Feminist, or merely critical?

In search of Gender Perspectives in Informatics*

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Introduction

For many years we have been pondering the question where we might find the gender perspectives in informatics. In doing this, we feel squeezed between two opposing groups, between feminists researchers who seem to believe that informaticians are male whatever sex they may be, and women working within technological disciplines who claim that there is no gender perspectives in science: science and technology are neutral. We think otherwise.

As female informaticians we believe that there are gender aspects in informatics, and that questioning these is interesting from both a feminist and an informatics point of view. In order to be able to pose or understand feminist critique of technology, an understanding of gender aspects is necessary. The article aims at clarifying what a feminist critique of the discipline is or can be. There is very little discussion about these issues among our colleagues, even among our female colleagues. Our own attempt to raise a discussion with feminist researchers ten years ago received little or no response (Bratteteig & Verne 85). We believe a better understanding of what might constitute a feminist critique is a prerequisite for presenting feminist alternatives, or using informatics in feminist emancipatory ways.

The aim of this article is to discuss gender aspects in informatics, indicating where feminist critique of the discipline can be posed. We believe feminism can be a resource for any discipline; however, little utilised in informatics. We base the discussion on existing, well-known critique of the discipline from the inside as well as from the outside. The result of our discussion is, however, more questions than answers—to both informatics and feminist research.

Our discussion starts with Sandra Harding's book "The Science Question in Feminism" (1986), by adopting her own starting point: "We began by asking, "What is to be done about the situation of women in science?"—the "woman question" in science. Now feminists often pose a different question: "Is it possible to use for emancipatory ends

* Informatics is the term for computer science departments in the universities in Norway, indicating that the discipline is defined broader than the traditional computer science departments. Instead of using the term "computer scientist" to denote the practitioners, we introduce the term "informatician" to denote a professional educated from an informatics department.

sciences that are apparently so intimately involved in Western, bourgeois, and masculine projects?"—the "science question" in feminism." (p. 9).

We have structured our thoughts about gender aspects according to Sandra Harding's five research programs for gender studies of the natural sciences. Harding's categories have been useful to systematise our questions about where gender aspects can be found and how existing research contribute to critique of informatics.

1. Equity studies

2. Studies of the uses and abuses of science and technology

3. Critiques of the existence of pure science

4. Studies to reveal social, symbolic and structural meanings

5. Epistemological inquiries to establish alternative understandings of knowledge

The first three programs concerns how women can be treated better in and by science, the last two how the male dominated science can be applied for emancipatory ends. In this article we focus on the fifth program which we find the most challenging and with the greatest potential of the five for contributing to changing informatics—and feminism.

1. Equity studies

It is a claim of little controversy to say that informatics is a male dominated discipline concerning the number of practitioners, both with respect to education and working life. In the educational institutions the number of female students is decreasing dramatically—the situation is worse today than ten years ago: in 1995 the number of female graduate students in the Department of Informatics, University of Oslo, was less than 10 %, before 1995 the number was considerably higher (approx. 20% from 1987 - 1994, cf, (Stuedahl 97)). This development happens in spite of efforts to increase the recruitment of girls/women to the discipline. The causes for this development can be many, but we see the same development in many Western countries (Klawe & Levenson 95; Adam 95; Camp 95). We think the main causes may be found both in the educational system itself, as well as in the media presentation of the discipline. (Elkjaer 89; Brecher 89). Studies of working life within the informatics disciplines show that women and men inhabit different job categories. Men are over-represented in jobs with high status and wages (Computerworld 97).

Current research referred to in this program concerns problems that stems from a segregated work life, by for example claiming that women in computing experience minority problems (Stuedahl, 97). However, from a feminist perspective the research program also includes more controversial discussions. Will more female informaticians make any difference? Will the women change the discipline? Do the women want to change the discipline?

2. Studies of the uses and abuses of science and technology

Reports of the use and misuse of informatics and its consequences come from both research and media. Studies of the use and consequences of Information Technology (IT) has traditionally been carried out by social scientists looking at the technology from the outside (e.g., Fossum 81). In Scandinavia a lot of studies of the effects of technology on work environment, working life, democratic rights, and privacy, have been conducted since the 70's (Nygaard & Bergo 74). Gender is a legitimate variable in such studies, e.g. to study female workers in particular or women's participation in working life under changing technical circumstances (e.g., Thoresen 81; Dilschman & Ehn 84; Cockburn 83; 85; Korbøl 77; Tijdens et al 89; Eriksson et al 91).

The discussion of gender perspectives within this program is problematic because it rests on assumptions about how women are, how women work, or how women participate in society: The discussion easily becomes a discussion of essentialism. We can all agree that there are differences between women and men: women's position in society is obviously different from that of men, the cultural upbringing of girls and women encourages a different set of skills and attributes for women than for men. It is possible to argue that all humans want to act in ways that fits with their skills and values, and by this explain why women tend to choose differently from men. However, we find this kind of argument hard to use as a basis for a general critique of technology and informatics.

3. Critiques of the existence of pure science

When science is used in the service of repression, it can be explained as results of "bad science". By analogy, bad IT-solutions or bad consequences of an IT-solution can be understood as results of bad system development, bad user contact, bad programming, bad user training, etc. The assumption is that if one follows "The Best Development Method" the solution will be "The Best System". However, practice shows that it may be difficult to evaluate a system: various groups may conclude differently. A user group may have conflicting interests with other user groups, employees may have conflicting interests with management (Bratteteig 94). The solution to such problems has more to do with power and communication skills than with the method used.

On this background, the program encourages critique that questions if existing methods, techniques, and work practices can be enhanced to give better IT solutions. One may claim that the selection and definition of problems for computerisation always bear the fingerprints of the dominating groups in a society, and that any development methodology will build on and strengthen existing power structures (Joey & King 91). But does an IT solution get better by being developed by female informaticians? Is an IT solution better if women or feminists consider the solution to be a good one?

4. Studies to reveal social, symbolic and structural meanings

Sandra Harding makes this a program to “read science as a text” for interpretation. This includes to re-examine the founding fathers of science to reveal a sexist basis of science, e.g. the introduction of dichotomies like mind/body, reasons/emotions. In informatics such a project would be concerned with studying the formalisms of computer systems (programs) and programming languages (eg, Vehviläinen 94). We also may include studies of attitudes and practices from the first application areas. The first computers were developed in war time to assist in the war. Military industry is still active in research and development in informatics. One can also try to address attitudes in informatics culture, e.g. the hacker subcultures (Turkle 84; Håpnes & Rasmussen 91).

We find it just as relevant to re-examine the "father disciplines" of informatics: mathematical logic and physics. Within mathematics and parts of physics there are no users or applications, only abstract elegance. Informatics has met massive critique to the notion that it is possible to design a good IT solution with applied mathematics and physics as the only bases. This critique has resulted in a series of multidisciplinary sub disciplines, including social sciences in the discipline (in areas like system development, human computer interaction, interface design).

But we might ask as Sandra Harding: Which relevance has practices and attitudes from these "father sciences" to modern informatics? To what extent will attitudes in the subcultures of the discipline influence mainstream consensus? How can we explain the importance of military and industrial applications for practice in other application areas?

5. Epistemological inquiries to establish alternative understandings of knowledge

In order to approach a feminist epistemology, we discuss critique and alternative perspectives that are present in the informatics discipline today. The basis for informatics is of course the computer, but the discipline also includes the environment of the computer. Some research and development milieus consider the usage of the computer to be an important part of the discipline, as well as the impact of computers on society. The computer is seen as part of a social setting. Even if some informatics groups only work with the computer as such, many groups also locate the computer in space and time: i.e. they address the history and consequences of the computer, and they include the environment of the computer: the work, the organisation, the society in which the computer is used. The focus on usage introduces human beings and society into the discipline, and by this legitimates questions about values, politics, and interpretations. Technology and technologists are not neutral.

The following discussion includes four topics from the discipline of informatics. The topics are: A) computers, B) information, C) programming, and D) computer games.

Apart from the last one these topics are central to the discipline. Where relevant we try to show established alternatives or current debates within the topics, and indicate where we

might see a gender perspective. For some of these the gender perspective is more easily seen than for the others.

A. Computers

What is a computer? Many people would say that a computer is a computing machine, consisting of programs or software, hardware, and data. But is a computer just the physical thing itself? What if we say that a computer is a running system, i.e. a system in use (Mathiassen 81; Dahlbom & Mathiassen 93)? A running system is not a static artefact, it is a process in which a human being interacts with and utilises a machine. Hence we will find it more difficult to separate the computer system from its surroundings, to find its borders. Does the computer system stop at the keyboard or is the human being also included in the system? Informatics as the study of computers becomes a different discipline if the computer is a process in a context rather than a thing. In the first case, we find that technical knowledge is only a part of what is necessary to know: we also need to know something about usage, about work, about human beings, about organisations, about society. Politics and ethics can be introduced into the discipline, and new discussions can arise (Nygaard 86). The process of stripping away the contingencies of an object's creation and its situated nature is described as "naturalization" (Star 94). A naturalised object is taken for granted, and the actions that go into maintaining and recreating the local meaning of the object is forgotten. Is it necessary for system developers to regenerate contingencies and situatedness for a computing system after a naturalisation process?

If system developers are responsible for changing computer systems: is it also their responsibility to change work routines that make use of the computer system? Is changing a work routine considered changing the system? What does a system developer do when s/he finds the proposed system unethical or disagree with the politics it will implement? How can computers be used for emancipatory ends if the people who pay for the development disagree of the possible emancipation?

In line with this argument we will argue that a computer based information system built by an informatician who views the system as a context dependent process will be different from a system built by a designer occupied with the gadget itself. A limited view of computer systems as a technical device will result in an emphasis on the technical sides of the systems, where factors like speed, the beauty of the code, novel techniques would be preferred. A broader view on computers in context would also consider other factors—and evaluate them against each other—like user friendliness, security and privacy, training costs, cooperate climate, autonomy of work environment etc. A good computer solution is often technically simple, user friendly and useful (Bjerknes & Bratteteig 88).

The fact that the discipline is called informatics instead of computer science at the University of Oslo points to the approval of a broad view on computer systems within the

Department of Informatics. One should not forget, however, that engineering, the construction, design, and use of digital machines is the kernel of the discipline.

Where is the gender aspects of the computer? Studies of women's behaviour indicate that women use technology in order to achieve something (eg, Kristiansen & Blom 97; Bjerknes & Bratteteig 84), not in order to play: the technology itself is not as interesting as the way is can be utilised. The broad conception of computers fits with this view, and we can interpret this to be that many women prefer a broader view on computers. We warn, however, against an essentialist line of argument that may conserve current conditions that may change.

B. Information

The notion of information is widely discussed in informatics. A common definition is that information is interpreted data, e.g. the number 40 is interpreted as body temperature or as age. Information is connected to knowledge and work: information is supposed to add to our knowledge, and we use information in work, e.g. when we make decisions. In both cases, there are two main schools of looking at information, emphasising its formal or informal nature respectively. The formal interpretation of information focus on written or oral material and expects a fact-like presentation. Decision making is seen as a rational process in which the right amount of information is sought and used (Galbraith 79). The informal school bring into consideration the tacit knowledge, experienced knowledge, and skills, and emphasise that story telling, case histories, and similar experiences are important ways of exchanging information (Feldman & March 81). Many information workers do use conversations, dialogues, and stories as their way of exchanging information—many traditional female cultures do that (Wynn 79; Suchman & Wynn 84; Suchman & Jordan 89), but also traditionally male cultures as copier repair staff do (Orr 86; 96). Studies show that decision making involves politics, power, and seemingly irrational behaviour: information is used to legitimate rather than ground a decision, decisions are made with little or no factual basis (Feldman & March 81). Improvisation, opportunistic behaviour, and gossip are key notions in real information processing (Ciborra 96). To emphasise explicit and written language at the expense of experience and skills—the formal vs. the informal—has consequences for what is seen as knowledge (Ong 82).

Design and redesign of computer based information systems is based upon analyses of information, information needs, and knowledge, thus the way these concepts are defined heavily influences both the systems and the process of building them. The technology is based on a model of reality: a system to support central health authorities needs a different interpretation of the notion of "bed", and thus a different model and implementation of the notion, than a local system built for supporting nurses in their daily work: the two databases are different (Bjerknes & Bratteteig 87).

And the feminist perspective? Studies of women's work, women's communities, women's cultures can be used to explain different notions of information—and the usefulness of

the notions—but this still is based on conceptions of how women are, how they work, how they live their lives etc. In line with the previous discussion, we find it difficult to base scientific critique on such conceptions.

C. Programming

Mastery of computer programming is a central competence within computer science and informatics.

Programming languages is designed to describe general tasks, and are therefore rather abstract formalisms. Programming requires knowledge of logic and the relevant technical issues involved. It is difficult to apply a gender perspective on programming. Is the activity of symbol manipulation masculine? This discussion is exceedingly difficult to undertake without making assumptions about male or female cognition and epistemology. We hear that men have a better developed spatial perception. Women have more synapses than men, and thereby can do more things in parallel. However, we all know that what has been considered male or female has varied through history. Research where such claims are made and allegedly proved is also seriously criticised (Star 89). It is therefore highly questionable whether the road via cognition is a fruitful way to address gender aspects of programming.

Since the object of programming is not man, the most easily accessible gender aspect would be the gender of the person who carries out the programming. Does it matter if it is a woman or a man who programs? Hard-core programmers express that testing programs is cowardly or feminine[*] . It is hard to discern whether this is irony or not, probably both.

To some extent we believe that a female programmer will tend to do things differently than a man, e.g. when testing or doing graphical design. But is this important? Is it significant? There is great variation also within the gender groups.

What kind of theories can explain how an artefact or action is to be considered masculine or feminine? Is it sufficient with an extentional explanation that claims that for something to be feminine the significant characteristic is that it is produced or enacted by female practitioners? Or do we need intentional explanations that claim that the artefact (or action) possesses an inherent symbolic gendering independent of whether it is used by or present in women or men (an example is studies of the computer as a masculine artefact (Lie 95))?

D. Computer games

The official policy in Norway emphasise that girls should become more computer literate. Some claim that computer games is a good introduction to informatics and a motivation for getting computer literate (Lange 95; Svoen 95; Øiestad 93; Malone 81; Malone & Lepper 87; Bjerrum Nielsen 87). The question arises whether computer games can be

[*] An example is attitudes expressed in the text “Real programmers don´t write Pascal”, which was circulating among programmers in the 80's.

designed to be particularly interesting for girls. One of the authors actually received such a request.

In discussing girls and computer games, we can state a number of facts: everybody knows that girls do not like shooting, fighting, killing, war-like scenes, bombs, robots, and other phenomena that are dominant in many computer games. However, such negative information does not build an alternative game system. Instead we ask if results from women's studies could be used in this case. We found that studies of girls and computer games as well as studies of girls and pedagogic, girls' use of IT in school, women and perception etc. are of dubious value. What the results indicate is that girls (and women) primarily tend to prefer useful activities. The do not play around at random with technological equipment, but learn sufficiently to be able to do their tasks. This will actually rule out computer games as a way to computer literacy for girls at all! In addition:

- Girls prefer communication to technical activity. Does this imply that we should design a communication game? But girls prefer communication with proper humans, not fantasy figures. E-mail might be sufficient for this.
- Girls prefer taking care of other people (caring rationality (Thoresen 89; Sørensen 82). But the idea of a nursing game does not really serve the needs to create something new.
- Girls like dolls. Do we the consider the Barbie Doll Game where the user can dress and undress a Barbie Doll and walk around in her house (cf. Multimedia 96) as the ultimate computer game for girls?
- Girls like pink. A game with pink background does not seem a major breakthrough strategy towards computer literacy.
- Girls in their teens are occupied with make-up, boys, horses, pop-stars etc. We do not consider these interests as potential building blocks for an innovative and emancipatory computer game for girls.

The question we are left with is whether we change anything or rather conserves status quo by implementing the conditions and characteristics of some present female culture. We find it difficult to utilise descriptive information about women in our society today to design alternative games and systems.

However, men do "get their pink colour": they seem to feel at home with the standard interfaces and solutions. Independent of women's liking or disliking of pink, a pink background could act as a positive signal to women that the application was designed for them to feel comfortable, welcome, at home. The "pink colour" may seem like a detail, but the sum of many such tiny details can contribute to a minority feeling of women in the computing field.

Developing epistemology through use of technology

The main use of a critique is as a basis to create new alternatives. This might imply to develop an alternative epistemology, cf. Harding's point no. 5. The four topics discussed above indicate that we sometimes learn something from questioning the established truth, whereas there are topics (like programming) where we find that the questions do not teach us much. A new epistemology can evolve through experiences from new application areas and new ways of applying Informatics knowledge.

The basic difference between the pure technical perspective and the alternatives discussed above is that use and consequences from use of technology is included in the discipline, as a part of the discipline. To call this feminist or merely critical is a question of definition: many of the alternatives fit well with values, positions, and theories from feminist writers, and we believe that most women would feel more comfortable within a broader discipline of informatics. Existing gender research seems to support this view (Brecher 89). To pinpoint our view: we do not feel a need for a feminist programming language (even if the writing style of the French feminists (Helene Cixous et al.) could be interesting to investigate) or feminist techniques for reverse engineering (even if feminist deconstruction of text would mean a new approach to redesign :-). We also would like to emphasise that there are alternatives to existing systems development methods; approaches that emphasise aspects that are also found in gender research (Bjerknes & Bratteteig 86; Thoresen 89; Bødker & Greenbaum 89).

Focus on the use of technology is interesting also seen from within the discipline: new applications bring the discipline further just as much as the research on the technology itself. Much of the work in systems development consists of delimiting, defining, describing and formalising the application area for the system. Thus the application area becomes visible in the finished systems, in the model of the world which is implemented through data structures, variables, values, routines, and procedures. In approaching a new application area one may experience new technical challenges based on characteristics of the application area rather than the technology: technology develops by continuously being used in new ways. In this way the applications influence the direction of the technical development, and the research agenda in informatics. New technological needs are created in this way.

Let us illustrate this claim by a thought experiment: developing a computer based system for a new application area—refugee shelters for battered women[*]. One day in November 1996 we read in the Norwegian newspaper Aftenposten that many refugee shelters for battered women have problems with their funding, because they refuse to report to the funding municipalities how many users they have from each municipality. The reason for this is that they give priority to the promise of absolute confidentiality to their users. In small Norwegian municipalities the number of users itself might give sufficient information to identify who the users are. The shelters considers confidentiality and

[*] Norwegian: Krisesenter for mishandlete og voldtatte kvinner.

privacy more important than following standard rules for reporting to their funding agencies.

Let us suppose we were asked to make an information system to support administration and reporting within the shelters, as well as supporting communication between the shelters. The task is challenging with respect to anonymity and security. The awaited standards for Internet security is mostly created to support secure transfer of numerical information like credit card number etc. Security standards for the Health Services might be useful, but this is probably an overkill. How to generate reports without reporting too much? Should the clients be represented in the system with their full names, with the possibilities for leakage this might open up for? Are there more examples where reasoning and priorities in the refugee shelter differs seriously from the reasoning of the government?

Another aspect of this case is challenges met during system development. The IT people would need to cooperate with the users, i.e. the staff at the shelters, often women who previously used the shelters themselves. They might be sceptical to co-operating with men, and the users of the shelters might be emotionally unstable. If the legitimate "shop talk" during lunch in the development team includes advice on how to collaborate with women in crises, we would consider that the discipline had changed.

An additional question we pose here is whether this example is to be considered a feminist alternative? Is it radical at all? Ultimately we want a society with no need of women's shelters—in this perspective building a system to support them seems to be a paradox. Do we consider use of IT for such unwanted purposes as emancipatory? Is it sufficient as a start in the right direction?

As informaticians we do find it difficult to work with a technology if it is considered that it can never be used for emancipation: technology will always be a servant to the dominating groups in a society, and at some level it will conserve existing societal structures (e.g. power structures). One may even argue that technology or informatics is in the process of becoming naturalised (Star 94), stripped of origin, context and consequences. One interesting use of feminist critique is to uncover those "forgotten" issues, and reinterpret these concepts in a better described environment. This might make it easier to see alternative interpretations, i.e. alternative understandings of what technology and informatics might be. We fully adopt Donna Haraway´s claims that we “need to go into the dirty matter” and that “science is too important to be left to the enemy”† (Asdal, 95).

Concluding remarks

We find the discussion of informatics based on the five research programs for gender studies and natural science of Sandra Harding fruitful. We find it hard, however, to

† This is translated from Norwegian: Vi må inn i den skitne materien. Vitenskapen er for viktig til å overlates til fienden.

discern what feminist critique adds to other kinds of societal critique, be it socialist, environment, anti-capitalist, ethical etc. We need a collection of feminist theories that more directly could be used to criticise the epistemology of informatics and create alternatives. The most important critique of the discipline is that understanding of consequences of technology and conditions of use is essential in informatics, ie, the ability to achieve such an understanding—and to act in accordance with it—is an important skill for the professional informatician. We argue that use and applications of technology should be a part of informatics, and that the epistemology evolves through experiences of use.

An adoption of this view will have great implications.It implies turning the internal status structure among the practitioners upside down, such that solely technical expertise might be seen as limited instead of brilliant. This change would be fundamental to the discipline, and would require more than just discussing use and consequences as an addition to the technical stuff.

One way to influence the discipline from the inside is to demonstrate how different world views actually result in different computer systems—and thereby different conditions and consequences for the users. To choose the application area is actually quite important in this matter because the application area gives both the basis for the basic model of the system and for the technical challenges that influence the direction of technical development. The applications sets the agenda both locally in the development milieus and in the global discipline of informatics as a whole: the technology and the development of the technology is a global matter. The selection of application areas is a political matter as well; a question of power. The ones who have resources for funding new technological development give the priority to what systems are built.

As female informaticians we are not doing women's studies. Movements towards doing feminist research might weaken our contact with and ability to do technological research (in contrast to the effect of social studies of technology for social scientists). We think it is of vital importance to stay an informatician, but with an interest in feminist research, refusing to resolve this dilemma by choosing one of these areas of research. By doing this, we do not accept the dichotomy between feminism and technology. The challenge is to learn to live with, and possibly harvest from, the contradictions and alleged paradoxes that arise.

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