GENDER & TECHNOLOGY: THE EPISTEMOLOGICAL PROBLEM

GENDER AND TECHNOLOGY: WHAT PROBLEM?

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O n August 25, 1995, the astute and profound newspaper USA Today in a front page lead story reported the launching of Windows 95 as the "geek event of the century"[1]. USA Today relates early in its commentary on Windows 95 that "it's a guy thing. Few women were among early buyers"[2]. These comments in the popular American newspaper point us to the topic we are here to seriously consider together: "Gender and Technology: What Problem?"

My response to this question is: "The Epistemological Problem." I am questioning the knowledge structure of computer science and its impact on males and females. Let us begin by considering the double pronged question: Does computer science in its theory, practice, and politics embody discrimination towards women, and if so, how does this embedded discrimination work *itself out in applications to the arts?* The difficulties for women in computing have been communicated over the last decade through a variety of major research institutions' reports on women and computing, in numerous computer science publications, through published critical studies on women and computing, and in sundry organizations for women in computing[3]. I will not rehearse the long list of contributors to the discussion. These studies, reports, and organizations confirm what we have come to recognize and experience: **There are biases, limitations, and obstacles to women's participation in computing.**

I will briefly suggest two ways to get at this question of discrimination and limitation with regards to women and computing, and invite audience and panel participants to expand the discussion. First, physicist Evelyn Fox Keller, in her social study analysis of modern science, argues that modern science is a male-shaped domain in the construction of its epistemological structure molded on the foundation of a male-shaped western philosophy. This philosophical base leads to a view of knowing privileging a linear, hierarchic, rational, and abstract approach to knowing. Further, she contends that this knowledge structure, from Plato forward, has systemically ignored or distorted everyday living contexts, thus remaining a male-shaped domain from the vantage point of both epistemological construction and sociological construction. I argue elsewhere that would take too long to elaborate here that the knowledge structure of computer

science is the offspring of the knowledge structure of modern science and also neglects living contexts, thus ignoring questions concerning gender ideology, ideas about ethnicity and class, and considerations affecting power constructs managing electronic-based information and equipment accessibility[4]. A philosophical tightening of the modern enlightenment view of science during the past century and a half, and consequently also of the younger field of computer science, has made this epistemological approach even more rigid and exclusive.

Second, to further investigate the epistemological structuring of computer science and subsequent socialization processes, I administered in 1994 and 1995 survey questionnaires and constructed interviews concerning computing and discrimination to almost 500 persons at two major United States research institutions with strong concentrations in computer science and related areas involving the arts. These instruments were designed to search out deeper understandings concerning biases, limitations, and obstacles in computing, locate discrimination, and initiate change with regards to women and minority persons in computing, and to computer-based applications in the arts. Let me briefly and summarily review the findings for you.

The findings overwhelming indicate that the major problem bringing forth bias, limitations, and obstacles for women in computing is situated in the knowledge structure of computer science. The data illuminates particular knowledge-base problems: females suffer intellectual intimidation from the "the old boys' network" which often stereotypes women as illogical and gives an assumed edge to males in knowledge comprehension and knowledge development. Males who have been "hacking" and experimenting with the computer often from the ages of four or five years gain computing prior-knowledge and prior-experience advantages over females of apparent similar intellectual aptitude and capability. Studies in educational computing consistently discuss the predicament of a lack of computing in elementary and secondary school, noting however, that when computing education is available, it is usually males that benefit.

These factors, accompanied by further substantiating data, call for strategies and developments within all levels of computer science education and the computing industry to alter the prior computer knowledge, prior computing experience advantages that favor males, to search out alternative approaches to computing other than just those based on western logic, to build a "critical mass factor" in education and industry that includes both female and male leaders and mentors, and to develop alternatives to the so-called "male geekdom" attitude and ambience that often pervades computing environments, as noted in the USA Today remarks. A surprise in the data was the lack of insightful commentary elaborating social beliefs and understandings about women in computing, and points to a need for further research to provide a more in depth analysis about socialization problems of women and minorities in computing.

Let us conclude this panel contribution by asking the question: If there exists, as argued, discrimination towards women and others in the epistemological structure of computer science, what does this have to do with computer-based applications in the arts? Applications of developing electronic technologies to the arts embody the underlying epistemological structure of computer science that forms the technologies. The application of a particular electronic technology is not an act of neutrality for it embraces the epistemological structure of the technology and passes on embedded discrimination. Looking particularly at applications of electronic technologies in the arts, we are faced with contemporary challenges raised by this hidden discrimination. We stand at a point where in a situation of little or no existing theory for the electronic arts, we can build theory, ethical in its forming, that takes into account analysis of biases, limitations, and obstacles in computing for women and minority persons, and theory that reconnects the modernistically partitioned concerns of arts discourse, electronic technologies, and our everyday living contexts.

Finally, let me emphasize that the changes I am suggesting for the theory, practice, and politics of computer science will require a communal effort to address social injustices to males, females, and minority persons who are involved with its knowledge structure and its many applications, including the arts. Perhaps, in a front page lead article in the August 25, 1998 edition of USA Today we will read about Windows 98 as an inclusive and friendly environment for women, men, and minority people.

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Notes

[1]. James R. Healey, "What A Show" and "Eager Buyers Seeking More Than Software," USA Today 25-27 August 1995, A-1, B-1.

[2] Healey (25-27 August 1995) [1] p. B-2.

[3] Barriers to Equality in Academia: Women in Computer Science at MIT (Cambridge, Mass.: MIT, 1983); Women Undergraduate Enrolment in Electrical Engineering and Computer Science at MIT (Cambridge, Mass.: MIT, 1995); K. Frenkel, "Women and Computing," Communications of the ACM 33 (1990) pp. 35-46; A. Pearl, ed., "Women in Computing," Communications of the ACM 38 (1995) pp. 26-82; and E. Spertus, Why Are There So Few Female Computer Scientists? Technical Report 1315, Massachusetts Institute of Technology Artificial Intelligence Laboratory (Cambridge, Mass., 1991).

[4] M.L. Morbey, "Gendered Technology for Art Education: The Case Study of a Male Drawing Machine," Arts and Learning Research 10 (1992-1993) pp. 88-100; M.L. Morbey, "Aaron: Portrait of the Young Machine as a Male Artist," Revue d'art canadienne/Canadian Art Review XX (1993) pp. 130-139; and M.L. Morbey, "Women, Discriminating Computer Technology and Visual Arts Education: How Might It Be Different?" in D.C. Gregory, ed., Art Education and Technology Anthology (Reston, Va.: National Art Education, in press).