

Constructing Gender Bias in Computer Science

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INTRODUCTION

Gender bias in technical fields, as in computer science (CS), is a well-known phenomenon. It is shown in presenting computing history as a male victory, while female computing pioneers have been forgotten (Gürer, 1995; Vehviläinen, 1999). The statistics demonstrate gender bias in IT (information technology) workplaces nowadays: only about 20 to 30% of computer professionals are women, and they also have lower salaries than men working in IT (Ahuja, 2002; Pateli, Stack, Atkinson, & Ramsay, 1999). Furthermore, there are studies dealing with CS students (e.g., von Hellens, Nielsen, & Beekhuizen, 2004). Few studies focus on CS academics. Camp (1997) is one of the rare ones: She describes the shrinking pipeline problem in the USA. Women hold 25% of master's degrees in CS, but only 6% of full professors are women. (Camp, 1997) The CS field is not the only one where female professors are rare. Husu (2001) presents two reasons the general bias is causing: (1) like professionalism in general, academic professionalism is also connected to masculinity and (2) female post-graduate students and newly qualified doctors get less support from their senior colleagues than their male counterparts. Besides supporting to complete studies successfully, older colleagues can support post-graduate students in becoming members of the academic society, which is essential in making an academic career.

This article concerns on the construction of the gender bias among CS academics. I will focus on what happens in everyday practice and how gender bias is reproduced over and over again. I see gender as a process which is constantly under negotiation. In this article, the negotiation process is studied by analysing one case, which is one university department in the technical field. This article focuses on the negotiation of gender within the department; it does not deal with what happens in society or in families (such as taking care of children), although

they both affect women's working situation in a department.

The structure of this article is as follows. First, the theoretical background of the relationship between masculinity and technology is described, as it forms the basis for understanding the gender bias in the CS field. Second, the empirical case is described. Third, the suggested explanations for the gender bias are dealt with and connected to the theoretical understanding of gender and technology. Fourth, a forecast of future trends is given, and, finally, conclusions are drawn on the main points of the article.

UNDERSTANDING THE BACKGROUND OF GENDER BIAS

When we try to understand gender bias in the CS field, it is useful to start with thought-models which, according to Wajcman (1991, pp. 137-144), include a connection between masculinity and technology. The connection is not inherent in biological sex difference, but rather a result of the historical and cultural construction of gender (Wajcman, 1991). Although the connection between masculinity and technology is commonly accepted, the views of the mechanism vary. I will present them using the classification of Gill and Grint (1995).

One response to the perceived link between masculinity and technology has come from *eco-feminists*. It sees women as being essentially close to nature because of being rooted in biology. Women's biology, the theory argues, has led to a specific way of "knowing" and experiencing the world which is undervalued. The aim is to retreat into female culture and produce "woman-friendly," feminine technologies. (Gill & Grint, 1995, pp. 5-6.) This perspective is used in practice in creating women's own ICT groups (see, e.g., Vehviläinen, 2000).

For *eco-feminists*, technology is inherently and inevitably patriarchal, but for *liberal feminists*, technology is neutral. For them, the issue is the different

ways in which men and women are posited in relation to technology. (Gill & Grint, 1995, pp. 6-8.) It is important to involve more women in technical fields and to increase their participation in technical education. As technology is seen as neutral, women have to change their attitudes to take the opportunity; it is seen as a question of women's individual choice (Vehviläinen, 2000).

Powerful criticism of both the liberal and the eco-feminist positions has made way for a new approach: seeing *technology as masculine culture* (Gill & Grint, 1995, p. 8). This approach views technology as being much more than simply artefacts or hardware; it is also knowledge and practices involved in the use of technology (based on Grint & Woolgar, 1997). Seeing technology as masculine culture implies that the link between technology and masculinity is reproduced in everyday practices. (Gill & Grint, 1995, pp. 8-12.) According to this approach, gender is not natural or stable, but socially constructed (Wajcman, 1991). Masculinity and femininity are used as abstract frames of reference; a kind of standard that one refers to in the articulation of one's own gender as well as of that of others. Thus, speaking of a connection between masculinity and technology does not mean that technology reflects the capacities of specific men, rather the qualities of some social image of masculinity. (Lie, 1995; Wajcman, 1991, p. 143)

THE CASE OF CSUT

I will describe how the connection between masculinity and technology manifests itself in workplace practice by citing a case, which is the department of CSs in the University of Tampere (CSUT), Finland. Finland is a five-million-inhabitant country in Northern Europe. It is typically presented as a gender equal country, which is evidenced in women's and men's equal proportions of the labour force and in women's and men's equal levels of education: 26% of Finnish women and 22% of men hold academic degrees; women have 51% of the master's degrees and men 49%, but the situation is reversed among PhDs, as 66% of the degree holders are men and 34% women (StatFin, 2004). The discussion of gender equality ignores the fact that the Finnish

labour market is strongly segregated into women's and men's work (Kolehmainen, 1999).

The case in this study, CSUT, has about 500 students and almost 100 faculty members. There are 25 teaching posts, ten administrative, and supportive posts, and the rest of the staff are temporary project researchers, whose contracts are typically made for one year at a time. CS is understood as a wide field including five streams: algorithmic, software development, information management, information systems (IS), and interactive technology.

I will focus on the teaching staff, because their posts are thought to be permanent and they are selected with a view to the benefit of the whole department. The teaching staff in CSUT includes ten professors (one of them is an emeritus professor), six instructors and nine senior academic assistants (see Table 1). The professors and instructors have permanent posts, but someone may occupy a post on a temporary basis, typically for a year. Nowadays there are also semi-permanent professorial posts which are for three to five years. Senior academic assistantships are typically postdoctoral posts, in which half of the working time is used for research. They are temporary posts, the standard duration of which is five years (called here semi-permanent), but they may be for one year (called temporary). The teaching staff includes five women and twenty men (see Table 1).

In Finland, it is normal for doctors to continue to work in the same departments where they wrote their dissertations. This is also the case in CSUT: 11 of the 25 male PhDs and three of the eight female PhDs were working in CSUT at the end of 2004. The

Table 1. The number of teaching staff in CSUT at the end of 2004

	Permanent		Semi-Permanent		Temporary		TOTAL	
	M	F	M	F	M	F	M	F
Professor	7	0	0	1	1	1	8	2
Instructor	2	1	-	-	2	1	4	2
Senior assistant	-	-	2	0	6	1	8	1
TOTAL	9	1	2	1	9	3	20	5
Percent	90	10	67	33	75	25	80	20

Note: M=male; F=female

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