career opportunities (Messing and Elabidi 2003).

Feminist researchers in the UK also emphasized the links between women's work in the home and in the workplace; but in a different way. Looking back at her study *Girls, Wives, Factory Lives* Anna Pollert remarks that

> a key aspect of shop-floor life was the entry of a world outside into the factory. Conversations with and between women demonstrated how private gender relations, images of romance and marriage, and household experience entered and shaped workplace life and were, in turn, shaped by it (Pollert 2012, p. 175).

Sally Westwood's observational study of women's work at 'StitchCo' comes to a similar conclusion. Women in this company were confined to the 'typical' low-paying semi- and unskilled jobs of machinists and finishers. The trade union was dominated by skilled male white workers. Westwood observed that the women had developed their own 'culture of resistance' which reflected their private lives:

> Women claw back time and 'extras' from the company in multifarious ways, from birthday celebrations to needle and thread. The personal and familial is firmly brought inside the workplace through a rich round of 'women's celebrations' - engagements, marriages and pregnancies. There is an unforgettable account of the workplace rituals surrounding a marriage, in which creativity, resistance to its bondage and submission to the mythology of a romantic escape through marriage intermesh in equal proportions (Standing 1986, p. 112).

Westwood thought of women's culture as deeply contradictory. While establishing an autonomous space on the shop floor against management control, it also reinforced traditional notions of femininity. Also Acero (1995) points out contradictory aspects of women's situation in Brazilian and Argentinian textile factories and their responses:

> Women's subordinate position in the factory was defined also by certain differences in their own responses and relationships. They tended to relate to supervisors as if they were family figures and to prefer men to women in these positions. At the same time they were more readily aware and active than men in denouncing faulty working conditions and high machine-pacing as factors affecting their health. They were also keener than men to defend the principal of equal wages for equal work. Younger women in the new sections expressed support for other workers' movements. They blamed themselves, individually, for not taking a strong position within the workplace by demanding the registration of promotions in their work records; yet they took no group action. Their consciousness was contradictory and was expressed differently from that of male workers. There was thus a recomposition of the forms of subordination of women after technical change (Acero 1995, p. 78).

Practices to confine women to particular kinds of jobs where widespread. In Latin American countries, women workers faced a powerful coalition of politicians, social reformers and the Catholic Church (French and James 1997) that sought to confine them to the home. Industrialists employing women in these countries 'were seen as fostering the violation of women's natural social role' (p. 9). In line with Catholic paternalism, systems of discipline were established in the attempt to control male sexuality while 'protecting' women's virtue and honour. There was an evident contradiction between economic needs and gender prescriptions. On the other hand, working conditions in some areas of work were hard to cope with for women, as a former worker in the meatpacking industry explains:

[…] because it is a place, well it's like a monster when you go in there, in that darkness, that dampness, in that situation of lines of men with knives in their hands, I don't think that was very nice, you felt bad, but necessity made you get used to it (French and James 1997, p. 11).

Work in the textile industry was deemed more appropriate by working-class families.

What is appropriate for women became deeply entangled with what was accessible. An example is domestic work which, in many countries, was women's most common paid occupation, because it involved work inside a family, even if not her own. One of the important books was Mary Romero's *Maid in the U.S.A.* (1995), a study of Chicana household workers in the 1980s which examined the intersectionality of race, class, and gender. Studies of women's work also drew attention to the struggles of migrant workers.

3.1.3. *The intersections between paid work and work in the home*

Women researchers in Germany reacted to the neglect of women's work as a field of study by developing their own discipline: 'Geschlechter- und Frauenforschung' ('research on gender and women'). One of its foci was how women in different areas of work 'balance' the exigencies of both spheres of life; another, more philosophical one, dealt with women's relationship to technology. Paradigmatic of this approach was research by Becker-Schmidt et al. (1984), who in a series of socio-psychological and phenomenological case studies in the automotive industry described the 'experience of ambivalence' of working mothers which they saw as reflecting the contrasting requirements of the work sphere and the reproductive sphere. Another example is Ostner and Beck-Gernsheim's (1979) account of nursing in hospitals, which demonstrates the closeness of professional caretaking to caretaking in the home. Although their aim was to demonstrate in which ways this so-called 'weibliche Arbeitsvermögen' ('female capacity of work') was simultaneously used and devalued, they were also criticized as contributing to the sex-typing of jobs and professions.

Some of the studies of women's work focused on the intersection of women's paid work with their work in the home. Understanding the qualitative difference between the work sphere and the reproductive sphere and how it shapes women's identity was a particularity of German gender and women's research, although there is also work in other traditions with this focus. An example is Luxton's (1980) study of women's housework over three generations in Flin Flon, Manitoba (Canada). On the basis of participant observation and in-depth interviews, it described women's work in the home and how women's lives were shaped by domestic responsibilities. It also challenged notions of the invisibility of women's work and the view of women's work in the home as lacking in social and economic value. Also notable during this period is Rakow's (1992) ethnographic study of women's use of the telephone undertaken in 1985, in a small, mid-western town in the United States. Rakow's work challenged then popular accounts of the telephone as something women enjoy,

and showed how the telephone 'provides a network for gender work (social practices that create and sustain individuals as women or men) and gendered work (productive activity assigned to women)' (Rakow 1992, p.1).

Sallie Westwood spent over a year—from March, 1980 to May, 1981—on the shopfloor of a company she referred to as 'StitchCo', in the fictional Needletown, later revealed to be Leicester, England (McLoughlin 2013). Westwood's (1984) access to 'StitchCo', where she described her work as 'an anthropologist studying the culture of the shopfloor by hanging around the coffee bar, lurking in the lunch canteen and sharing a few "risqué' jokes"' was facilitated by a local contact, and undertaken with the knowledge of both management and the union (Westwood 1984, p. 2). Westwood noted that 'once management realized that I did not want to take women away from the production process to conduct lengthy interviews, they were surprisingly open to my suggestion that I be allowed to immerse myself in the life of the shopfloor' (Westwood 1984, p. 2). She became a participant observer in a department she described as 'the final section, "the racks," [where women] counted the clothes and packed them ready for the waiting vans, [and] had more freedom to move around than the women in the other sections' (Westwood 1984, p. 21). 'The racks' was a department where 'women who had not succeeded as [sewing] machinists, but whom the company chose to keep on, were employed' (Westwood 1984, p. 21). She described herself as the least skilled worker in her department.

Westwood pointed out that workplace studies, such as the work she undertook at 'StitchCo' were not new, and she drew inspiration from previous work undertaken between 1963 and 1977 by Tom Lupton (1963), Theo Nichols and Huw Beynon (1977), Theo Nichols and Peter Armstrong (1976). While these works had contributed to Westwood's understanding of waged work, they had focused on the lives of male workers and class issues, and only Pollert's (1981) work—also inspired by these earlier studies—offered 'a major corrective to the concentration upon men in her study of women workers' (Westwood 1984, p. 11).

Westwood's work is notable for several reasons.[3] First, she describes her data collection methods in more detail than was characteristic of the time, which included an acknowledgement of the known challenges associated with her method ('subjective intrusions by the researcher, lack of a foundation for generalisations, unreliability' (Westwood 1984, p. 2)) which she indicates she is conscious of, but unimpressed by, 'because the attempt to inhabit and record a cultural space requires this method of working' (Westwood 1984, p. 2). Second, her use of theory is exquisite. Westwood (1984) acknowledges the importance of theory, but in her own words, refuses to fetishize it:

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[3] Although Westwood's work clearly reflects the observational work she undertook and she includes many dialogues between workers in her writing, first-hand accounts of her observations are oddly absent from her writing.

> Life does not lie around like leaves in autumn waiting to be swept up, ordered and put into boxes. The drama of life is richly textured, multi-faceted and dense and we cannot hope to make sense of our world and, more, interpret it, without a coherent theoretical understanding. We need theories to explain the world in which we struggle, to inform our practice and our politics, but this does not mean that we necessarily need a spectacular set of mental acrobatics, or a fencing match with all that has gone before (p. 3).

Acknowledging that theoretical issues arose at every turn, she hoped that rather than festishizing theory her work would contribute to the development of feminist theory 'because it draws attention to the complexities of women's subordination, but in a way that is rooted in the experiences of women's lives' (Westwood 1984, p. 3).

Scholarship which was concerned with the automation debate played an important role in bringing questions about how skill and gender intersected in paid and unpaid work to scholarly attention. Work undertaken during this period also stressed the significance of cultural factors in shaping work. Field-based methods and a healthy scepticism about the gender biases in analyses of skill proved a fertile ground for subsequent scholarship which further explored the visibility and invisibility of skill, as well as its relationship to technology.

3.2. The skills women need in their work

In her book *Shaping Women's Work: Gender, Employment and Information Technology* Juliet Webster (1996, 2014) argues:

> Changes in women's office work could not simply be read off from a conventional labour process analysis, but required in addition a feminist perspective – an understanding of the nature of 'skill' in women's work, and a recognition of the gender relations creating power (p. 113).

This insight was already voiced over a hundred years earlier. In 1909, Käthe Schirmacher, had stated

> Man's capacity for work is valued higher due to higher ability, higher demands, and higher burdens. The two latter factors are the basis of man's gender bonus, his gender allowance. Woman's capacity for work is given lower value, due to lower ability, lower demands, lower burdens. The two latter factors are the basis for her 'gender deduction' ('Geschlechtsabzug') (Schirmacher 1909).

Hence, key to studies of women's work is the notion of skill. In the context of the automation debate, feminist researchers suggested that 'skills are not technically but socially determined and that the skills that women use in their job are not fully

recognized and evaluated. Skill is defined to give priority to traditionally "male" work' (Wajcman 1991b, p. 43). Jane Gaskell argued

> that managing skill definitions is a political process, one that organized workers engage in continually. Women have been at a disadvantage in this process of managing skill definitions because they have not been represented by strong collective organizations. As a result, the notion of skilled work is used in a way that devalues the work women do (Gaskell 1983, p. 13).

Roslyn Feldberg, in her discussion of the 'comparable worth movement' in the US, also pointed at the different valuation of women's and men's skills:

> Much of women's work involves recognizing and responding to subtle cues in the work process or in other people, yet women's ability to do so is devalued. For example, the work of housewives, secretaries, teachers, aides, and nurses is geared toward understanding other people's needs and assisting them in realizing their goals. But this work is judged less skilled or less important than that of the persons being assisted (Feldberg 1984, p. 321f.)

While women's work may be 'undervalued' (by predominantly male employers or trade unionists), it is problematic to view skills as primarily 'socially determined'. Observational studies of women's work assume that the skills needed to perform a particular task or job can be described and even 'measured' to a certain extent. Hence, skills have a material dimension that may or may not correlate with how much they are valued in comparison to other skills; but how much women's skills at work are valued (as reflected in their wages) also depends on other factors, such as the definitional power of management over job descriptions.

3.2.1. *The invisible skills in women's work*

One of the main thrusts of women's studies was to demonstrate the invisible skills in women's work. In their studies of hospital work (Strauss et al. 1985), and caretaking at home of chronically ill family members (Corbin and Strauss 1988), Strauss and Corbin had argued that the work of patients and family but also a part of nurses' work remains invisible to physicians and technicians. This insight had an enormous influence on much of the observational work done in the field of health care (and beyond) and its commitment to making the skills needed in care work visible. Feldberg (1992) made a strong argument about the invisibility of nurses' work:

> On the one hand, nurses are treated as if their work was only to 'carry out orders'. On the other, nurses are held legally responsible, and hold themselves morally responsible, for the care of their patients. Moreover their knowledge develops in a

context in which they rely on each other for support and assistance, forging strong networks and a sense of group professional identity, while confronting the limits of their autonomy and authority. Finally, the nursing profession is highly differentiated, by clinical specialty, work-setting, administrative position, class and educational background. (Feldberg 1992, p. 182)

In this context, supporting nurses in their effort to get recognition for their professional skills was a strong motivation for researchers (Kergoat et al. 1992; Street 1992; Acker 1997).

For example, Francophone ergonomists studied the work of nurses with a focus on working conditions and how to improve them. But they also sought to demonstrate the skills that performing the work required. A much-quoted study is Theureau et al.'s (1979) temporal analysis of the work of nurses in three hospital wards. He followed several nurses in each of the wards for six days each, recording their movements, the activities they performed, their verbal exchanges with other hospital personnel, their collaborations, and how they dealt with incidents, noting the duration of each activity. One of the main insights of this study, which was conducted in an 'anti-Taylorist' spirit, was:

The work of nurses has its own characteristics: it has a conscious design aspect (activities are constantly adapted to new situations), it is sequential, pre-programmed and interrupted, it is team work, and all these characteristics confer an important methodological value to the nurse's introspection (Theureau et al. 1979, p. 34).

Hence, apart from demonstrating workloads and the need for additional staff, Theureau's study describes how nurses program and re-program their daily work, partially in collaboration with others, as a key characteristic of nursing.

Nursing became a research topic of interest again in the late 1980s and early 1990s, not least in relation to the introduction of IT-based nursing documentation systems (e.g. Bjerknes and Bratteteig 1985, 1988; Feldberg 1992; Wagner 1993, 1995; Bowker and Star 1999). For example, Françoise Acker, for several decades, studied nursing and its development as a profession, under the influence of health policy and the introduction of IT-based nursing documentation systems. She did substantial observational work in a diversity of health institutions in France, in combination with interviewing and document analysis. Her work is highly relevant from a CSCW perspective, as she early on focused on documentation practices, arguing that the techniques of writing - 'l'ecriture du travail'- nurses acquire and practice allows them to decontextualize or disentangle, hence analyse, certain aspects of their work. Referring to Strauss' et al. (1985) notion of articulation work, Acker (2000) pointed out that it is 'a permanent feature of the work of nurses' (p. 29). In an earlier paper with the title 'Sortir de l'invisibilité' Acker (1997) explicitly refers to the 'gender project' of professionalizing nursing which was at the core of 'la

coordination infirmière', a spontaneous movement organized by nurses in 1988. With reference to Kergoat et al. (1992) who documented and analysed this movement, she argues:

> One of the issues of the movement of 1988 was the difficult construction of a relationship to the notion of skill, the transition from the merits of the person towards professionalism, towards the expertise needed for a function [...], articulating the professional nature of the work. How to manage, as professionals and no longer as women, the emotions, the sentiments of the ill and one's own, which develop with the experience of an illness and medical care? How to break through a reactivity which is individual, personal and profane or through what P. Corcuff (1996) terms compassion and rely on defined entities, on knowledge, on theories that help work through the experiences and behaviours (Acker 2000, p. 67).

In a similar way David Hughes in 'When Nurse Knows Best' (1988) sought to make the widely overlooked professional skills of nurses visible.[4] He was interested in the patient categorisation process and in the contributions of non-medical personnel, in particular nurses, to this process. His focus was on 'areas where nurses' work does appear to move closer to the focal tasks of diagnosis and treatment, and on instances where observed patterns of doctor-nurse interaction appear to be at odds with the traditional dominant-subservient model' (Hughes 1988, p. 3). He provides detailed accounts of their interactions, highlighting the ways in which nurses contribute to the diagnosis and prepare for certain investigations that will be required or carry them out themselves.

Nursing is just an example of a debate that problematized traditional notions of skilled work that was reserved for certain professional activities, as well as what was considered 'men's work'. Studies of women's work often demonstrated the skills that are needed to perform apparently simple work activities. For example, in a pioneering study Pacaud (1949) identified '14 difficulties' telephone operators have to cope with in their daily work:

> The telephone operator constantly keeps an eye on the lights indicating call and those indicating supervision: it is almost always that whilst talking to a caller she withdraws the cards pertaining to the conversation she just finished; when she is about to establish a communication that a colleague asks her for advice concerning another user; when she sees someone quitting a post that she needs to think to give it to a person that urgently asked for this post (Pacaud 1949, p. 216).

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[4] Hughes' fieldwork which was based on a 'traditional participant observation study' in a casualty setting in a British hospital extended over ten months, five days a week, 'spending at least three hours, and sometimes whole work shifts, observing the processing of patients'.

Also early studies of office automation and women's work portrayed secretarial work as involving professional skills such as abstract thinking, planning, and servicing people from inside and outside the organization in various ways (e.g. Lie and Rasmussen 1985; Webster 1986; Silverstone and Towler 1984).

3.2.2. *'Measuring' and evaluating skills*

Studies of (women's) work in the French and German tradition also were motivated by the idea of designing 'mentally demanding work', in contrast to low-skilled repetitive work. For this purpose, it was important not only to observe and describe the deployment of skills under particular working conditions, but also to evaluate the work according to a set of criteria that included concepts such as skill level, stress, and margins of disposition (Bannon et al. 2011). In German Industrial Sociology this empirical approach to understand skills as part of the larger organization of work reaches back to the beginnings of the twentieth century when Max Weber, against the fashion of the time of conducting laboratory experiments with the aim of investigating the 'psycho-physics' of work, stressed that factory conditions of work contained an 'array of built-in conditions which are alien to the laboratory' such as housing conditions, sanitary conditions, financial needs, the wage system (Brain 2001, p. 668). Hence, it was important to look at the performance of work in real work environments.

Weber's student Marie Bernays (see 2.1.) followed a detailed work plan written by Max Weber and a questionnaire developed by Alfred Weber in her research. She analyzed personnel lists and payrolls and tried to connect data about the workers' (social) background, biography and 'cultural level' with economic factors and the reality of factory life. She looked at both men's and women's work and the division of labour between them. Knowing the work, she argued,

> can only have one purpose: to on the basis of a description of the machinery and the activity provide an analysis of those manipulations that workers have to perform on the machines with a view onto the question: which special skills does each category of worker have to activate when performing these manipulations (Bernays 1910/2012, p. 283).

The observational part of her study was based on several weeks of working incognito in the textile factory as a winder. The descriptions that she provided (with the help of the company's technical director) focused on the technicalities of each work process rather than on how workers accomplish their tasks situationally. Emphasis was on in which ways workers' manipulations may influence the workings of a machine, that means the skilled part of their work that requires training and experience. For example, 'the work of women at the roving frame is manifold and she has a stronger influence on the machine's performance than the stretcher' (Bernays 1910/2012, p. 285). This also influences the time needed for learning a specific task, such as 'twisting' the yarn: 'An average of four weeks of learning is needed before a

(woman) worker is able to survey 330 to 400 twisting spindles. Attention and dexterity are then required in order to reach a higher piece rate' (Bernays 1910/2012, p. 290). Bernays presented

> each of the principal machines used in the factory, along with the worker's mode of operating them, including the degree of muscular or mental difficulty. She assembled detailed performance curves for workers on each of the machines, which, in the piece-rate system used in the factory, corresponded closely with their wages (Brain 2001, p. 677).

One of the most important German studies of women's work in the late 1970s was done by Lothar Lappe who carried out detailed studies of typical examples of women's work within the electronics, mechanical (optical), clothing, and food industry. This was a rather extensive study that sought to capture the organizational environment, the technologies in place, the organization of the work itself, and the (hidden) human resource strategies of the companies. Apart from conducting expert interviews, Lappe performed altogether nineteen observational studies, using a categorical scheme that was partly based on Hacker's 'action regulation theory' (Hacker 2003),[5] with the following dimensions: qualification, stress (physical and psychological), margins of disposition, opportunities for collaboration, time structure of the work, and wage form (Lappe 1981, p. 192).

Here is an excerpt from a workplace description—complex fine-motor manual work: assembly of building blocks. It starts with an account of the preparatory work (of about 1 ½ hours) and continues with the production process, which takes about 11 min per element:

> First, the transistor needs to be picked up with a pair of tweezers from the work plate and shoved with the help of a second pair of tweezers in the correct position for assembly and inserted in the holes that have been stamped into the plate. Next the diodes have to be inserted, with the help of tweezers, the miniscule resistors brought into the position for assembly, their ends bent and left in this not yet soldered position. Only after the condensers have been placed, the ends of the wire can be soldered on the backside of the UKW building block. After a phase of

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[5] In their observational work, German industrial sociologists used elaborate categorical schemes for identifying the skills needed to perform work based on Hacker's action regulation theory (Hacker 2003), which distinguished between sensory-motor skills, perceptive routines, diagnostic and planning skills, and motivational skills. The observer used a highly detailed scheme for evaluating different aspects of the work she or he observed. An example is VERA (Verfahren zur Analyse von Regulationserfordernissen in der Arbeitstätigkeit; Procedure to analyze the regulation requirements of work activities) which was developed by Österreich and Volpert (1987) with a focus on skills, margins of disposition, and stress-related factors. Such an analysis required between two hours (in the case of simple manual assembly work) and eight hours (in the case of complex activities such as maintenance) (Moldaschl 1991). As a result of these distinctions, industrial sociologists were able to show that automation affected the skill level needed for particular types of work in rather different ways.

adjusting and correcting the already positioned small elements, the sticking out ends of the wire are cut carefully and then a small 'absorption pearl' has to be placed with the help of tweezers on the transistor and soldered. The electrical contacts between single elements are partly produced by placing small metal hooks on the backside of the building block, metal pin by metal pin, and then soldered with tin. After removing the surplus tin remains from the pins, the already fitted circuit board is mounted and soldered. Finally the building block is turned and its back liberated from all sticking out wires and soldered (Lappe 1981, p. 129).

Using the categorical scheme that he further developed in his book *Die Arbeitssituation erwerbstätiger Frauen* (*The work situation of gainfully employed women),* Lappe (1981) arrived at a detailed assessment of different types of work; e.g. in the case of assembly work in the electronics industry:

Untrained workers need about a year to be able to perform this task at the required speed. Characteristic of this task are the varied *sensory-motor skills*: high precision movement when seizing, inserting minute elements, coordinating the manipulation of two tweezers, as well as continuous visual control on the basis of differentiated kinaesthetic and haptic feedback. […] A change of building elements is difficult even for experienced workers, due to fine variations of the 'colour, wire thickness, length, form, and angle of contact ends' of the numerous small elements that look the same to a lay-person.…

At the end of a shift workers often suffer from disorders of the coordinating center, as well as from sensory disorders due to the tininess of the elements and the glare emitted by some metal parts. Moreover, the required intensity of attention over a long period of time results in considerable perturbation of the ability to concentrate and 'genuine psychical fatigue'.

The *margins of disposition* concerning movement, timing, and speed of work are extremely narrow and the wage form (piecework) discourages workers from varying the work process (p. 130).

Looking at these different approaches to making the skills in women's work visible, we see at that time, on the one hand, an influential discourse about how gender relations impact what counts as skilled work. In Judith Wajcman's words: 'Skill definitions are saturated with gender bias. Women workers carry their status as subordinate individuals into the workplace, and this status comes to define the value of their work' (1999, p. 37). On the other hand, namely within German Industrial Sociology, tools had been developed that allowed for evaluation (and eventually comparison) of different types of (women's) work. This research also addressed issues of skill and repetition of work, as well as issues of job re-design.

3.3. Working conditions and women's health

Issues of women's health were central to most studies of working conditions. Already some of the early studies of women's work looked at issues of sanitation and women's health. Examples are Edith Abbot's book *Women in Industry* (1909) and Elizabeth Butler's studies of women's work in industry as well as in mercantile stores. Women's health was also an important topic in Latin American studies of women's work, such as e.g. Mirta Zaida Lobato *La vida en las fabricas* (2001) or Tinsman's *More than Victims: Women Agricultural Workers and Social Change in Rural Chile* (2004). The focus of studies undertaken in the Francophone ergonomic tradition was on working conditions and women's health.

3.3.1. *The work of Elizabeth Beardsley Butler*
Commissioned by the Pittsburgh Charities Publication Committee, the so-called Pittsburgh survey was among the first studies that explored the relationships between working conditions and workers' health. One of its major findings was

> The contrast … between the prosperity on the one hand of the most prosperous of all the communities of our western civilizations ... and, on the other, the neglect of life, of health, of physical vigor, even of the industrial efficiency of the individual (Hill and Cohen 1984, p. 21).

As part of the Pittsburgh report Elizabeth Beardsley Butler (see 2.1) 'combed the city for industrial and commercial enterprises that employed women and found them in factories that produced pickles, confections, crackers and cakes, cheap cigars, workers' overalls, paper boxes, clothbound books, glassware, and electrical equipment' (Greenwald and Anderson 1996, p. 147). She had a strong interest in the physical environment in which women had to work, registering insufficient lighting, unhealthy fumes, restricted spaces for movement, and so on. She also focused on the women themselves, remarking on their bodies and their aptness for the work:

> Some of them are young girls, a little stupid, a little inefficient, here and there with a defect of sight, here and there with a slightly deformed body, nearly always in some respect physically below the standard strength that keeps pace with a machine (Butler 1909, p.77).

Her descriptions of the work the women perform mix all these elements, as in this example of work in foundries:

> The benches of the core makers are on either side of the ovens, ranged through seventy feet of drifting dust. Each girl has her little heaps of different kinds of sand, her mold and shaping tools. She makes the sand cores and carries them, a trayful at a time, weighing sometimes ten pounds, sometimes twenty, sometimes

fifty, to the ovens to be baked hard. Her work may be on cores with vents and spikes, or on simple finger-shaped cores which pay the makers $ 10 a 1000. Quick girls can make three a minute or 10,000 a day. The large intricate cores which fit into big machines are not made by girls, but by men in another room.

Sometimes part of the foundry itself is used as a core room. Sometimes a space is set apart between machines, or a narrow bit of a room is partitioned off on the floor above. For example, in one case twelve girls work in a loft above a brass foundry. The fumes from the brass find their way up the narrow stairway leading to the loft and out through the one window at the end of the room. The girls stand at their benches in the midst of the dust and fumes. In every core room but one the ovens are either in the room or close beside it (Butler 1909, p. 210).

Apart from using observational methods, Butler sought to obtain information about number and occupation of employees, working hours and wages, carrying out interviews with management and also seeking 'testimonials' from individual workers. Many of the women working in factories were 'chief breadwinners'.

Sanitation and public health issues were in the center of her study of saleswomen. The list of illustrations in this report is telling, for example: *A Balcony Diminishes Air Space; Wares Supplant Air and Daylight; A Well Lighted Store Building; Seats—but not for Saleswomen; A Bad Lunch Room.* Butler's descriptions of workspaces witness her attention to the many details that matter for a smooth flow of work to happen:

In certain departments, as for instance in the white goods or dress goods departments, the rolls of cloth instead of being placed in the shelves lengthwise, are sometimes laid cross- wise and thus project at an angle. This plan, as well as the introduction of the wider stock case, seriously interferes with the comfort and convenience of the saleswomen. It is difficult for them to pass each other, and in this narrowed space the strain of lifting heavy boxes or rolls of goods is increased. A width of two feet is necessary, and when this is decreased by too much stock on the shelves or by too large a stock case between adjacent counters, the comfort, and in consequence the efficiency, of the saleswoman is correspondingly diminished (Butler 1912, p. 8).

The use of photographic images is another remarkable feature of studies like the Pittsburgh survey. Most of them were taken by Lewis Hine whose visual images reinforced Butler's descriptions:

The recurrent photographic image presented by Hine and other (unidentified) photographers in *Women and the Trades* shows a woman or group of women or girls in concentrated, frequently regimented activity, standing or sitting stiffly, often stoop-shouldered, at work stations (Greenwald and Anderson 1996, p. 147).

3.3.2. *The lens of Francophone ergonomics*

As early as in 1949 Suzanne Pacaud, who is considered one of the founders of Francophone Ergonomics, published a study *Recherches sur le travail des téléphonistes. Etude psychologique d'un métier* (Research on the work of telephone operators. A psychological study of an occupation) which was based on observations. She considered the work as a complex activity, sought to identify the difficult parts of it and the effects it had on worker's health:

> Indeed, if one envisaged the normal flow of work to do, the work would appear simple. But, in fact, it is not. Risking to be paradoxical, one could state that the normal work of a telephone operator consists of having to master a series of difficulties. Each of these, taken by itself, is insignificant, but practicing them persistently makes the task delicate, complex and often psychologically exhausting (Pacaud 1949, p. 48).

It took almost two decades, until the late 1960s, before a team of French researchers together with trade unionists embarked on another study of women's work, this time in the electronics industry. It was published in 1972 under the title *Conséquences du travail répétitif sous cadence sur la santé des travailleurs et les accidents* (Consequences of repetitive piece work for workers' health and work accidents) (Laville et al. 1972). It was based on extensive fieldwork and it happened to concern the working conditions of women and was undertaken with the aim of uncovering the reasons behind their frequent complaints and manifest health problems. As Alain Wisner, the then director of CNAM (Conservatoire National des Arts et Métiers) and initiator, explained, at the origin of the study there were difficulties related to men understanding why the women found their work strenuous:

> The question concerning women workers in the electronics industry had been asked by the electronics branch of the CFDT perfectly illustrating the masculine power at that period. The question had been formulated as follows: we are in charge of the electronics branch, all of us men, and our members, all of them women, find the work really hard. They even have nervous breakdowns and we want to know if all this is to be taken seriously … I hardly exaggerate! (Teiger 2006, p. 82).

This was a pioneering study which provided insights that were relatively novel at that time. It demonstrated the variability of seemingly repetitive work as well as the women's high level of 'mental' (or cognitive) activity: they have to take numerous micro-decisions, make up for incidents, memorize actions to take that have no logical connection. It also highlighted the elaborate strategies the women workers developed to gain time, circumvent difficulties and fight against the 'mindlessness' of the work and measured the physical stress resulting from rigid body postures.

Teiger et al. (2006) points out that in France the first studies that empirically demonstrated the negative psychological effects of work (la 'névrose du travail') resulting from alienating and exploitative working conditions were carried out in areas of women's work, such as telephone operators (see Doray 1996). For example, Dessors' et al. (1979) study of the work of telephone operators found evidence of intense stress (a consequence of having to read microcards on viewers and to search for information under time pressure) resulting in sleep disturbances, digestive problems and even personality changes that affected those close to them:

> The general opinion of the operators is that the work is *mindless*, that they themselves are just *talking machines*, robotized, as they are forbidden to have personal conversations with clients or colleagues during work, and that this robot-likeness stays with them after work (Dessors et al. 1979, p. 497).

The women that participated in this study describe themselves as nervous, hypersensitive, sometimes even aggressive but also as apathetic and lacking interest, 'ne plus avoir envie de rien'. Duraffourg et al. (1976) in a study of women operating hydraulic (and other types of) presses, observed the effects of the constant noise as well as the contradictions between work rhythm and expected quality on their health. They, for example, describe the postures the women at a particular press have to assume to be able to insert a piece:

> The time during which these postures need to be maintained is so important as it is difficult to seize the pieces which often fit tightly together due to the lubricant which convers them. In some cases, the workers use small tools or a magnet to make grasping them easier. Based on an observation of 30 minutes (148 cycles) we have been able to ascertain that on press B3 the metal sheets continued to stick in 13% of all cases, obliging the worker to hit the stack and stay longer in an uncomfortable position (Durrafourg et al., 1976, p. 9).

Teiger et al. (2006) demonstrated how making the health problems of working women resulting from high levels of attention under time pressure, noise, rigid postures, etc. visible gives them and their trade union representatives a voice.[6]

Quebec based Francophone ergonomists had women's occupational health and safety as one of their main research foci, which Karen Messing describes as covering five areas:

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[6] French ergonomic studies of women's work were not driven by a feminist agenda but by practical concerns. French ergonomists were design-oriented. Gender was not an issue at the time the study was carried out. In her appraisal of the work of Teiger (2006) writes: Women's work has played an important role in the direction Alain Wisner initially took towards the concept of working systems being 'adapted' to workers and in the elaboration of the arsenal of conceptual and methodological tools he constructed. But this role has remained largely invisible, because not problematized (p. 71).

documenting the unexpectedly heavy physical and mental workload involved in occupations traditionally assigned to women; showing the consequences for women's health of their precarious relationship to the work force; demonstrating the health effects of the double workday; studying the effects of work on those aspects of biology that are sex-specific; suggesting ways to remove ergonomic barriers to women entering non-traditional jobs which have been designed in relation to the typical male body (Messing et al. 1992, p. 1)

As part of this research, they also sought to disentangle the influence of sex (biological) and gender (socially constructed roles) as contributors to women's occupational health issues (Messing 1994). Focusing on the health of women workers has served as an important entry point not only to fieldwork-based studies of women's work, and has also been an area that has had a central focus on work (re)design—though often falling short in focusing on how technology might be redesigned as a means of supporting women's work and women workers.

3.4. Technology and the redesign of work

Views about the nature of technology evolved in parallel with the emergence of science, technology and society studies, which brought scholars from multiple disciplines—including sociology and anthropology—together. Feminist scholars, such as Hacker (1981), Keller (1987a, b), Harding (1986) and others, reflected on the gendered nature of science and engineering and influenced a whole generation of women to think about how the inclusion of women would change how scientists think about nature and the kinds of machines engineers build; and collections edited by Rothschild (1983c) and Zimmerman (1983) in some sense marked the emergence of technology as a contemporary feminist issue.

Rothschild's edited collection, *Machina Ex Dea* was particularly influential. It explored how different social formations integrated technology differently, and how ideas about machines also had a class basis (Hubbard 1983). The book sought to both articulate what a feminist approach to technology was, and demonstrate why feminist perspectives of technology were necessary in that focusing on technology from a feminist perspective could impact the field of technology studies (Rothschild 1983a). Rothschild argued that women's contributions had been largely left out of technological history, that women's roles as producers and reproducers—what Cowan (1979) called 'bearers and rearers of children, workers and homemakers' (Rothschild 1983b, p. xii), and the relationship of women's work to technological change had been left largely unexplored, and that omitting women as subjects of study influenced subsequent knowledge production related to technology studies. Rothschild went on to argue that feminist perspectives within technology studies could speak to those concerns which were central to the then emergent area of technology studies: content and methodology; social context; determinism, and the nature of technology.

In the afterword to *Machina Ex Dea*, Rothschild (1983a) argued that future feminist technology studies should address three often overlapping areas: historical analyses, analyses of women and work, and epistemology and values. Drawing on research by McGaw (1982), Rothschild noted that most research about women's paid work addressed the period prior to the 1940s, and new work concerned with women's paid work was only beginning to emerge as areas where women had been concentrated in the paid labour force were increasingly subject to computerization.

An immensely popular book on women and technology was Ruth Schwartz Cowan's *More Work for Mother* (1983) where she explored the use of household technologies by middle-class women. She was criticized for the absence of a theoretical framework and for ignoring feminist and Marxist scholarship. However, as Parr (2005) argues, her work

> has stimulated scholars to explore specific settings in the United States, influenced studies of domestic work in diverse national settings and of a wide range of new technologies, and been a significant reference point in theorizations of gender and technology (Parr 2005, p. 611).

3.4.1. *The work of Cynthia Cockburn*

Cynthia Cockburn's work about gender and technological change is well-known. It began with *Brothers: Male Dominance and Technological* Change (1983) where she took an unapologetic socialist-feminist stance in writing about technological change in four unionized newspaper houses in the UK based on interviews with union craftsmen. In her next project (1983–1984) she began conducting observational work exploring the effects of technological change through case studies of three technologies: computerization of pattern and cutting processes in the clothing industry; computerization of goods handling and merchandizing processes in mail order warehouses; and computed tomography (CT) scanning in radiology departments (Cockburn 1985). In addition, with the cases which formed the foci of *Machinery of Dominance,* Cockburn (1985) also introduced a new strategy which she continued in her subsequent work on the microwave oven. She followed the three computer-based technologies upstream 'to their point of origin, or as near to this as it is possible' (Cockburn 1985, p. 3). Each industry was placed in an historical context, and computerization of the work was explored in relation to one of the dominant themes of the book: 'the *sexual division of labour*, the way work is divided up between men and women' (Cockburn 1985, p. 8; emphasis in original).

In *Gender & Technology in the Making*, Cockburn and Ormrod (1993) continued with a focus on following technologies upstream which had begun in *Machinery of Dominance*. The microwave study was undertaken as part of a larger, 10 country study, which began in 1989 (see Cockburn and First-Dilić 1994). By the late 1980s,

attention was shifting away from studies of women and technology, and research was increasingly directed towards examining processes surrounding the development and use of technologies in, or through which, gender was constituted (Wajcman 1991a).

Arguably, this reformulation, which shifted the focus from the impact of technology on gender relations to a focus on the mutual shaping of technology and gender relations, was indicative of evolving views of technology. Increasingly, technology was being viewed in much less deterministic terms than it had been by scholars such as Braverman (1974), whose analyses seemed to offer little possibility for change related to technology, beyond wholesale rejection of technology. Around the same time, actor-network theory (ANT) was gaining currency in several intellectual communities, and this move away from viewing technology in a deterministic vein and seeing it instead as a product of complex social networks, the outcome of which depended partly upon processes surrounding its introduction and use, is reflected in Cockburn and Ormrod's (1993) work.

Cockburn's contributions were amongst the earliest pieces which offered detailed observational accounts of how women experienced technological change in their paid work, and focussed on technology as an object and subject of study. Her attention to detail concerning how she gained access to study sites, and her methodological approach helped many after her see the potential of observational studies in contributing to work redesign, and how, if attention was not paid to how technologies are gendered, women would disproportionately experience adverse aspects of technological change. Arguably, although the general insights which resulted from Cockburn's contributions have had widespread impacts, some aspects of the work she undertook—particularly about the gendered nature of technological change processes—have had less of an impact on understanding contemporary CSCW systems.

Cynthia Cockburn looked at computerization as a process by which men asserted their power through the control of technology. She also provided detailed accounts of how, for example, Computer Tomography (CT) changed the work of radiologists demonstrating that creating what can be interpreted as a pathological symptom requires an amalgam of pathological knowledge and expertise in handling the different functions of the imaging equipment (Cockburn 1985). The production of CT images became a highly skilled work task and contested terrain.

3.4.2. *Women, work and computerization*
Issues around women and technology gained prominence in the field of IT in the 1980s, as visible in the important series of 'Women, work and computerization' conferences that were organized as part of IFIP (International Federation for Information Processing). Most of the work that was presented in these conferences were observational and/or interview studies that explored how IT systems influenced women's work with a view onto the gendered division of labour and on changing skills. Many studies of information technology and women's work followed this

path. For example, Mitter and Rowbotham (1995) collected a number of empirical studies concerning the influence of new technologies on women's work in poor countries, including Latin America, India and Sub-Saharan Africa that, taken together, provide a rather varied picture of women and technology in these countries.

Also the well-known studies of office automation (Glenn and Feldberg 1977; Webster 1986) discussed the effect of computerizations on women's work. Lucy Suchman and Eleanor Wynn's 'Procedures and problems in the office' (1984) also addressed design issues. They did this very much in the way that later became the concluding 'implications for design' section of CSCW papers, asking how the 'understanding of procedural work as essentially problematic is important to the design of office information systems' (p. 152).

Technology became a topic in studies of nursing, as soon as hospital management started introducing nursing information systems (see e.g. Wagner 1993). For example, Françoise Acker's work discussed the double work of nurses that participate in in the formalization of nursing: they have to articulate formalized descriptions of work within the hospital's nursing units and have to have them accepted by other professional groups (Acker 1995).

Some Canadian work undertaken at the time (Benston and Balka 1993) along with work undertaken in Europe (Green et al. 1993) utilized action research methods, including participant observation, in hopes of engaging women as end users in technology design activities, but only managed to engage users in aspects of implementation (Benston and Balka 1993), or fell short when it came to influencing long term change. Of particular note are chapters in the final section of *Gendered by Design* (Green et al. 1993) which outlined participatory design methods utilized in an effort to overcome day-to-day gendered dynamics at work.

Very few projects at that time actually engaged in systems design in support of women's work. The *Florence* project, one of the early participatory design projects, had women— nurses— as its main user group. An anthropologist was hired who did extensive fieldwork in two hospital wards. To our knowledge, this fieldwork was never published, but it supported a process of mutual learning involving designers and users which resulted in an IT system in support of the nurses' work (Bjerknes and Bratteteig 1987).

4. Implications for CSCW

All of the issues we have addressed in this paper are pieces of a larger conversation about trying to locate women's work in a context that addresses its visibility and value, whether or not that work has been undertaken from a feminist perspective. Yet it is only when it is addressed and situated contextually that the complex influences which shape women's work become visible. Below, we reflect on the contributions – and potential contributions - that our review of fieldwork-based studies of women's work make to contemporary computer supported cooperative work scholarship.

4.1. The value of an historical perspective for CSCW research

Our use of an historiographic approach is based on the belief that 'historically grounded, sufficiently complex understandings of empirical phenomena' (Duffy 2007) can also be helpful in apprehending contemporary phenomena. Such a perspective is at the heart of studies of labour history. For example, the Latin American studies of women's work (French and James 1997) we refer to offer such a perspective, as in Lobato's study of the meatpacking industry that covers the period from 1904 to 1970, documenting the technological changes that took place following what she terms 'Americanismo' (Lobato 2001); or Tinsman's (2004) study of women agricultural workers which covers the period from 1973 to 2002. Another example is the anthology *Women, Work and Protest. A century of US women's labor history* edited by Milkman (1985).

CSCW research can benefit from such a perspective as it brings some issues and concerns to the fore that have been 'lost' and/or pushed to the background. The studies of women's work we have outlined here offer a wider and more sociologically oriented perspective of the 'context' in which work is embedded, as they seek to clarify the intersections of gender, paid work/ reproductive work, organization, technology and the 'politics' surrounding them. As technologies found in the home and homes themselves continue to be a focus of computerization, the insights of past work which explored the intersection of gender, paid work, unpaid work and technology remain salient, as do the methodological approaches which have evolved as scholars and practitioners sought to make women's work visible within the complex settings in which it is situated. These past studies of women's work also help us understand some of the historical continuities in the division of labor and shed light on issues that are only implicitly present in the current discourse, such as the concept of skill and a concern for working conditions and workers' health. These 'issues are regular features of working life in contemporary society' and 'they are issues analysts and designers of coordination technologies, if their studies aim at any degree of realism and worldly relevance, invariably will come across and have to cope with' (Bannon et al. 2011, p. 227).

There are several lessons to be learned from our brief and in some ways also selective account of studies of women's work. First, old studies of women's work remain stimulating to read from a contemporary CSCW perspective in part because of *the attention they pay to the larger context of work – policy* making, organization, gender relations, relations of paid work and work done in the home. This is reflected in the questions researchers asked and the methods they used, as Anna Pollert's questions in *Girls, Wives, Factory Lives* (1981) demonstrate:

> Does it make any difference to be a *woman* worker? Is work seen or felt differently from a man? How does marriage and the family come into work? What is the atmosphere of a women's factory'? Do women deal with supervision, discipline and control the same way as men? How does women's trade unions differ from

men's? What are the economic prospects of women in a time of rising unemployment? What, in short, is distinctive about wage labour of a woman, because of her socialisation as a woman and her oppression as a woman? (p. 5f.)

Hence, an important thread which is woven through the material outlined here is the need to look at women's work across multiple contexts, in order to really understand gender. For example, Feldberg and Glenn (1983b) found they had to look at work processes (similar to what we, in CSCW, call work practices) as well as organizational change and changes in occupational structures, in order to make sense of changes in women's work related to computerization. In the German tradition studies of work followed the 'company case study' approach which combined the analysis of workplaces with interviews with management, human relations staff, and trade union representatives to obtain contextual data about a sector of work or a company — an approach similar in some respects to that taken in Francophone ergonomics. Hence, observational work was embedded in rich empirical material about the context of work. French studies of women's work focused on the larger organizational context in which it was embedded, on working conditions, personnel strategies and they also paid attention to the private situation of women workers, a perspective that plays an important role in the feminist research of Sally Westwood who did not focus on the workplace as much as on women's working culture and on their unpaid work at home. A gendered analysis of labor requires 'going beyond the study of women workers and women's work' (Baron 1991, p. 36) as the 'challenge facing labor historians is to explore the articulation of gender and class in the lives of working-class subjects, both male and female' (French and James 1997, p. 4).

Second, political commitment often in combination with feminist engagement helped bring issues to the fore that tend to be overlooked. At the heart of nearly all of the work undertaken that we describe, is a desire to *make women's work visible*—this was true for the early studies as well as more contemporary observational studies of women's work. A theme common to all studies is the gender stereotyping of jobs and the invisibility of women's skills. Many hospital studies undertaken in the 1980s and 1990s aimed at demonstrating the highly skilled nature of nursing. Studies of women's work have produced rich accounts of the—often invisible and undervalued—skills in women's work. There is a long-standing tradition in CSCW research of making hitherto unnoticed types of work or work relegated to the background visible (Star and Strauss 1999), which is partially inherent to the idea of performing 'naturalistic' studies of work. Blomberg et al. (1996) raise the issue of invisible work with respect to the 'routine/knowledge work' distinction in divisions of labor, using the example of document coding and data entry that has been defined as 'routine' although requiring judgmental and interpretive work. As a political program the aim of making women's work visible also directs the choice of domains and types of work/jobs which are explored (e.g. medical secretaries, or microwork on computing platforms).

Third, CSCW can benefit from a focus on *concern with technology and skill*. Studies of women's work were often undertaken upon occasion of a new piece of technology being introduced at the workplace. Observations of how this affected women's work were combined with a critical analysis of gender relations and the 'nature' of technology, as exemplified by the work of Cynthia Cockburn. Such studies have also challenged notions of skill and demonstrated how they are inextricably bound to ideas about sex and gender. Toni Robertson's study of a small company that was owned and managed by women points at the importance of 'naming women's workplace skills', in particular 'differences in personal communication skills and style, and responsibility for communication and relationship building work' (Robertson 2000, p. 210). She sees those as central to workplace activities, including the use of CSCW technologies.

CSCW researchers use the concept of skill but it is not necessarily in the foreground of their 'analytic sensibility'. As Randall et al. (2007) remark: 'We have to decide, for design-related purposes, whether categories such as skill are relevant, and this is a nontrivial exercise' (p. 46). While CSCW researchers would agree with the observation that work practices require skills and the application of knowledge, it is indeed not trivial to move from the description of a practice to a more systematic analysis of the nature of the skills which a competent performance of a practice requires, whether these skills are valued, and in which ways they can be developed, maintained and extended. Failing to address these issues also can lead to poor design solutions that fail to meet the underlying goals of CSCW. In overcoming those limitations, varied methods such as some of the more quantitatively grounded methods of Francophone ergonomics may be useful in overcoming what are arguably barriers and 'seeing' otherwise invisible aspects of the skills utilized in work, particularly women's work. Similarly, having an understanding of labour market segmentation—which many of the earlier studies of women's work explored - adds nuance to how we understand skill.

Finally, in particular the studies of women's work that were based in a feminist perspective support a *global perspective*. This is to do with the fact that the women's movement, in spite of all the differences that feminist scholarship brought to the fore, was and is comparative, historical, and transnational. We do not want to claim here that CSCW research has to necessarily develop a political perspective on work but draw attention to an argument by Ferree and Mueller that

> studies of women's movements point to the analytic usefulness of […] acknowledging a relationship between gender and political opportunity that may vary systematically between states and in state institutions relative to civil societies, giving either women or men different advantages in mobilizing at any given point (Ferree and Mueller 2004, p. 590).

Hence, in particular comparative case study research in CSCW may benefit from more systematic historical and transnational work, as this would help advance

knowledge about why the realities of work practices and technological change may vary considerably, nationally and culturally.

4.2. A wider repertoire of methods

The issues that led scholars studying women's work also influenced the methods they used. Much has been written about the role of ethnography in CSCW. 'The task of the ethnographer', as Randall et al. (2007) maintain, 'is to understand context in such a way that we can identify the rules which are in place and how people decide on their applicability; understand why people do what they do, and identify the social contexts which make them meaningful things to do' (p. 34). They also state that fieldwork in CSCW is done with an 'analytic sensibility which orients to design' (p. 53). However, much fieldwork in the service of design is done without focusing on the bigger context/ picture with broader contextual issues being left in the background, yet taking the bigger context seriously has methodological implications. We are neglecting the broader contexts in which work is carried out at our peril; taking context into account has implications for both how we perform our work (methods of study), as well as the designs we produce as a result.

Whether research on women's work undertaken between the late 1960s and the mid 1990s included observational methods (or not) seems to have been shaped more by the research tradition in which it positioned itself rather than by being feminist. It also depended on whether women researchers were interested in understanding the details of the work as it 'naturally' occurs: an ethnographic approach to studying work practices was far from common in the period we cover in this paper. Often the 'voice' of the women workers themselves and how they experienced the work was considered the most relevant one to make to be heard, as it was not the work practices as such but their value (in terms of hardships, exigencies, pay and other benefits, sociability, etc.) that was in focus.

In the United States, Canada and the United Kingdom, observation-based studies of women's work were often proceeded by scholarship which was given voice and legitimacy by the saying 'the personal is political', and, particularly earlier on, interviews and surveys were the prominent methods used to make sense of women's paid work. For feminist researchers, the fine details of work tasks were not necessarily in the focus of attention; some of Cockburn's work (1983, 1985) is an exception here. Feminists were interested in the issues surrounding women's work: the work culture they developed; how they dealt with supervision and control, as well as with particular working conditions; gender relations at work; women workers' relationship with trade unions and/or their willingness to organize; and the links between domestic life and paid work. While 'hanging around', observing and asking, allowed authors to explore some of these issues, researchers also carried out interviews. Anna Pollert had access to the factory floor under the condition that her presence would not interrupt production. As a consequence:

> I had to talk to workers as they worked; whether I liked it or not, I had my nose on the shop-floor, got to know informal groups as well as individuals, and witnessed the subtleties of factory relations within the inexorable pace of work (Pollert 1981, p. 6)

She mentions observation as one of her methods but talking, conducting interviews was much more relevant in view of her research questions, while the details of the work practice itself remained in the background.

Feminist researchers in Germany preferred the narrative interview with a strong biographical focus as a method, as it allowed them to explore women's relationship to work through the lens of their private life (and vice versa). One of their main arguments was that women's experiences in the home influence how they perform and experience work. Some of the interview-based studies of working women (e.g. Ostner and Beck-Gernsheim 1979) also produced detailed descriptions of the character of the work in different settings (each covering several pages) putting it in relation to women's biographies and domestic lives.

Over time, significant changes have occurred in norms of knowledge production and how we conduct, report and write about research methods. In the 1980s, often detail about the specific methods used to carry out a study were left either unaddressed altogether (e.g., Feldberg and Glenn 1983a, b), or researchers simply used terms such as qualitative, without specifying what type(s) of qualitative methods were used. Cockburn's work is interesting in this regard, in part because the level of detail about her data collection and analysis methods grew with each of the books included here (Cockburn 1983, 1985; Cockburn and Ormord 1993), perhaps reflecting these evolving norms and standards.

Another interesting aspect of studies of women's work had more to do with the particular research tradition in which it was anchored than with a feminist agenda. French ergonomic studies of work combined observations of how different work tasks were performed with measurements, e.g. the strain caused by particular postures, weights to lift, noise, or lighting conditions. They also carried out individual and group interviews and discussed their observations with the workers and trade union representatives. For example, in the early study of women's work in the electronics industry which focused on one complete cycle of assembling a TV set (Teiger et al. 2006) the researchers used multiple methods to study work 'in the wild'. They performed systematic observations of the work process at several work stations over several months, in order to understand the skills needed to perform the different tasks and the body postures the women had to assume to carry them out; they paid special attention to the frequent incidents and how the women dealt with them; they performed electro-physiological measurements; they conducted group and individual interviews; and, on a regular basis, discussed their findings and interpretations with the women workers. Without a strong involvement of the trade unions the study would not have been possible; and the trade unions as well as the company's top management were expected to take action with respect to proposals to improve the working conditions. The women trade unionists considered the findings

especially valuable, since they provided a status of objectivity to the women's experiences:

> The union women point out that the results provided them with a 'legitimacy' and 'arguments', confidence in themselves and assurance vis à vis the foremen and management: they were not just 'robots' but were able to contest the supposedly scientific character of the timing, and the methods to determine time and movement that determine the piece rates (Teiger et al. 2006, p. 26).[7]

An interesting example of how to combine observation with measurements is a Canadian study by Courville et al. (1991) who observed over three days how one male and one female mechanic assembled a diesel engine with a focus on the most difficult and physically demanding tasks:

> All activities performed during the three days were noted on a grid. The two workers chosen for direct comparison were videotaped with simultaneous chronometry during all tasks which had been reported as demanding. All objects manipulated were weighed with a digital scale […]. Use of tools and protective equipment was noted (p. 165)

In addition, grip measurements were taken, the time spent on each task was noted and the two workers were also asked to rate their perception of difficulty of each task, as well as of fatigue and of pain in different parts of the body. The conclusion of this study was that women of slightly larger than average size could do this 'male job' (in a workshop with 1200 men and three women) as easily as men provided some simple measures would be implemented.

5. Opportunities for contemporary CSCW research: some conclusions

In conclusion of the genealogy of observational studies of women's work we have presented in this paper, we reflect on in which ways it allows for new opportunities to answer questions, question answers, and advance the field of CSCW research. One of our motivations is that as new forms of computerization occur, skill as well as gender stereotyping and the sexual division of labour persist, and remain inextricably bound together. The computerization of work continues—albeit now in a significantly different form than it did in the 1970s and 1980s—and issues which surfaced in

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[7] A key characteristic of Francophone ergonomics was the participation of the workers in the design of the study and the discussion of the results. This concerns in particular what is called 'pre-diagnostics': it implies sharing the data as well as the descriptive categories, which were often represented graphically. This principle was also followed in an early study of women's work in the mid 1970s: the work of telephone service operators, which Cathérine Teiger also participated in (Dessors et al. 1979). This piece of research was commissioned by the trade union on the occasion of the introduction of a special apparatus for reading microfiche. The women operators participated in all phases of the study.

relation to the automation debate remain salient, for example in the context of bringing AI-based tools to real work environments, and continue to come to bear on the work CSCW practitioners do. Also, new forms of organizing work, as for example mobile or nomadic work have gained momentum and with the increasing significance of (big) data and online platforms of all kinds and the gig economy associated with them new types of work have emerged. These new forms of work emerge in environments in which gender-based differences in home life are likely to reinforce gender-based differences in the workplace, and historical conceptions of skill associated with (male) gender may gain foothold.

Our reflection on opportunities for learning that an historical analysis of studies of women's work offers, focuses in particular on the European CSCW research program to which we feel close. This research program

> implies an approach to technology development radically different from that of the previous development of interactive and collaborative computing, namely, an approach to technology development in which ethnographic and other forms of in-depth workplace studies play an essential and proactive role (Schmidt and Bannon, 2013, p. 350).

Workplace studies in this tradition are not a goal in themselves but they are carried out with a view onto developing collaborative systems in support of work practices (even if not all CSCW research necessarily engages with design). Another, related, ambition is to develop a theory or set of concepts that can help to better understand practices and guide design. Blomberg and Karasti (2013) reflect on the essential role of ethnographic studies in CSCW research. They emphasize that 'unlike traditional sociology where sociological categories (e.g. gender, class, power, religion) are used to describe and explain phenomena, ethnomethodology makes visible participants' situated methods for creating the coherence of phenomena' (p. 402). Hence, CSCW research has produced a rich body of workplace studies in many different domains but there has never been a specific focus on gender and/or women's work.

One of the conclusions from the history of studies of women's work is that the particular people who perform the work, also using technologies to accomplish whatever their tasks are, *do matter*. However, workplace studies and the concomitant design activities are mostly done with a view on a 'genderless user' or practitioner (Bardzell 2010). Studies of women's work contest this perspective, suggesting a specific focus on women and other neglected groups of workers (e.g. migrant workers). First of all, this calls for strengthening research that looks at 'forgotten' areas of work, much of it carried out predominantly by women, with the aim to make these types of work visible. There are some recent studies dedicated to this endeavour. For example, Bossen et al. (2014) have brought the work of medical secretaries to the attention of researchers, work that 'is typically regarded as routine, unskilled, or not "knowledge work"' (p. 78). They make the contribution of medical secretaries to the maintenance of patient records visible, showing how 'as persons placed at central places on wards they coordinate, communicate and

transcribe, but their contribution to the overall work arrangement is relegated to the background' (p. 102). Geiger et al. (2018) conclude from their study of documentation work for open source software (OSS) libraries that this 'is a kind of work that has implications for those concerned with systemic inequalities, particularly gender and those who do not speak English as a first language' (p. 796). Ismail and Kumar (2018) studied health data work performed by social health workers in underserved communities in Delhi India. They describe the ways in which their data collection practices reflect sensitivity to social norms; how the women 'navigate social barriers in a patriarchal society' (p. 12); and how their data collection practices 'reflect and foster feminist solidarity' (p. 2).

These recent studies confirm that work continues to be organized in largely gendered ways, characterized by a division of labour by sex and gender, influenced by ideas about what constitutes skilled work as opposed to unskilled work (for example, England 2005; Hakim 2016). Although awareness of gender issues has arguably improved, conventional ideas about work (e.g., men do skilled work, women's work tends to be less skilled) endure, often alongside the gendering of work within jobs. This continues to have implications for how we see work (e.g., when designing systems, whether or not we focus on work predominantly under-taken by women workers). The work we have profiled serves as a reminder that work undertaken in cognate areas such as Francophone ergonomics can help us see work differently, which has implications for design.

A challenging task is to also understand how a worker's gender (or social class) may influence the work to be done. From the point of view of Francophone ergonomics, which combines qualitative and quantitative data collection methods in field settings, Messing et al. (2018) pose this question, asking: 'What does it mean to "observe" gender? How can observations of gender dynamics be validated during ergonomic interventions - what if men and women disagree? How can gender be observed without recourse to gender stereotyping of either workers or ergonomists?' (p. 6). They point at 'work-family articulations' in the form of 'schedule choice ('bidding'), schedule man-agement, and health protection', work and task organization, but also 'interactions, with superiors, co-workers and customers, in collective strategies and in the context of emotional work' (p. 18) as observable aspects of gender at work, although this also poses some challenges researchers have to be aware of.

Another pivotal insight from a genealogy of studies of women's work is the importance of embedding workplace studies in rich empirical material about the context of the work. The pioneering studies we have described point at the necessity of expanding the notion of the 'field' beyond the workplace by including (women) workers' living conditions, work at home, and other potentially relevant aspects of their lives. Recent studies of mobile or nomadic work focus on how (women and men) workers manage the boundaries between work and everyday life, also looking at gendered patterns. For example, Ciolfi and Lockley (2018) observed a variety of approaches to what they call 'boundary sculpting', such as 'managing expectations (of organisations and professional stakeholders, of families, and their own); practicing individual working styles and professional identities; establishing and refining routines;

managing the "pull of the personal" seeping into work; and - conversely- weaving life into work' (p. 810). Matilal (2020) has started a study of time practices of women who have returned to work after maternity leave in the Indian software services sector, in which she follows individual women for a longer period of time. Her aim is to understand how agency over the scheduling of working-time and management of work life boundaries affects women's participation in the labour market. The study by Webster and Zhang (2020) of immigrant women becoming 'chefs' in their own kitchen as part of the gig economy is a good recent example of how

> gendered narratives of idle capacities and women's work in the home and family spheres are marketized and transformed through the platform. Our study widens the scope of understanding the gig economy by positioning gig work as part of broader social relations between a company, the workers and gender norms (p. 113).

A related insight from the history of studies of women's work is the importance of examining working conditions and skill requirements. This is one of the strengths that Francophone Ergonomics and German Industrial Sociology have brought to workplace studies and that may be more fully exploited by CSCW research. This has been observed before: studying work

> means that issues of working conditions, issues of workload and stress, of dependability and safety, of the debilitating effect of monotonously repetitive work without scope for learning, of professional autonomy in making decisions — are, if not essential or ubiquitous, then surely typical. Or to put it differently, these issues are regular features of working life in contemporary society. Therefore, issues of working conditions and related issues of dependability, complexity, stress, monotony, etc. are issues analysts and designers of coordination technologies, if their studies aim at any degree of realism and worldly relevance, invariably will come across and have to cope with (Bannon et al. 2011, p. 226).

Again, a focus on women's work does not conceptualize these issues exclusively with respect to the workplace but includes aspects of women's lives, such as childcare responsibilities, living conditions, health issues, (lack of) opportunities for learning, and so forth. It also begs ethical questions with respect to social justice that an interest in feminist approaches has brought to HCI and CSCW (Fox et al. 2017, Bellini et al. 2018). Again, this is not entirely new as it echoes a long-standing concern of CSCW research with empowering the users and improving their working conditions in a given (organizational) setting.

The 'gendering of technology', how to understand and ultimately to avoid it is another opportunity for reflection and action that studies of women's work brings to contemporary CSCW research. Cockburn and Ormrod (1993) in *Gender and Technology in the Making* remind us of how gendering of technologies occurs, not as a singular moment or act resulting from design, but rather is distributed through design and use processes.

Recent studies show how examining the particular situation of women in specific areas of work or modes of carrying out work also generates ideas about new tools that account for needs that would have otherwise not have been made visible. In their study of a gig work platform, Foong et al. (2018) propose to 'implement specific pricing guidelines for women to increase visibility of the bill rate gap, and analytics for employers to understand hiring practices' (p. 53); Matilal (2020) suggests we think about the design of technologies that give women software engineers greater agency over the scheduling of their working-time; and Ismail and Kumar (2018) ask for data collection tools that appropriately reflect the practical needs of the social health workers (and not just the data needs of high-level stakeholders).

A final point concerns the need and usefulness of a global perspective. Such a perspective has become inevitable, given the conditions of many modern work-places. It is present in, amongst other things, the increasing number of CSCW studies in non Western countries as well as of work on global platforms and companies.

Although CSCW practitioners have paid significant attention to the social organization of work and to the design of technology to support cooperative work, there is ample room to contribute to scholarship and practices which seek to identify and challenge the ways that social organization of work and gender come together in the gendering of work. Prior field-based studies of women's work have contributed a great deal to our understanding of the myriad ways in which context is significant in understanding women's work and has yielded valuable insights about the nature of work, the role of gender and culture in work and more. There is much work yet to be realized in bringing insights derived from these methods and the studies produced through their use into CSCW practices and design.

References

Abbot, Edith (1909). Women in industry. A study in American economic history. *The Economic Journal,* vol. 20, no. 77, pp. 73-77

Acero, Liliana (1995). Conflicting demands of new technology and household work: Women's work in Brazilian and Argentinian textiles. In S. Mitter; and S. Rowbotham (eds): *Women Encounter Technology: Changing Patterns of Employment in the Third World.* London, UK: Routledge, pp. 70-92.

Acker, Françoise (1995). Informatisation des unités de soins et travail de formalisation de l'activité infirmière. *Sciences Sociales et Sante,* vol. 13, no. 3, pp. 69-92.

Acker, Françoise (1997). Sortir de l'invisibilité: Le cas du travail infirmier. *Raisons pratiques,* vol. 8, pp. 65-94.

Acker, Françoise (2000). Ecriture du travail, travail d'ecriture, élaborer les outils qui conviennent. *Diagnostics infirmiers, un langage pour le 3° millenaire,* vol. 8, pp. 17-30.

Baethge, Martin; and Herbert Oberbeck (1989). The future of the white collar worker. In H. Ernste and C. Jaeger (eds.): *Information Society and Spatial Structure.* London: Belhaven Press, pp. 117-127.

Bannon, Liam; Kjeld Schmidt; and Ina Wagner (2011). Lest we forget. The European field study tradition and the issue of conditions of work in CSCW research. *ECSCW 2011: Proceedings of the 12th European Conference on Computer Supported Cooperative Work, Arhus, Denmark, 24-28 September 2011*, London: Springer, pp. 213-232.

Bardzell, Shaowen (2010). Feminist HCI: Taking stock and outlining an agenda for design. *CHI 2010: Proceedings of the SIGCHI conference on human factors in computing systems, Atlanta, Georgia, 10–15 April 2010*, New York: ACM Press, pp. 1301-1310.

Baron, Ava (1991). Gender and labor history: Learning from the past, looking to the future. In A. Baron (ed.): *Work Engendered: Toward a New History of American Labor*, Ithaca, NY: Cornell University Press, pp. 1-46.

Becker-Schmidt, Regina; Gudrun-Axeli Knapp; and Beate Schmidt (1984). *Eines ist zuwenig, beides ist zuviel: Erfahrungen von Arbeiterfrauen zwischen Familie und Fabrik.* Bonn: Neue Gesellschaft.

Beck-Gernsheim, Elisabeth (1976). *Der geschlechts-spezifische Arbeitsmarkt: zur Ideologie und Realität von Frauenberufen*. München: Aspekte.

Bellini, Rosanna; Angelika Strohmayer; Eptisam Alabdulqader; Alex A. Ahmed; Katta Spiel; Shaowen Bardzell; and Madeline Balaam (2018). Feminist HCI: taking stock, moving forward, and engaging community. In Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems CHI 2018, 21–26 April 2018, Montréal, QC, Canada, pp. 1-4. https://doi.org/10.1145/3170427.3185370.

Benería, Loudes; and Martha Roldan (1987). *The Crossroads of Class and Gender: Industrial Homework, Subcontracting, and Household Dynamics in Mexico City*. Chicago: University of Chicago Press.

Benston, Margaret (1983a). For women, the chips are down. In J. Zimmerman (ed.): *The Technological Woman: Interfacing With Tomorrow.* New York: Praeger, pp. 44-54.

Benston, Margaret (1983b). Technology in the workplace: Chipping away at women's work. *Horizons*, vol. 1, no. 7, pp. 20-24.

Benston, Margaret; and Ellen Balka (1993). Participatory design by non-profit groups. *Canadian Woman Studies Journal/les cahiers de la femme,* vol. 13, no. 2, pp. 100-103.

Bernays, Marie (1910/2012). *Auslese und Anpassung der Arbeiterschaft der geschlossenen Grossindustrie, dargestellt an den Verhältnissen der "Gladbacher Spinnerei und Weberei AG" zu München-Gladbach im Rheinland.* (1st ed., Duncker & Humblot, 1910). Essen: Klartext Verlag.

Bjerknes, Gro; and Tone Bratteteig (1985). Female technologists working with a female dominated occupation: Opportunities and initiatives. In A. Olerup; L. Schneider; and E. Monod (eds): *Women, Work, and Computerization: Opportunities and Disadvantages : Proceedings of the IFIP WG 9.1*

First Working Conference on Women, Work, and Computerization, Riva Del Sole, Tuscany, Italy, 17-21 September, 1984. Amsterdam, New York: North Holland, pp. 27-29.

Bjerknes, Gro; and Tone Bratteteig (1987). Florence in Wonderland. In G. Bjerknes; P. Ehn; and M. Kyng (eds.): *Computers and Democracy: A Scandinavian Challenge*. Aldershot, UK: Averbury, pp. 279-295.

Bjerknes, Gro; and Tone Bratteteig (1988). Computers - utensils or epaulets? The application perspective revisited. *AI Society,* vol. 2, no. 3, pp. 258-266.

Blomberg, Jeanette; and Helena Karasti (2013), Reflections on 25 Years of ethnography in CSCW. *Computer Supported Cooperative Work (CSCW)*, vol. 22, no. 4-6, pp. 1-51.

Blomberg, Jeanette; Lucy Suchman; and Randall H. Trigg (1996). Reflections on a work-oriented design project. *Human-Computer Interaction*, vol. 11, pp. 237-265.

Bossen, Claus; Lotte Groth Jensen; and Flemming Witt Udsen (2014). Boundary-object trimming: On the invisibility of medical secretaries' care of records in healthcare infrastructures. *Computer Supported Cooperative Work (CSCW)*, vol. 23, no. 1, pp. 75-110.

Bowker, Geoffrey C.; and Susan Leigh Star (1999). *Sorting Things Out: Classification and its consequences*. Cambridge, Mass.: MIT Press.

Bracke, Maud Anne (2015). Our bodies, ourselves: The transnational connections of 1970s Italian and Roman feminism. *Journal of Contemporary History*, vol. 50, no. 3, pp. 560-580.

Brain, Robert Michael (2001). The ontology of the questionnaire: Max Weber on measurement and mass investigation. *Studies in History and Philosophy of Science,* vol. 32, no. 4, pp. 647-684.

Braverman, Harry (1974). *Labor and Monopoly Capital: The Degradation of Work in the Twentieth Century*. New York: Monthly Review.

Butler, Elizabeth Beardsley (1909). *Women and the Trades: Pittsburgh, 1907-1908*. New York: Charities Publications Committee.

Butler, Elizabeth Beardsley (1912). *Saleswomen in Mercantile Stores, Baltimore, 1909*. New York: Charities Publication Committee.

Capy, Marcelle; and Aline Valette (1984). *Femmes et travail au XIXe siècle*. Paris: Syros.

Celarent, Barbara (2009). Review: The Woman Who Waits The Saleslady. The Schoolma'am by Frances Donovan. *American Journal of Sociology,* vol. 115, no. 3, pp. 984-990.

Chappert, Florence; Karen Messing; Éric Peltier; and Jessica Riel (2014). Conditions de travail et parcours dans l'entreprise. Vers une transformation qui intègre l'ergonomie et le genre? *Revue multidisciplinaire sur l'emploi, le syndicalisme et le travail,* vol. 9, no. 2, pp. 49-72.

Ciolfi, Luigina; and Eleanor Lockley (2018), From Work to life and back again: Examining the digitally-mediated work/life practices of a group of knowledge workers. *Computer Supported Cooperative Work (CSCW)*, vol. 27, no. 3-6, pp. 803-39.

Cockburn, Cynthia (1983). *Brothers: Male Dominance and Technological Change*. London: Pluto.

Cockburn, Cynthia (1985). *Machinery of Dominance: Women, Men and Technical Know-How*. London: Pluto Press.

Cockburn, Cynthia; and Susan Ormrod (1993). *Gender and Technology in the Making*. Thousand Oaks, California: SAGE publications.

Cockburn, Cynthia; and Ruza First-Dilić (1994). *Bringing Technology Home: Gender and Technology in a Changing Europe*. Maidenhead, UK: Open University Press.

Cohen, Marcy; and Margaret White (1987). *Taking Control of Our Future: Clerical Workers and New Technology*. Vancouver: Press Gang Printers and Publishers.

Corbin, Juliet M.; and Anselm Strauss (1988). *Unending Work and Care: Managing Chronic Illness at Home.* San Francisco: Jossey-Bass.

Courville, Julie; Nicole Vézina; and Karen Messing (1991). Comparison of the work activity of two mechanics: A woman and a man. *International Journal of Industrial Ergonomics,* vol. 7, no. 2, pp. 163-174.

Cowan, Ruth Schwartz (1979). From Virginia Dare to Virginia Slims: Women and technology in American life. *Technology and Culture,* vol. 17, January 1979, pp. 51-63.

Cowan, Ruth Schwartz (1983). *More Work for Mother*. New York, USA, Basic Books.

Dalla Costa, Mariarosa; and Selma James (1973). *The Power of Women and the Subversion of the Community*. Bristol, UK: Falling Wall Press.

Dessors, Dominique; Catherine Teiger; Antoine Laville; and Charles Gadbois (1979). Conditions de travail des opératrices des renseignements téléphoniques et conséquences sur leur santé et leur vie personnelle et sociale. *Archives des maladies professionnelles, de médecine du travail et de Sécurité Sociale,* vol. 40, no. 3, pp. 469-500.

Donovan, Francis (1920). *The Woman Who Waits.* Boston: R.G. Badger.

Donovan, Francis (1929). *The Saleslady*. Chicago: Chicago University Press.

Doray, Bernard (1996). Un regard sur l'oeuvre de Louis Le Guillant dans le domaine de la psychopathologie du travail. In Y. Clot (ed): *Les Histoires de la psychologie du travail. Approche pluridisciplinaire*. Toulouse: Octarès, pp. 124-38.

Duffy, Mignon (2007). Doing the dirty work: Gender, race, and reproductive labor in historical perspective. *Gender &* Society, vol. 21, no. 3, pp. 313-336.

Dumais, Lucie; Karen Messing; Ana Maria Seifert; Julie Courville; and Nicole Vezina (1993). Make me a cake as fast as you can: forces for and against change in the sexual division of labour at an industrial bakery. *Work, Employment and Society,* vol. 7, no. 3, pp. 363-382.

Duraffourg, Jacques; Francois Guérin; Frances Jankowsky; and J.-C. Mascot (1976). *Analyse ergonomique du travail dans un atelier de presses en vue du transfert de certaines presses dans un nouvel atelier à construire*. Montrouge, Paris: Ministère du travail, Agence Nationale pour L'amélioration des Conditions de Travail (ANACT) & Laboratoire de Physiologie du Travail et d'Ergonomie du CNAM

Eckart, Christl (1992). Die verleugneten Voraussetzungen des "Normalarbeitsverhältnisses" und ihre Wiederkehr in weiblichen Berufsbiographien. *Forschungsberichte / Research Memoranda,* no. 300.

Eckart, Christl; Ursula G.Jaerisch; and Helgard Kramer (1979). *Frauenarbeit in Familie und Fabrik: eine Untersuchung von Bedingungen und Barrieren der Interessenwahrnehmung von Industriearbeiterinnen*. Frankfurt/New York: Campus-Verlag.

Eldridge, John Eric Thomas (1968). *Industrial Disputes: Essays in the Sociology of Industrial Relations*. London: Routledge.

England, Paula (2005). Gender inequality in labor markets: The role of motherhood and segregation. *Social Politics: International Studies in Gender, State & Society*, vol. 12, no. 2, pp. 264-288.

Federici, Silvia (1975/2014). The reproduction of labour power in the global economy and the unfinished feminist revolution. In M. Atzeni (ed): *Workers and Labour in a Globalised Capitalism: Contemporary Themes and Theoretical Issues*. Basingstoke, UK: Palgrave Macmillan, pp. 85-110.

Feldberg, Roslyn L. (1984). Comparable worth: Towards theory and practice in the United States. *Journal of Women in Culture and Society,* vol. 10, no. 2, pp. 311-328.

Feldberg, Roslyn L. (1992). Comparable Worth and nurses in the USA. In E. Meehan; and P. Kahn (eds.): *Equal Value/Comparable Worth in the UK and the USA*. Basingstoke, UK: Palgrave Macmillan.

Feldberg, Roslyn L.; and Evelyn Nakano Glenn, (1983a). Incipient workplace democracy among United States clerical workers. *Economic and Industrial Democracy,* vol. 4, no. 1, pp. 47-67.

Feldberg, Roslyn L.; and Evelyn Nakano Glenn (1983b). New technology and its implications in US clerical work. In D. Marschall; and J. Gregory (eds.): *Office Automation: Jekyll or Hyde?* Cleveland, Ohio: Working Women Education Fund, pp. 89-95.

Ferree, Myra Marx; and Carol McClurg Mueller (2004). Feminism and the women's movement: A global perspective. In D. Snow; S.A. Soule; and H. Kriesi (eds): *The Blackwell Companion to Social Movements*. Malden, MA, USA: Blackwell, pp. 576-607.

Foong, Eureka; Nicholas Vincent; Brent Hecht; and Elizabeth M. Gerber (2018), Women (still) ask for less: gender differences in hourly rate in an online labor marketplace. *Proceedings of the ACM on Human-Computer Interaction*, vol. 2, no. CSCW, pp. 1-21.

Fox, Sarah; Amanda Menking; Stephanie Steinhardt; Anna Lauren Hoffmann; and Shaowen Bardzell (2017), Imagining intersectional futures: Feminist approaches in CSCW, *Companion of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing, Portland, Oregon, 25 February – 1 March, 2017*. New York: ACM Press, pp. 387-93.

French, John D.; and Daniel James (1997). *The Gendered Worlds of Latin American Women Workers: From Household and Factory to the Union Hall and Ballot Box*. Durham, North Carolina: Duke University Press.

Friedman, Andrew L. (1987). The means of management control and labour process theory: A critical note on Storey. *Sociology,* vol. 21, no. 2, pp. 287-294.

Friedmann, Petra; and Birgit Pfau (1985). Frauenarbeit in der Krise — Frauenarbeit trotz Krise? Korrekturversuch an einem arbeitsmarkttheoretischen Allgemeinplatz. *Leviathan*, vol. 13, no. 2, pp. 155-186.

Gaskell, Jane (1983). Conceptions of skill and the work of women: Some historical and political issues. *Atlantis: Critical Studies in Gender, Culture & Social Justice*, vol. 8, no. 2, pp. 11-26.

Geiger, R. Stuart; Nelle Varoquaux; Charlotte Mazel-Cabasse; and Chris Holdgraf (2018), The types, roles, and practices of documentation in data analytics open source software libraries. *Computer Supported Cooperative Work (CSCW)*, vol. 27, no. 3-6, pp. 767-802.

Gillette, Robert (2018), Foucault's genealogy, In L. Downing (Ed.) *After Foucault. Culture, theory, and criticism in the 21st century*, Cambridge, UK: Cambridge UP, pp. 17-30.

Glenn, Evelyn Nakano; and Roslyn L.Feldberg (1977). Degraded and deskilled: The proletarianization of clerical work. *Social Problems,* vol. 25, no. 1, pp. 52-64.

Glucksmann, Miriam (2012). Reflecting on women on the line: Continuities and change in women's work. *International Labor and Working-Class History,* vol. 81, no. 1, pp. 168-173.

Glucksmann, Miriam (aka Cavendish, Ruth) (1982). *Women on the line*. London: Routledge.

Gottschall, Karin (2010). Arbeit, Beschäftigung und Arbeitsmarkt aus der Genderperspektive. In F. Bohle; G.G. Voss; and G. Wachtler (eds.): *Handbuch Arbeitssoziologie*. Wiesbaden: VS Verlag für Sozialwissenschaften, pp. 671-698.

Green, Eileen; Jenny Owen; and Den Pain (1993). *Gendered by Design?: Information Technology and Office Systems*. London: Taylor & Francis.

Greenwald, Maurine W.; and Margo Anderson (eds.) (1996). *Pittsburgh Surveyed: Social Science and Social Reform in the Early Twentieth Century*. Pittsburgh, Pa.: University of Pittsburgh Press.

Hacker, Sally (1981). The Culture of engineering: woman, workplace and machine. *Women's Studies International Quarterly,* vol 4, no. 3, pp. 341-353.

Hacker, Winifred (2003). Action regulation theory: A practical tool for the design of modern work processes? *European Journal of Work and Organizational Psychology,* vol. 12, no. 2, pp. 105-130.

Haicault, Monique (1982). Femmes de valeur, travail sans prix: le travail à domicile. *Cahiers du GRIEF (Groupe de Recherches Interdisciplinaires d'Etudes de Femmes), Série A*, pp. 32-63.

Hakim, Catherine (2016). *Key Issues in Women's Work: Female Diversity and the Polarisation of Women's Employment*. London, UK: Routledge-Cavendish.

Harding, Sandra (1986). *The Science Question in Feminism*. Ithaca, NY: Cornell University Press.

Hartmann, Heidi (1979). The unhappy marriage of Marxism and Feminism: Towards a more progressive union. *Capital & Class,* vol. 3, no. 2, pp. 1-33.

Hill, Charles; and Steven Cohen (1984). John A. Fitch and the Pittsburgh survey. *Western Pennsylvania History: 1918*-2018, vol. 67, no. 1, pp. 17-32.

Hubbard, Ruth (1983). Foreword. In J. Rothschild (ed.): *Machina Ex Dea*. New York: Pergamon Press.

Hughes, David (1988). When nurse knows best. Some aspects of nurse-doctor interaction in a casualty department. *Sociology of Health and Illness,* vol. 10, no. 1, pp. 1-22.

Ismail, Azra; and Neha Kumar (2018). Engaging solidarity in data collection practices for community health. *Proceedings of the ACM on Human-Computer Interaction*, vol. 2, no. CSCW, pp. 1-24.

Jochmann-Döll, Andrea; and Gertraude Krell(1993). Die Methoden haben gewechselt, die "Geschlechtsabzüge" bleiben: auf dem Weg zu einer Neubewertung von Frauenarbeit? In: K. Hausen; and G. Krell (eds.): *Frauenerwerbsarbeit : Forschungen zu Geschichte und Gegenwart.* München: Hampp, pp. 133-148.

Karpf, Anne (1987). Recent feminist approaches to women and technology. *Radical Science Journal,* vol. 19, pp. 158-170.

Keller, Evelyn Fox (1987a). The gender/science system: or, is sex to gender as nature is to science? *Hypatia,* vol. 2, no. 3, pp. 37-49.

Keller, Evelyn Fox (1987b). On the need to count past two in our thinking about gender and science. *New Ideas in Psychology,* vol. 5, no. 2, pp. 275-287.

Kergoat, Danièle; Françoise Imbert; Hélène Le Doaré; and Danièle Senotier (1992). *Les infirmières et leur coordination, 1988-1989.* Paris: Lamarre.

Kern, Horst; and Michael Schumann (1974). *Industriearbeit und Arbeiterbewußtsein.* Frankfurt: EVA-Europäische Verlagsanstalt.

Lappe, Lothar (1981). *Die Arbeitssituation erwerbstätiger Frauen. geschlechtsspezifische Arbeitsmarktsegmentation und ihre Folgen.* Frankfurt, New York: Campus Verlag.

Lappe, Lothar (1988). The use of technology and the development of qualifications: How the debate about the labour process is viewed in German Industrial Sociology. In D. Knights; and H. Willmott (eds.): *New Technology and the Labour Process.* London: Palgrave Macmillan, pp. 230-264.

Lappe, Lothar; and Ilona Schöll-Schwinghammer (1978). *Arbeitsbedingungen und Arbeitsbewusstsein erwerbstätiger Frauen.* Göttingen: Campus.

Laufer, Jacqueline (1982). *La Féminité neutralisée?: les femmes cadres dans l'entreprise.* Paris: Flammarion.

Laville, Antoine; Catherine Teiger; Jacques Duraffourg; and Alain Wisner (1972). *Conséquences du travail répétitif sous cadence sur la santé des travailleurs et les accidents.* Paris: Laboratoire de physiologie du travail et d'ergonomie.

Lie, Merete; and Bente Rasmussen (1985). Office work and skills. In A. Olerup; L. Schneider; and E. Monod (eds.): *Women, Work, and Computerization: Opportunities and Disadvantages: Proceedings of the IFIP WG 9.1 First Working Conference on Women, Work, and Computerization, Riva Del Sole, Tuscany, Italy, 17-21 September, 1984.* Amsterdam: North-Holland, pp. 43-52.

Linn, Pam (1987). Gender stereotypes, technology stereotypes. *Radical Science* 19, pp. 127-151.

Lobato, Mirta Zaida (2001). *La vida en las fábricas. Trabajo, protesta y política en una comunidad obrera, Berisso (1904-1970).* Buenos Aires: Prometeo libros.

Lorenzini, Daniele (2020). On possibilising genealogy. Inquiry, pp.1-22. https://doi.org/10.1080/0020174X.2020.1712227.

Lupton, Tom (1963). *On the Shop Floor: Two Studies of Workshop Organization and Output.* New York: Pergamon Press.

Luxton, Meg (1980). *More Than a Labour of Love: Three Generations of Women's Work in the Home* Toronto: Women's Educational Press.

Luxton, Meg; and Pat Armstrong (1991). Margaret Lowe Benston, 1937-1991. *Studies in Political Economy,* vol. 35, no. 1, pp. 7-11.

Maruani, Margaret; and Chantal Nicole (1989). *Au labeur des dames: Métiers masculins, emplois feminins.* Paris: Syros.

Matilal, Oindrila (2020). Time matters: Flexi-time and women's retention in the 24/7 workplace. *ECSCW 2020: Proceedings of the 18th European Conference on Computer-Supported*

Cooperative Work, Siegen, Germany, 13– 7 June 2020. European Society for Socially Embedded Technologies (EUSSET), 36 p.

McGaw, Judith (1982). Women and the history of American technology. *Signs: Journal of Women in Culture and Society,* vol. 7, Summer, pp. 798-828.

McLoughlin, Sean (2013). *Discrepant Representations of Multi-Asian Leicester: Institutional Discourse and Everyday Life in the 'Model' Multicultural City*. Leeds: White Rose, University of Leeds.

McNeil, Maureen (1987). *Gender and expertise*. London: Free Association Books.

Messing, Karen (1994). Women's occupational health and androcentric science. *Canadian Woman Studies*, vol. 14, no. 3, pp. 11-16.

Messing, Karen; and Elabidi, Diane (2003). Desegregation and occupational health: how male and female hospital attendants collaborate on work tasks requiring physical effort. *Policy and Practice in Health and Safety,* vol. 1, no. 1, pp. 83-103.

Messing, Karen; Marie-Joseph Saurel-Cubizolles; Madeleine Bourgine; and Monique Kaminski (1992). Menstrual-cycle characteristics and work conditions of workers in poultry slaughterhouses and canneries. *Scandinavian Journal of Work, Environment & Health*, vol. 18, no. 5, pp. 302-309.

Messing, Karen; Mélanie Lefrançois; and Johanne Saint-Charles (2018) Observing inequality: Can ergonomic observations help interventions transform the role of gender in work activity? *Computer Supported Cooperative Work (CSCW),* pp. 1-35.

Mickler, Otfried; Eckhard Dittrich; and Uwe Neumann (1976). *Technik, Arbeitsorganisation und Arbeit*. Frankfurt: Aspekte.

Miles, Angela; Betsy Warrior; Maria Mies; Margaret Randall; and Collette Guillaumin (1993). Margaret Benston's political economy of women's liberation: International impact. *Canadian Woman Studies,* vol. 13, no. 2, pp. 31-35.

Milkman, Ruth (1983). Female factory labor and industrial structure: Control and conflict over" woman's place" in auto and electrical manufacturing. *Politics & Society,* vol. 12, no. 2, pp. 159-203.

Milkman, Ruth (ed) (1985). *Women, Work, and Protest: A Century of US Women's Labor History*. London: Routledge.

Milkman, Ruth (1987). *Gender at Work: The Dynamics of Job Segregation by Sex during World War II*. Urbana and Chicago: University of Illinois Press.

Mitter, Swasti; and Sheila Rowbotham (1995). *Women Encounter Technology: Changing Patterns of Employment in the Third Wor*ld. London: Routledge.

Moldaschl, Manfred (1991). *Frauenarbeit oder Facharbeit? Montagerationalisierung in der Elektroindustrie*. Frankfurt: Campus.

Nichols, Theo; and Peter Armstrong (1976). *Workers Divided: A Study of Shopfloor Politics*. London: Fontana.

Nichols, Theo; and Huw Beynon (1977). *Living with Capitalism: Class Relations and the Modern Factory*. London: Routledge.

Noble, David (1984). *Forces of Production: A Social History of Industrial Automation*. New York: Knopf.

Oakley, Ann (1974). *The Sociology of Housework*. London: Robertson.

Ong, Aihwa (1987). Review: Disassembling gender in the electronics age. *Feminist Studies*, vol. 13, no. 3, pp. 609-626.

Österreich, Rainer; and Walter Volpert (1987). Handlungstheoretisch orientierte Arbeitsanalyse. In J. Rutenfranz and U. Kleinbeck (eds..), *Arbeitspsychologie* (*Enzyklopädie der Psychologie*, Themenbereich D, Serie III, Band 1), Göttingen: Hogrefe, pp. 43-73.

Ostner, Ilona (1978). *Beruf und Hausarbeit: Die Arbeit der Frau in unserer Gesellschaft*. Frankfurt: Campus.

Ostner, Ilona; and Elisabeth Beck-Gernsheim (1979). *Mitmenschlichkeit als Beruf: Eine Analyse des Alltags in der Krankenpflege*. Frankfurt: Campus.

Pacaud, Suzanne (1949). Recherches sur le travail des téléphonistes. Etude psychologique d'un métier. *Le Travail Humain,* vol. 12, no. 1-2, pp. 46-65.

Palmer, Bryan (1999). Before Braverman: Harry Frankel and the American workers' movement. *Monthly Review,* vol. 50, no. 8, pp. 33-46.

Parr, Joy (2005). Industrializing the household: Ruth Schwartz Cowan's "More Work for Mother". *Technology and Culture*, vol. 46, pp. 604-612.

Pollert, Anna (1981). *Girls, Wives, Factory Lives*. London: Macmillan Press.

Pollert, Anna (2012). Thirty years on from women on the line and girls, wives, factory lives. *International Labor and Working-Class History*, vol. 81, pp. 174-177.

Rakow, Lana F. (1992). *Gender on the Line: Women, the Telephone, and Community Life*. Urbana, Chicago: University of Illinois Press.

Randall, David; Richard Harper; and Mark Rouncefield (2007). *Fieldwork for Design: Theory and Practice*. London: Springer.

Robertson, Toni (2000). Co-operative work, women and the working environments of technology design. *Australian Feminist Studies*, vol. 15, no. 32, pp. 205-19.

Romero, Mary (1995). *Maid in the USA*. New York: Routledge.

Rosner, Daniela K.; Samantha Shorey; Brock R. Craft; and Helen Remick (2018). Making core memory: Design inquiry into gendered legacies of engineering and craftwork. *CHI 2018: Proceedings of the CHI 2018 Conference on Human Factors in Computing Systems, Montréal, Canada, 21–26 April 2018.* New York: ACM Press, Paper 531, pp. 1-13.

Rothschild, Joan (1983a). Afterword: Machina Ex Dea and future research. In J. Rothschild (ed): *Machina Ex Dea*. New York: Pergamon Press, pp. 213-225.

Rothschild, Joan (1983b). Introduction. In J. Rothschild (ed): *Machina Ex Dea*. New York: Pergamon Press, pp. ix-xxix.

Rothschild, Joan (ed) (1983c). *Machina Ex Dea: Feminist Perspectives on Technology*. New York: Pergamon.

Sachs, Carolyn E. (1996). *Gendered Fields: Rural Women, Agriculture, and Environment*. Boulder, Colorado: Westview Press.

Schirmacher, Käthe (1909). Wie und in welchem Maße lässt sich die Wertung der Frauenarbeit steigern? In G. Brinkler-Gabler (ed) (1979): *Frauenarbeit und Beruf* (Reihe: *Die Frau in der Gesellschaft, Frühe Texte*), Frankfurt am Main: Fischer, pp. 199-210.

Schmidt, Kjeld; and Liam Bannon (2013). Constructing CSCW: The first quarter century. *Computer supported cooperative work (CSCW)*, vol. 22, nos 4-6, pp. 345-372.

Silverstone, Rosalie; and Rosemary Towler (1984). Secretaries at Work. *Ergonomics*, vol. 27, no. 5, pp. 557-564.

Soden, Robert; David Ribes; Maggie Jack; Will Sutherland; Vera Khovanskaya; Phoebe Sengers; Seyram Avle; and Susanne Bødker (2019). Fostering historical research in CSCW & HCI, *Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing*, Austin, Texas, 9–13 November 2019, New York: ACM Press, pp. 517-22.

Soper, Kate (1993), Productive contradictions. In C. Ramazanoglu (ed) *Up Against Foucault: Explorations of Some Tensions Between Foucault and Feminism*, London, New York: Routledge, pp. 29-50.

Standing, Hilary (1986). All Day Everyday: Factory and Family in the Making of Women's Lives by Sally Westwood (Book Review). *Feminist Review*, vol. 22, pp. 11-113.

Star, Susan Leigh (1990). Power, technology and the phenomenology of conventions: On being allergic to onions. *The Sociological Review,* vol. 38, no. S1, pp. 26-56.

Star, Susan Leigh; and Anselm Strauss (1999). Layers of silence, arenas of voice: The ecology of visible and invisible work. *Computer Supported Cooperative Work (CSCW)*, vol. 8, no. 1-2, pp. 9-30.

Steinhardt, Stephanie B.; Menking, Amanda; Ingrid Erickson; Andrea Marshall; Asta Zelenkauskaite; and Jennifer Rode (2015), Feminism and feminist approaches in social computing, *Proceedings of the 18th ACM Conference Companion on Computer Supported Cooperative Work & Social Computing, Vancouver, Canada, 14-18 March 2015.* New York. ACM Press, pp. 303-08.

Strauss, Anselm; Shizuko Fagerhaugh; Barbara Suczek; and Carolyn Wiener (1985). *Social Organization of Medical Work*. Chicago: University of Chicago Press.

Street, Annette Fay (1992). *Inside Nursing: A Critical Ethnography of Clinical Nursing Practice.* Albany, New York: SUNY Press.

Suchman, Lucy; and Eleanor Wynn (1984). Procedures and problems in the office. *Office Technology and People,* vol. 2, no. 2, pp. 133-154.

Teiger, Catherine (2006). 'Les femmes aussi ont un cerveau!' Le travail des femmes en ergonomie: réflexions sur quelques paradoxes. *Travailler,* vol. 1, no. 15, pp. 71-130.

Teiger, Catherine; Liliane Barbaroux; Maryvonne David; Jacques Duraffourg; Marie-Thérèse Galisson; Antoine Laville; and Louis Thareaut (2006). Quand les ergonomes sont sortis du laboratoire.... à propos du travail des femmes dans l'industrie électronique (1963–1973). *Perspectives interdisciplinaires sur le travail et la santé,* vol. 8, no. 2, pp. 1-38.

Theureau, Jacques; Alain Wisner; Madeleine Estryn-Béhar; and A. Vaichère (1979). *L'analyse des activités des infirmiers (ères) des unités de soins hospitalières*. Paris: Laboratoire de physiologie du travail et d'ergonomie du CNAM.

Thompson, Paul (1989). *The Nature of Work: An Introduction to Debates on the Labour Process* (2nd ed). London: Palgrave.

Tinsman, Heidi (2004). More than victims: Women agricultural workers and social change in rural Chile. In P. Winn, P. (ed): *Victims of the Chilean Miracle: Workers and Neoliberalism in the Pinochet Era, 1973–2002*. Durham, North Carolina: Duke University Press, pp. 261-97.

Vigna, Xavier (2015). 'En vadrouille dans la classe ouvrière': prédécesseurs méconnus. *Les Temps Modernes,* vol. 2015, no. 3-4 (no. 684-685), pp. 187-203.

Wagner, Ina (1993). Women's voice: The case of nursing information systems. *AI & SOCIETY,* vol. 7, pp. 295-310.

Wagner, Ina (1995). Hard times: The politics of women's work in computerized environments. *The European Journal of Women's Studies,* vol. 2, no. 3, pp. 295-314.

Wajcman, Judy (1991a). *Feminism Confronts Technology*. Cambridge: Polity Press.

Wajcman, Judy (1991b). Patriarchy, technology, and conceptions of skill. *Work and Occupations,* vol. 18, no. 1, pp. 29-45.

Webb, Beatrice Potter (1898a). The diary of an investigator. In S. Webb; and B. P. Webb (eds): *Problems of Modern Industry*. London: Longmans, Greens & Co., pp. 1-19.

Webb, Beatrice Potter (1898b). How to do away with the sweating system. In S. Webb; and B. P. Webb (eds): *Problems of Modern Industry*. London: Longmans, Greens, and Co., pp. 139-155.

Webb, Sidney; and Beatrice Potter Webb (1898). *Problems of Modern Industry*. London: Longmans, Green & Co.

Webster, Juliet (1986). Word processing and the secretarial labour process. In K. Purcell; S. Wood; A. Waton; and S. Allen (eds): *The Changing Experience of Employment: Restructuring and Recession*. London: Macmillan, pp. 114-31.

Webster, Juliet (1996; 2014). *Shaping Women's Work: Gender, Employment and Information Technology*. Boston, MA: Addison, Wesley, Longman.

Webster, Natasha A.; and Qian Zhang (2020), Careers delivered from the kitchen? Immigrant women small-scale entrepreneurs working in the growing Nordic platform economy. *NORA-Nordic Journal of Feminist and Gender Research*, vol. 28, no. 2, pp. 113-25.

Weil, Simone (1951). *La condition ouvrière*. Paris: Gallimard.

Westwood, Sally (1984). *All Day, Every Day: Factory and Family in the Making of Women's Lives*. London: Pluto Press.

Wettstein-Adelt, Minna (1893). *3 1/2 Monate Fabrik-Arbeiterin*. Berlin: Verlag von I. Leiser.

Zimbalist, Andrew (ed) (1979). *Case Studies on the Labor Process*. New York: Monthly Review Press.

Zimmerman, Jan (1983). *The Technological Woman: Interfacing with Tomorrow*. New York: Praeger.