b) Bandiers, all EECS women
equity + later versions

EECS (there)

Bandiers to Equations

(1982)

different from my article

of same name
Dr. Paul Penfield  
Dept of EECS  
MIT  
Cambridge, MA  
USA 02139  

Dear Dr Penfield:  

I am writing to commend you on your support of Ellen Spertus, and her work on women in computer science. As I am sure you know, Ellen’s report on the problems of women in computer science has become de rigeur reading for women in the field, and for all classes (that I know of) on women and technology, gender and computer science, etc.

I gather, both from the report itself, and from what Ellen has told me, that MIT, and you personally, have been supportive of her work. It takes courage to speak out in these times against systemic discrimination, and to propose change. Ms. Spertus’ paper does both, and presents its case cogently and convincingly. It takes courage to support such work. This courage has paid off in many ways for women in computer science, and thus for the field of computer science.

Thank you again for your support for Ellen, and for all of us.

Regards,

Judy Goldsmith  
Assistant Professor

cc: Ellen Spertus
October 22, 1992

Professor Judy Goldsmith  
Department of Computer Science  
University of Manitoba  
Winnipeg, Manitoba  
Canada R3T 2N2  

Dear Prof. Goldsmith:

Thank you for your letter of October 2, commenting on our support of Ellen Spertus. Ellen is a remarkable person, as you perhaps realize. It is a pleasure to see her develop here at MIT.

At MIT we take seriously our responsibility to provide a learning environment for our students free from various kinds of harassment and discrimination, including gender discrimination. We don't always succeed but we try. This has to be a continuous effort because every year new students arrive. In the past few years MIT has produced several publications dealing with sexual harassment, one, by sheer coincidence, appearing the week after the televised hearings involving Anita Hill.

I am happy to support Ellen's work and similar work by others that help us toward this goal. I don't feel that your word "courage" to describe my support for her is appropriate -- it is simply part of a department head's job. As another example of what I consider my job, see the enclosed letter dated December 4, 1989.

You may not be aware of all that Ellen has done. The report which you mentioned was written while she was an undergraduate. For it she received the 1991 Levin Memorial Award (see page 31, 1991 awards and honors booklet). During this past year she ran a seminar series within her research group but reached out and involved people from other groups. She ran the whole thing, inviting the speakers, arranging for material to be distributed, etc. For this activity she was awarded the Department Head's Special Recognition Award (see page 20, 1992 booklet).

In addition, during the past year she and another graduate student instituted a "big sisters" program for female undergraduates. She was concerned that these people find it hard to get undergraduate research opportunities in
computer science, mainly because they do not seem to have the same amount of programming experience as male students of the same age (I do not understand why this is the case, but she says it is). The idea was to match up one graduate student to one undergraduate. It may be too early to judge the success of the project, but I believe things are going well. I have told Ellen that if she keeps this sort of thing up, we may run out of awards to give her.

Thanks again for your kind words.

Sincerely,

Paul Penfield, Jr.

cc: Ellen Spertus

    Awards & Honors, 1991-1992
Barriers to Equality in Academia:
Women in Computer Science at M.I.T.

Prepared by female graduate students and research staff in the Laboratory for Computer Science and the Artificial Intelligence Laboratory at M.I.T.

February 1983

545 Technology Square, Cambridge, Massachusetts 02139
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1. Introduction and Summary

This report describes aspects of the MIT Computer Science environment that hinder the professional and social development of many female graduate students and research staff. The environment is challenging, competitive, and difficult for both men and women. However, many women encounter additional problems that unfairly limit their academic, professional, and personal growth. These problems are widespread and have led to a perception outside MIT that this environment is particularly harsh for women. As a result, many women who start graduate work at MIT choose to leave before finishing their degrees, and many women who complete a graduate degree suffer unnecessarily while they are at MIT, because of their gender. In addition, many women choose not to apply to our Department for graduate work or do not come when accepted.

The principal conclusions of this report are:

- Although not a generally accepted fact, the women here are as qualified as the men. In order to realize their potential, women must be given the same opportunities as men to participate in and benefit from all aspects of the professional community.

- Many individuals in the community, either consciously or subconsciously, have expectations of women that are different from their expectations of men.

- Pervasive subtle discrimination can do as much damage as, if not more damage than, isolated incidents of overt discrimination.

- An uncomfortable social atmosphere interferes with a woman’s ability to work productively.

- Responsibility for change rests with the entire community, not just with the women.

- Many problems would be alleviated by increasing the number of women.

We have two major goals in writing this report. The first is to heighten other people’s awareness of the severity of these problems and of the effect of their own actions on the women around them. The second is to let women in other professional communities with similar problems know they are not alone. We believe that members of other minority groups encounter many of the same problems we describe in this report. We discuss, however, only our own experiences as a group of women in a predominantly male environment.

This report was written by female graduate students and research staff in Computer Science. At the graduate level, the Department of Electrical Engineering and Computer Science (EECS) is divided into six academic Areas, one of which is Computer Science. (See Table II-3 on page 35 for a
breakdown of the Areas.) Most of the problems described in the report are not specific to MIT's Computer Science Area; many of us have experienced similar difficulties at other academic and research institutions. It is to our Department's, Area's, and laboratories' credits that we received support and encouragement from the administration and faculty in preparing this report.

The next two subsections present an overview of the problems encountered by women in the Area of Computer Science. Problems related primarily to professional interactions are discussed in one subsection; problems related primarily to social interactions are in the second subsection.

### 1.1 Professional Inequality

Graduate education and research are more difficult for women in Computer Science at MIT than for their male colleagues. There are two significant obstacles that women have to overcome in the professional environment.

- Preconceived notions about the seriousness of women's commitments as Computer Scientists.
- Negative judgments of women's qualifications made on the basis of gender.

Women are handicapped by doubts about the seriousness of their professional intentions. Comments like "Jane came to MIT only to get a husband" make women feel that their academic and career goals are not treated with respect equal to that accorded to their male colleagues' goals. Personal comments about women made in professional situations -- for instance, during class lectures or technical discussions -- convey the attitude that women are there for personal reasons, not professional ones.

We believe that most faculty, staff, and students want to treat all members of the community fairly as individuals with different talents and abilities. However, despite good intentions, their behavior can express different expectations for women than for men or may be interpreted as doing so by others. Women come to MIT to receive a technical education and begin careers, just like their male colleagues. Behavior that implies or may be interpreted otherwise, especially in professional situations, is harmful to women.

The qualifications of female Computer Science graduate students are systematically doubted at MIT. Some female graduate students are told that they have poor backgrounds, although male graduate students with the same undergraduate background are not told that. Frequently heard comments like "I really don't think the women students around here are as good as the men" do great
Barriers to Equality

damage to women's self-images. In an environment that is difficult for all students, such comments make it even harder for women to perform well. It is not possible to succeed as a researcher if one's technical judgment and expertise are not respected by others in the field. It is very difficult to achieve a level of expertise if, as a student, one's peers and advisors have low expectations for one's success.

The low percentage of women in the Area may give the erroneous impression that there are a lower percentage of well qualified women than men. The women at MIT are well qualified. According to the Chairperson of the Computer Science Admissions Committee and the Directors of the MIT Laboratory for Computer Science and the Artificial Intelligence Laboratory, everyone who is accepted into Computer Science at MIT is qualified. Over the course of several years, some faculty members may not encounter any exceptional women students, while over the same period they may encounter several exceptional men. Consequently, some of them may conclude that women are inferior. Only the presence of more women will rectify this situation.

The obstacles described above sometimes are manifested through overt discrimination, for example explicit verbal comments that convey negative attitudes about women. Most of this report addresses more subtle behavior. Often, subtle behavior is not recognized as discriminatory, for two reasons. First, the actions often are not intended to be discriminatory; the people who convey biased attitudes toward women may be well-intentioned. Nevertheless, the effect of their behavior is to undermine the professional image of women held by their colleagues and the women themselves. Second, any particular incident might appear trivial when viewed by itself. However, when women experience such incidents daily, the overall effect of the environment is much greater than the sum of the individual incidents [8].

Because subtle discrimination is harder to recognize than overt discrimination, it sometimes does more damage. Constant exposure to negative comments diminishes a woman's self-esteem and leads her to believe that she cannot succeed. If she does not recognize such comments as discriminatory, she may not know the proper framework in which to deal with them; she may even blame herself for the problem.

1.2 Social Inequality

All students try to develop the social side of professional relationships. A large component of graduate education comes from informal interaction with colleagues. Informal settings such as luncheons and technical "bull sessions" provide relaxed atmospheres in which students can receive feedback on their progress from peers and supervisors, as well as valuable technical knowledge.
Barriers to Equality

Personal relationships among colleagues also foster the development of understanding and respect, which contribute to a student's self-confidence and ability to work well in groups. Often, women feel that they cannot develop the social side of professional relationships because they run the risk of attracting romantic attention that will erode the relationship. They are more likely to miss important opportunities for feedback and exchange of technical ideas, because they are not as easily accepted in informal settings as male colleagues.

Students also try to develop a social life in their professional environment -- a social life that does not necessarily include romantic relationships. For women, the development of friendships often is inhibited by an attitude among male graduate students, faculty, and staff members that a woman who is not romantically involved with someone is "available" and looking for a romantic relationship. Women feel that many men are not able to view them as a friend, but only as a potential date. As a result, women's actions are often misinterpreted; casual friendliness is mistaken for romantic overtures.

Within the Computer Science community at MIT, female graduate students are an extremely small minority. Many of the men in the laboratories are unaccustomed to being around members of the opposite sex in professional contexts. This gives rise to differential treatment of women that can make it more difficult for them to work effectively. The imbalance harms both men and women. Women are inundated with social attention, creating an uncomfortable social atmosphere that interferes with their academic progress. Women must spend extra time and energy dealing with problems that arise from the social imbalance. Some women react by becoming wary of all new men they meet. Thus, some men are confronted with negative reactions from women to seemingly innocuous, friendly overtures. In addition, men are frustrated by the lack of women with whom to interact socially.

Finally, social behavior in a few research groups sometimes approximates that of the locker room. Such things as demeaning posters, cards, and comic strips, sexist jokes, and inappropriate attention in the form of staring and following serve to remind women that they are different. As a result, many women feel excluded from the community and become isolated.

1.3 Organization of the Report

The rest of this report is organized as follows. Section 2 contains the bulk of our discussion of particular issues and problems. This discussion is based on a list of representative comments and incidents that contribute to an inhospitable environment for women. The original list and a revised
version were prepared by female Computer Science graduate students and technical staff and were distributed throughout the Area in 1981. This section also discusses the reactions of the community to the problems raised by the list. Reactions of both men and women were strong and often highly emotional. In general, the men’s reactions were positive; however, negative reactions often followed protestations of sympathy.

Section 3 contains recommendations that we feel are the key to improving the MIT Computer Science environment. Our general recommendation to individuals throughout the community is that they think more deeply about how their actions and words may convey negative attitudes, especially negative attitudes toward women. This report is filled with examples of how such attitudes can be conveyed, sometimes in subtle ways.

Some women have received positive reinforcement and encouragement from their research groups and the faculty at large. Section 4 is included both to present examples of supportive behavior patterns and to emphasize that not all of our experiences at MIT have been negative ones.

The bibliography is followed by three appendices. Appendix I lists the names of the authors of the original list on which this document was based: female graduate students and technical staff in Computer Science. Appendix II is a brief history of MIT women in EECS, with an emphasis on the Computer Science Area of EECS. It also contains the numbers of female students enrolled in the Department and Area over the last 10 years. Appendix III presents comments by some members of our community.

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1Copies of the revised version of the list can be obtained by contacting the EECS Graduate Office at MIT, Cambridge, MA 02139.
2. What Happened to Us

This section contains an annotated, revised version of the list that was circulated among our colleagues in the Area of Computer Science. There are two subsections that correspond to the two major aspects of our graduate careers: Professional Identity and Social Identity. A third subsection addresses the reactions of our community to distribution of the list.

Throughout this section, we discuss actual experiences of women in Computer Science at MIT that convey pervasive, biased attitudes about women. Some of the specific comments may at first appear insignificant, with consequences that are difficult to understand. However, when these experiences occur daily to many women, they create an atmosphere in which it is difficult for women to work effectively.

2.1 Professional Identity

2.1.1 First a Woman, then a Professional

The day-to-day experiences of many women in Computer Science are characterized by a greater emphasis on their gender than on their identity as serious professionals.

- Following a technical discussion over lunch with a faculty member, I was asked for a dinner date. I was left wondering whether the faculty member went to lunch for the intended technical discussion or for personal reasons.

- During a technical discussion with a faculty member, he made an obscene remark about my clothing when another man entered the room.

- While I was teaching a recitation section, a male graduate student burst in and asked for my telephone number. Men often interrupt me during technical discussions to ask personal questions or make inappropriate remarks about non-professional matters. Faculty members have referred to personal details about me in class lectures.

- When I was a teaching assistant (TA), one of my students missed the lecture and saw me later. He said, "Will you come sit on my lap sometime and tell me what I missed?" This illustrates a lack of respect for me as the instructor as well as an attempt to undermine my authority as a TA by focusing on the fact that I am a woman. Respect from one's students can be as important for developing self-confidence as respect from a peer or supervisor.

- If, during a technical meeting, a sexist comment is made, all eyes turn to me for my reaction. Not only am I constantly in the spotlight, but many men think it is alright to make sexist comments during technical meetings, even when I am in the room.

---

2 This generalization from the experiences of the women in our Area is supported by Hall in her report of a study conducted by the Project on the Status and Education of Women of the Association of American Colleges [3].
Barriers to Equality

- A male graduate student said "Gee, I don’t think it’s fair that the only two girls in the group are in the same office. We should share."

- I was told by a secretary planning a summer, technical meeting at an estate owned by MIT that the host of the meeting would prefer that female attendees wear two-piece bathing suits for swimming.

- During a grades assignment meeting, a professor decided to give a borderline student the higher grade because she was "cute." When I suggested that this was not a relevant basis for grading, another staff member chimed in, "Yeah, she’s not that cute."

- A male student identified a particular female colleague as "the one with no chest."

These examples represent professional situations in which men make sexual or other personal references to women. Such references can take the form of specific comments about a woman’s appearance and personal relationships or stereotyped comments about women’s abilities and personal traits.

- When I first met the professor in charge of a course for which I was a TA, he said, "Boy, the TAs have gotten a lot better looking around here."

- I received an anonymous message saying, "Looks like there is a hot item in the department."

These examples may seem less problematic than the previous ones because they were intended as compliments. In other, non-professional situations, they might be interpreted as compliments. However, regardless of the intent, in a work situation such comments detract from a woman’s professional image. As one woman summarized: "In professional situations, comments about my appearance are upsetting. They make me feel insulted, embarrassed, offended, hurt, and concerned for my stature as a professional."

- "Why do you need a degree for marriage?" -- a male colleague.

- "Jane came here only to get married." -- a male graduate student.

- "What’s an attractive girl like you doing in a place like this?" -- a male colleague.

- "Jane flirts to get whatever she wants."

This last set of examples reflects stereotypical assumptions about women’s roles and values. Some male colleagues view women only in traditional, gender-typed roles. Their stereotyped comments further convey the attitude that women are not serious professionals.

Whether intentional or not, personal comments about a female colleague made in professional
situations create the impression that the woman is there for personal rather than professional reasons. They convey the attitude that men think of us first as women and second -- if at all -- as professional colleagues. During a technical discussion, these experiences detract from the value of the woman's technical contribution and damage her credibility. Inappropriate comments by professors in the presence of graduate students and comments by graduate students that are not discouraged by senior colleagues legitimize these attitudes and perpetuate the lack of respect displayed for female members of research groups. As a result of these experiences, women feel undervalued and lose self-respect and self-confidence, all of which hinder their professional development.

The comments described above undermine women's professional identities by drawing attention away from their roles as professionals and focusing it on stereotypic roles for women. It is inappropriate to make such personal comments during technical discussions, either with MIT colleagues (for example, in a class, a technical seminar, a group meeting, or a meeting with a supervisor) or with visitors (for example, outside consultants, government representatives, or visiting scholars).

2.1.2 Invisibility

- I know men who ignore my questions about their work, but respond to a man who asks the same questions.

- It's very common not to be asked for my technical opinion on a relevant subject in my field of interest.

- I have been excluded from discussions. I even had two people with whom I was trying to have a meeting pull their chairs together and start talking to each other as if they'd forgotten I was in the room.

- In response to being asked about my work, a male colleague took over, gave my analysis of the situation, and said how long it would take me to do a task.

- I have been ignored, constantly interrupted, and talked over in meetings as if I weren't there.

- I was the only woman in a group working on a machine. Only one person could use the machine at a time. Often, while I was working on a task, a male graduate student would physically push me away from the machine and interrupt my work so that he could get at the machine. This didn't happen to the men in the group.

- It is a common experience for me to receive professional correspondence addressed to "Mr. Jones." Also, I have observed some of my male colleagues who are very surprised when they discover that a good technical article written by, for example, J. Jones, was
written by a "Jane" rather than a "John." Although men form a large majority of researchers in computer science, women have proven themselves capable of making valuable contributions to the field. When it is always assumed that engineers in general, and authors of good work in particular, are men, women's contributions are implicitly being overlooked.

Many women are treated as if they were invisible in technical situations. They feel that this is one way in which they are not taken seriously as professionals. They are overlooked in technical discussions and excluded from group efforts, their work is attributed to male colleagues, and their opinions are not sought on relevant technical subjects. One reason for this invisibility is that an aggressive discussion style is inappropriately viewed as a sign of competence. If a woman (or, for that matter, a man) does not discuss issues aggressively, then she (or he) is often viewed as less competent, and is not taken as seriously as a "more visible" colleague.

The examples listed above convey the attitude that women cannot make contributions to technical discussions or group work that are as valuable as men's contributions. Experiences that lead women to believe that they are not doing good work and are less competent than men promote a negative self-image for women. Also, such prejudices foster a lower image of women throughout the field and can inhibit the development of their careers.

2.1.3 Patronizing Behavior

- "We'll see how we can fix things for you so they're better." — a male colleague.
- Often, when I ask a male graduate student how to do some task, particularly something on the system, he will do it for me rather than explain to me how I can do it for myself.
- I asked a male graduate student a technical question and got an answer that seemed to be aimed at someone with little or no knowledge of computer science, as if it were being explained to a high school student rather than a colleague.
- It seems like all I have to do is ask one simple question and the people I work with try to take over my entire research problem and solve it for me. I think they're trying to be helpful, but it doesn't help me if I'm never allowed the chance to do my own project.

On the other end of the spectrum from invisibility is patronization. The final comment above emphasizes the key point: women, as well as men, need the opportunity to work on open-ended research projects on their own. They need this experience to develop the discipline necessary to focus on a research problem: the creativity to formulate alternative paths to pursue; the technical judgment to evaluate different alternatives and to choose the most appropriate one to follow; and the technical skill, self-reliance, and perseverance to carry a task through to its completion.
For a project to be a significant learning experience, it must be challenging. Because less is expected of them, women are relegated to straightforward, menial tasks more often than their male counterparts.

- "You want to do research? Let me see what I have that you can do.... This paper needs proofreading."  

Concerning the assignment of menial tasks, one woman comments:

- I resent being given what are considered menial tasks for two reasons: first, the dispenser of the tasks assumes that women should be doing more menial tasks than men, second, the dispenser is making a statement about whomever does the tasks by labeling them as menial.

Women ask only to be given the same chances to pursue challenging research problems and the same opportunities to prove themselves as are given to their male colleagues.

2.1.4 Qualifications

- "You got into graduate school because the Area needs more women."
- "You got into graduate school because Professor Jones is in love with you."
- "What am I going to do? This is an important course and my teaching assistant is a girl."
- I was told by a male faculty member that women do not make good engineers because of early childhood experiences ... little boys build things, little girls play with dolls, boys develop a strong competitive instinct, while girls nurture....
- "Women aren't concerned with technical details." — a male colleague.
- I've heard several teaching assistants come to the conclusion that women always ask for help more than men, with an implication that women can't figure things out on their own.
- I've heard men chuckle when a women's technical opinion is mentioned, and say "Oh, Jane," in a tone of voice that dismisses and ridicules her opinion.

Many of the problems that women encounter arise from some men's basic doubt that women are qualified to pursue a graduate career in computer science. In our Area, no unqualified students are accepted. Nevertheless, the qualifications of female graduate students are systematically doubted by male faculty members, graduate students, and undergraduate students. Many women feel that they have to be more qualified than men just to be considered as capable.

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3 We refer here only to relatively unchallenging work like proofreading, not more challenging work like reviewing papers.
Barriers to Equality

Women are often told that they lack qualifications needed for research projects and consequently are not given the opportunity to prove themselves. In addition to restricting the opportunities available to female students, this frequent questioning by others of women’s qualifications leads women to doubt their own qualifications. Self-doubt leads to lower self-confidence and makes women reluctant to take on challenging projects to prove that they really are capable.

Some people find it difficult to respect the goals of women in a technical field because they believe that women are incapable of technical endeavors. While most people would agree that men and women are socialized differently as children, these differences should not be allowed to form a permanent barrier to a woman’s training in a technical field. Instead, these insights should be used to construct academic programs for students that take advantage of their strengths and correct their weaknesses, should such weaknesses exist. In fact, most women applying to engineering schools have worked hard to overcome "deficiencies" in their backgrounds and, by the time they enter graduate school, are as well prepared as male students to undertake research in computer science.

Some research supervisors believe that women do not examine problems to a sufficient level of detail, do not exhibit independent thought, or cannot make substantial contributions to a technical discussion. Broad generalizations about women’s qualifications and abilities lead to reluctance on the part of some supervisors to accept women in research groups or to give them critical tasks.

- "I don’t like to supervise female graduate students. For instance I can’t stand it when they start to cry if you criticize their work. In general, I have trouble relating to them,” - a male faculty member.

While it is understandable that some male faculty members feel more comfortable dealing with stereotypically male reactions, they should accept the responsibility for learning to deal with both men and women in academic situations. Otherwise, differences that have no bearing on technical ability will continue to be used to deny women the opportunities that are available to men.

As mentioned before, stereotyping restricts opportunities available to women in the Area and encourages them to doubt themselves. One woman comments:

- Stereotypes make it harder for me to work here because they reinforce the idea that I can’t be a good engineer. This attitude is pervasive. It affects other people’s behavior towards me as well as my own self-image.
2.1.5 "Acceptable" Behavior for Women: A Double Bind

Some argue that women students would be best to adopt a "masculine" style in order to achieve classroom credibility. Others point out that a woman who does so may be perceived as "aggressive" rather than assertive because her way of talking and acting does not conform to "feminine" expectations: what a female student says in a "masculine" style may be rejected out-of-hand on that basis. Indeed, the same behaviors seen as "forceful" in a man may be viewed negatively -- perhaps even as "hostile" -- when used by a woman. ([3], p. 10)

The experiences we have had in the Computer Science Area of our Department at MIT reflect the double bind in which women are caught. On the one hand:

- "I was once told that the reason women don't finish here is that they are trained by society not to be aggressive."
- "You'll never make it through MIT. You're too feminine. You're just not aggressive and pushy enough."

And on the other hand:

- "You're so aggressive."
- "Mrs. Attila the Hun."
- "I'll bet she doesn't take any shit."
- "You sure are bitchy today; must be your period."

If a woman appears quiet and feminine, her success may be hindered because she is not competitive. If she does not appear quiet or feminine, she is socially ostracized. Women feel that there is no way for them to be accepted by their colleagues.

2.1.6 The Consequences for Women

Many of the individual experiences presented in the previous sections have the same consequences. Most directly, women suffer from the actual limitations placed on their professional development by the refusal or reluctance of faculty members to supervise them, to provide financial support for them, or to allow them to work on interesting and important problems. For any graduate student, there is often only one professor at a given institution whose interests coincide with the student's. For a woman, whose interests coincide with those of a professor who does not provide a supportive environment for women, there are no easy alternatives: she cannot continue her education unless she moves to another group, school, or field of work. Because the professor's attitudes often affect the research group's attitudes, an unsupportive professor contributes to a lack of valuable
Barriers to Equality

support from peers. When a woman leaves a group, her departure often is blamed on her lack of ability, rather than the faculty member’s lack of support or responsibility.

Other consequences for women are less apparent and more difficult to measure. Like everyone else, women internalize the opinions of themselves that others express frequently. When people whose ability they respect, such as their advisors, continually undervalue their contributions and imply that they are incapable of succeeding, they come to believe this negative appraisal of themselves. This problem leads to a vicious circle: once a woman is made to feel incompetent, she is less likely to accomplish as much as if she had received the encouragement given to her male colleagues. Dealing with biased behavior takes time and energy. Women who are subjected to this kind of behavior have less of each to devote to their work.

This treatment and the resulting struggle take their toll personally. One survival tactic that some women adopt in an unsupportive environment is withdrawal. They isolate themselves from their research groups and may select a research topic that requires little interaction with others. The environment encourages them to deprive themselves of the benefits of working with and learning from others -- an integral part of a graduate education. Alternatively, some women choose to hide their femininity. They intentionally dress unattractively or adopt a louder and more aggressive manner than when they are in more comfortable circumstances. Such behavior has the dual benefit of stopping sexual overtures and creating an image that is more in keeping with their colleagues’ view of an engineer or scientist. However, for many women, it is impossible or personally unacceptable to modify their behavior so drastically in these ways, even to become more acceptable to their colleagues. This alternative may backfire too, since some men cannot accept women who completely deny traditional women’s roles. (See [3].)

For many women, dealing with the problem of inequality in any of these ways is an unacceptable burden. Some leave MIT rather than remain frustrated with professional and personal compromises they find unavoidable. Some very capable women with the potential to make strong contributions to their field of research have left MIT without completing their studies. (This information was gathered from private conversations.) This is a loss to MIT as an institution, as well as to the women involved.

2.2 Social Identity
2.2.1 Misplaced Expectations

- In an interview with a faculty member about research the following gestures made by me were interpreted as "come-ons": (1) looking him directly in the eyes, (2) smiling while talking to him, and (3) leaning back in my chair.

- All I did was say "Hi" to a male graduate student, and the next time I saw him, he asked me out.

- A male student who had lunch with me a number of times when we were teaching assistants for the same course regarded me as his "territory." I overheard him say to another male graduate student, in reference to a third, "John is muscling in on my territory."

- Having lunch with male graduate students seems to signify that I'm going out with them. The same is implied by technical discussions. In short, people seem to assume that I'm going out with any male I talk to.

- Professor Jones and I were working late on a project, and we decided to grab something to eat. I thought we'd go for a sandwich. Imagine how I felt when we drove up to a fancy, candle-lit restaurant. I didn't want to go in because it seemed too much like a date situation, but he insisted and also wouldn't let me pay for my dinner. I felt as if I had been forced into going on a date with him, and after that I always felt nervous about being alone with him.

- A male faculty member and I played tennis together a few times until I realized that he was viewing our games as dates.

- Following a technical discussion over lunch with a faculty member, I was asked for a dinner date.

Men's expectations of how a woman should behave frequently cause her actions to be misinterpreted. Women in this environment often feel that they are viewed primarily as potential dates. A female graduate student who is friendly with a male colleague runs the risk of having the male colleague assume that she is romantically interested in him. Other men may make this assumption, whether or not the man concerned does. A lunch appointment with a man to discuss a technical matter may be viewed by him and/or other members of the community as a social date. It is difficult to keep a professional relationship from being mistakenly interpreted as a romantic one. Such misinterpretations disrupt both social and professional relationships.

Some men expect the women to bear the burden for the imbalance in the number of women and men; they expect the women to accept the excessive social attention that results from the low percentage of women.

- A male graduate student said, "The problem with this place is that there aren't enough attractive, available female graduate students." Enough for what? I'm not here to be attractive and available.
Barriers to Equality

- A graduate student said, "Men are tired of only seeing men. They want to see women in dresses, not women who look like men."

Other men use the lack of women as an excuse for unrelenting sexual advances and other unacceptable behavior; they argue that there are too few women around for men to know how to act toward them.

When viewed only as social beings, women are sometimes felt to be disruptions to the work environment. They are not considered to be part of the research atmosphere and are treated as distractions and nuisances.

- A faculty member told other students that one of his male students wasn't getting his work done because I had started going out with him and he was spending too much time with me. I wasn't going out with him. His lack of progress was due to completely different reasons.

Some men seem unable to view a woman as an individual, not associated with any man. At times, women find it extremely difficult to participate in group social activities because of expectations that they pair up with men.

- I went on a ski trip with a number of men in the Area. At the conclusion of the day, there was an explicit discussion among the men about who was going to be my "partner" for the night.

The following are comments from female graduate students about how experiences like those presented have affected them.

- I am uncomfortable about asking certain male graduate students for help (about the system, projects, etc.) because it might be viewed as "coming on" to them. More times than not, the answer to a question is followed by an invitation to go out.

- I find that I have a sense of anxiety all the time here. Because I never know who's going to decide that I'm "available," I'm not comfortable away from my desk, and I find it difficult to talk to male graduate students. This is particularly noticeable because I am comfortable talking to female students and the majority of the faculty.

- These situations have made me stop talking to male faculty members and fellow graduate students. Any approach made to me by male faculty members or graduate students I view with great suspicion.

- Because men always think that I'm coming on to them, I don't feel comfortable joining technical bull sessions. I feel as if I'm missing a valuable part of my graduate education.
2.2.2 Unwanted Attention

- One of the male research associates started taking an interest in me. He went out of his way to find opportunities to talk with me. However, once he found out that I was engaged to be married, he completely ignored me. Subsequently, he began to bother my female officemate. He wouldn’t leave her alone even though she said “no” to several dinner invitations. I resent the fact that I was treated as a potential date instead of as a colleague.

- Male graduate students will often walk into my office just to “talk” or “chat.” Many times when I want to work and I ignore them, they stay. Even when I explicitly ask them to leave, they continue to dawdle in my office.

- I continued to receive dinner invitations from a male graduate student after I’d been turning them down at least twice a week for two months.

Women are as interested as men in romantic relationships. However, in an environment that is ninety percent male, the women are inundated with unwanted attention. Often a woman’s response of “no” is not taken seriously; she is repeatedly bothered by the same man or by others.

If a woman is approached romantically by a colleague, particularly someone in a supervisory position, she might hesitate before rejecting the social overture, because rejection of social attention will often harm the professional relationship. The fact that this is more of an issue for women than for men results from the imbalance in the number of women and men and the resulting larger amount of social attention that each woman receives; it is compounded by the predominance of males in supervisory roles.

- I have been grabbed and tickled by a male graduate student in my research group with whom I have no personal involvement.

- When I was sitting at my terminal typing, a male faculty member came up behind me and started rubbing my neck and shoulders.

- While talking with a male colleague in my office, he suddenly placed his hand on my breast and said he liked me.

A few men are much bolder in their attentions to women. They use physical contact in demeaning and taunting ways or as an excuse to be deliberately personal. Physical contact can be comforting and reassuring between friends. However, the set of examples above illustrates inappropriate instances of physical contact.

Many men fail to understand why women do not appreciate constant attention like that described above. Some believe that their comments and actions are “flattering” or “cute.” They do not realize
that women find such comments and actions bothersome. Furthermore, the large number of men in the Area causes the number of offenses to be unacceptably large.

The following are comments from female graduate students about how unwanted attention has affected them.

- Approaches from Prof. Jones made me feel uncomfortable with him. In situations where I should have been able to go to him with questions, I avoided him. I still feel uncomfortable around him and have yet to say more than "hello" several years later.

- Faculty members should understand that personal attentions from a faculty member threaten my professional image. I don't want to fight the "She got through because of Prof. Jones" syndrome.

- Trying to have a social life here is very difficult. I have to be constantly on guard for "wanton" men. I don't have the time and energy to be constantly having to "defend" myself while I am trying to get work done on my thesis.

- We don't want it to seem like we're saying all attention is bad. We want the men here to treat us as well-rounded people, which includes desire for human relationships. The problem with the attentions we receive now is that our freedom of choice is ignored.

2.2.3 Obscenity

- I have had obscene mail sent over the computer system to me by male graduate students.

- There is a picture of a nude woman on our system which is printed out and displayed. It is also used occasionally to demonstrate the graphics capabilities of the system.

- "That's where you belong: on your knees." I was kneeling in the library in front of the card catalog. He walked up and planted himself right next to me such that if I turned to face him, my face would have been just below waist level.

- There was an obscene decoration on display in a professor's office. When I objected by pointing out that it might offend some women, my objection was laughed off.

Obscenity is pervasive in our environment. Humor in the laboratories often takes the form of sexist, demeaning jokes. By placing women in demeaning roles, these jokes make women acutely uncomfortable. By focusing attention on women as sex objects, obscene material makes it difficult for them to establish identities as professionals. Obscenity tends to keep women from becoming integrated into the community as colleagues and adds to the "locker room atmosphere."
2.2.4 The Fishbowl Syndrome

- Wherever I am, be it in my office or the elevator, or at a lecture, seminar, or meeting, male graduate students, faculty, and staff are always staring at me as if I were some sort of freak.

- A male graduate student sitting next to me leered at me all through a seminar. This happened so often that in subsequent seminars I made sure that my friends sat around me to "shield" me from this particular graduate student.

- As a first year student I was followed around intermittently by a professor who was teaching one of my courses. He never said anything and kept his distance, but he was watching. It was unnerving.

- A faculty member started paying a lot of attention to me -- going out of his way to "run into" me, talking to me a lot, and flirting. When I asked another woman student what she thought was going on, she told me he had made advances to a couple of other students. She was surprised that I had not been warned about him.

- A male graduate student said, "What do you expect? You are a very attractive and interesting woman so you are going to attract a lot of attention."

Female graduate students are continually stared at in classes, group meetings, even their offices, and are often followed by male colleagues. This kind of unwanted attention is more subtle than that of the previous sections, because there may be no verbal or physical interaction. Although the casual observer may not even be aware of it, women are constantly under surveillance. This makes them feel uncomfortable and out of place. As one woman commented:

- I always feel as if I am being pursued. I also feel like I'm in a spotlight. All my actions are under close scrutiny constantly and I feel extremely self-conscious.

2.2.5 The Consequences for Women

Women in the Area are in a double bind. If they choose not to get involved in social relationships, they can alienate themselves from particular individuals and from the community. This detracts from career growth because the women do not get the valuable feedback and technical interaction offered by informal settings. Isolated from the community, they also forfeit supportive relationships with friends and colleagues. On the other hand, friendships with male colleagues usually are assumed to be romantic, not only by the male colleague, but also by the community at large. This assumption disrupts both professional and non-professional relationships.

For many of us, the consequences of the attitudes described in this Section can be summarized by one woman's comment:

- I feel like I can never have any friends here, like I can never fit in. I've never felt so isolated in my life.
2.3 Reactions

Reactions to the problems raised by the list were strong and often emotional. The reactions of men and women are addressed separately in the following subsections. The reactions of some individuals in the community are presented in Appendix III.

2.3.1 Men

The men’s reactions to the list were generally positive. Most conversations, whether in groups or privately, began with an affirmation that we had raised legitimate issues, and most men supported our concern that these issues be addressed. Beyond that, reactions varied widely.

The Associate Head for Computer Science of the EECS Department was dismayed at the extent of our problems. In a memo to the faculty, he described why he believed they should not dismiss these problems as merely oversensitivity on the part of the women (see Appendix III.1). Another professor sent a letter to us expressing his concern about our problems (see Appendix III.3). A group of men began meeting weekly to discuss our situation and theirs; some of their comments are in Appendix III.4.

There was a general feeling among many men that the list and the discussion following its distribution were useful and important first steps toward improving the environment for both women and men. Some men spent a great deal of time analyzing their behavior toward women. They commented that the discussions prompted by us increased their sensitivity to how their actions affect women around them. Although the amount of harassment is difficult to measure, many men appear to have become more aware of the feelings of women.

There also were negative reactions, often following protestations of sympathy. Some men said that they agreed with the points we raised, but their actions did not bear that out. There were a few cases in which harassment increased. Many men expressed anger and frustration. They were angry at us for "publicly airing dirty linen" or behaving like spies. They were frustrated for several reasons. Some men could not understand how people they had considered to be reasonable and rational could reach conclusions so different from their own. Others were frustrated by our lack of consideration for the problems they face due to the small number of women to date. Some were frustrated that we had not sought them out individually to hear their concerns. Still others were embarrassed at the possibility of having made mistakes in the past, and self-conscious about the possibility of making mistakes in the future. These reactions led some men to avoid women.
Barriers to Equality

In looking for a reason to dismiss the issues addressed, some men attacked what they considered to be incidents taken out of context. There were two reasons that incidents were not described as some might have wanted. First, in many cases, descriptions were changed to mask the identities of the participants. Second, incidents could not be described in their full contexts either because the women describing them did not have complete information or for lack of space. In all incidents described, we felt we had included enough information to make the point. Some men have since told us that they originally wanted to dismiss the list as a whole because of a small number of incidents that they felt were taken out of context.

The following is a partial list of frequently heard comments from men and our reactions to these comments:

- "Can't you take a joke?"
  Usually, when a woman’s complaints evoke this response, she does not think the incident in question was funny. If she lets the episode slip by without complaining about it, she is giving tacit approval to something that upsets her.

- "It wasn’t meant that way."
  Perhaps no offense was intended, but the speaker should be more sensitive to how other people perceive his comments or are affected by his actions.

- "Tell me whenever I am doing something you don’t like."  
  In this case, the speaker is relieving himself of the responsibility for thinking of others and is putting the full responsibility to point out problems on the woman. He is asking for the impossible. Women form only a small percentage of the Area; they cannot be expected to be everyone else’s consciences. Also, women cannot always speak out; often, it would be damaging for a woman to say something (for example, to her thesis advisor or in the middle of a technical meeting). In other cases, no woman is present when an offensive remark is made.

- "Are you going to put that on your list too?"
  This was an immediate reaction that continues to be heard months later. Frequently, a comment like this comes from someone who feels betrayed, who perhaps feels his privacy was invaded. The speaker does not understand the anguish many of us felt while creating and publishing the list.

- "I agree with the important points, but you should get rid of the trivia."
  The most interesting aspect of this common comment is that each speaker labels a different set of items trivial. More importantly, one of the significant aspects of the women’s lives at MIT is our continual bombardment with discrimination in the form of minor, offhand comments and almost unnoticeable, suggestive actions. Incidents that may appear trivial can be seriously upsetting when they occur continuously.
2.3.2 Women

Many women who had not participated in creating the original list reacted very strongly to it. First, when the original list was distributed to the faculty it contained several items related to secretaries. The secretaries showed us how these comments portrayed them in a demeaning way; we realized that we had been insensitive to some of the implications of these comments. We removed the offending items from the list before distributing copies to the other members of the laboratories and continued to discuss the issues with secretaries and among ourselves. Second, the group of authors was composed of all the female graduate students but only some of the research staff. Unfortunately, many groups in the labs are isolated from other groups, and we did not find all the research staff. Those women who were omitted were justifiably hurt by not being included. In general, many of the women in the labs who had not participated in preparing the list were frustrated, because, as women, they were expected by male lab members to defend the list. We have been very touched by the expressions of support and loyalty that we received from so many of these women.

Our own reactions to general distribution of the list were very complicated. We found ourselves more in the limelight than ever before; everything was scrutinized and questioned, where previously it had just been watched. We found that even after all the energy we had expended in creating the list, we were misunderstood. Some of us became frustrated at having to say things and explain ourselves so many times. Others became depressed about the need for so much additional explanation. Most were angry that a few people could express sympathy for us and continue or increase their misbehavior. We were also disappointed with ourselves for not being more sensitive to the other women in the labs in the way we were asking the men to be sensitive to us. All of us were exhausted and torn between the desire to straighten it all out and make everyone understand what we were trying to say and the desire to get back to our work. Few, if any, had realized how much energy and emotional strength the process could take and continues to take.

There were also positive reactions. The open and honest effort of some of the men to understand and improve the situation was elating. That, and a closeness among the women that had not existed before, made many of us realize that our efforts had been valuable. All of us learned more about ourselves and each other.
3. Recommendations

Women in Computer Science at MIT have spent many years of their academic and professional lives attempting to come to terms with a predominantly male environment. Many have made uncomfortable adjustments in their lives and styles of behavior. We ask that women not be forced to continue to make these adjustments. We hope that everyone in the community accepts the responsibility to work towards change.

Our general recommendation is to think about and discuss how actions and words may be interpreted as a statement of underlying attitudes, especially attitudes toward women. A first step in this direction is to modify outward behavior. Since we cannot expect people to change their attitudes immediately, we look for an initial change in behavior and hope that a change in thinking will follow in time. We ask that you examine your colleagues' behavior, as well as your own; if you witness a situation in which a woman is treated unfairly, say something to the people involved. In the short term, better behavior at least will make daily life easier for women; in the long term, it will improve the behavior of others by setting a good example.

No list of formal recommendations will solve the problems discussed in this report. However, we offer the following recommendations as suggestions for ways to begin improving the environment for women. Most of the recommendations below are excerpted from a report of the Project on the Status and Education of Women, of the Association of American Colleges [3]. We highly recommend this report to all faculty, administrators, and students. The organization of subsections below parallels that of the subsections dealing with Professional Identity in Section 2. Section 3.6 provides additional recommendations to the administration and faculty. We have not made specific recommendations for improving the social environment, because social behavior is a matter of individual taste and values. For some guidance, we suggest that you reflect on the experiences illustrated in Section 2.2, which have led to an uncomfortable social atmosphere for women.

3.1 First a Woman, Then a Professional

- Do not make inappropriate personal remarks to or about women in professional situations.

  * Never make demeaning remarks, such as "...come sit on my lap sometime...", in professional situations.

  * Do not use sexist humor to "spice up a dull subject..." or make disparaging comments about women as a group.
Barriers to Equality

Do not allow a discussion of a female student's work to be turned into a discussion of her physical attributes or appearance. In general, do not make more references to women's appearances or personal lives than to men's appearances or personal lives.

- Avoid stereotypical assumptions about women's roles and values.
  - Assume that women's reasons for pursuing an education are professional, not personal.
  - In addressing a class, use terminology that includes both men and women in the group and that reinforces an equal view of men's and women's roles and career choices. Avoid using the generic "he" when possible. Experiment with language that reverses expectations based on gender.
  - Group students in a way that implies that women are as competent as men, not according to gender.

- Faculty members should be careful in approaching female students as dates to avoid putting the women in untenable positions. The role as potential date must not supersede the professional and academic roles.

3.2 Invisibility

- In a technical meeting or classroom discussion, if someone has something to say, make sure he or she has a chance to say it without interruption. Some people talk louder and longer than others and may have to be asked to allow others to finish speaking.

- Intervene in communication patterns among men and women that may shut women out. For example, ensure that women are not "squeezed out" from viewing laboratory demonstrations or engaging in group projects.

- Watch for and respond to nonverbal cues that indicate a female colleague's readiness to participate in the discussion. Reflecting back on stereotypes, do not dismiss as incompetent people who are not aggressive in technical discussions.

- Pay particular attention to classroom interaction during the first few weeks of class, and make a special effort to draw women into the discussion during that time. Call upon each woman directly and as often as each man.

- Ask women qualitatively similar questions as men, give them the same amount of time to respond to the question as you would give a man, and respond to men and women in similar ways when they make comparable contributions to class discussions.

- Use student evaluations as a source of feedback on the treatment of men and women in your classrooms.

- If there is a woman working or taking a course in an area of interest to you, seek her out and question her. Such questioning is a good means for initiating technical discussions with women and indicates to them that you take them seriously as professionals.
Barriers to Equality

- Include women in the "informal" interactions that are important in communicating support and acceptance as a colleague.

- Discuss academic and career goals with women, offer to write letters of recommendation for them, and consider women as well as men when making nominations for fellowships, awards, and prizes. Contact both men and women when publication, research, and other professional opportunities arise.

3.3 Patronizing Behavior

- Assume that women are knowledgeable in technical matters; if they do not understand something, they will ask.

- When a woman asks a technical question, answer the question in the same way that you would for a man; do not do her work for her. Avoid seemingly helpful comments that imply that she is not as competent as a man.

- As mentioned before, ask women the same kinds of questions as men and use the same tone of voice and attitude in responding as you would with a man.

- Consider women as well as men when choosing classroom, teaching, and research assistants. Give men and women the same responsibilities.

3.4 Qualifications

- Do not associate competence exclusively with some qualities -- especially traditionally male qualities, such as assertiveness -- and not others. There is much variation in the technical expertise, creativity, motivation, and perseverance of individual women and individual men. Some are theoreticians, others are system builders; some are innovative and impulsive, others are methodical. Judge the abilities of every individual objectively and design a research program to suit his or her particular talents.

- Try to consider ways to bring new students "up to speed" when they first enter graduate school. For example, give them research literature to read and then discuss the research with them. Provide small projects for new students and suggest background material that will be useful in their research. Take an interest in their progress and help them build the skills that they need to do research.

- When supervising graduate students and research staff, express confidence in their ability to develop their own research projects and provide help and encouragement along the way. Assume that women are as capable of completing research tasks as men.
3.5 Double Bind

- Try to notice whether a "feminine" or "masculine" style of a student’s comment, question, or response affects your own perception of its importance. Some female students tend to state their comments hesitantly or in an "overly polite" fashion; do not assume because of this that they are uncertain about what they want to say or that they are not saying much that is worthwhile.

- Do not assume that women who do not work in a "masculine" style are not competent. At the same time, do not ridicule women who choose a masculine style for doing so.

3.6 Additional Recommendations to Administration and Faculty

The following recommendations were composed by the authors of this report.

- Promote open discussion between men and women about problems that have been encountered in the Area. In particular, the faculty and administration should:
  - Sponsor regular faculty discussions of this topic.
  - Sponsor additional meetings open to all members of the laboratories to air these issues.
  - Distribute this report to all new members of the laboratories to ensure their awareness of the problems.

- Demonstrate a formal commitment to providing a positive educational environment for women. In particular, the administration should:
  - Publish a formal policy statement articulating this commitment.
  - Establish a formal grievance procedure that addresses both overt discrimination and the subtle inequities that contribute to a woman’s discomfort with the environment.

- Establish a committee responsible for improving the environment for women. In particular, the committee should:
  - Oversee implementation of the recommendations contained in this report and seek additional solutions.
  - Provide advice to men and women on the issues discussed in this report.
  - Take an active role in the solution of problems that require outside intervention.

- Make Area-wide and Departmental commitments to increasing the number of women faculty, staff, and students. In particular, the faculty and administration should:
  - Lobby for Institute-wide support of this commitment.
Barriers to Equality

• Actively recruit female faculty, staff, and graduate students.

• Encourage female undergraduates to consider graduate training and challenging research careers.

• Include student representatives on Area-wide and Departmental committees, such as the graduate admissions committee, and on faculty search committees. In the area of graduate admissions, female graduate students could provide valuable input into the evaluation of women's applications.

• Maintain records on students that leave the Area before fulfilling their original goals, in an attempt to assess whether changes in the educational or administrative policies of the Department might help to decrease the loss of good female students from Computer Science.

• Improve the advising and professional training of both graduate and undergraduate women. In particular, the faculty and administration should

  • Encourage the visibility of female members of the research groups at conferences, and promote contacts with researchers outside MIT. This exposure contributes to the placement of women in good positions in academics and industry.

  • Provide regular feedback on students' progress as suggested in [1].

  • Provide and promote formal as well as informal training in the critical presentation of technical material, both in written and verbal form. For example, offer a seminar on how to give a presentation.

  • Promote good undergraduate preparation of women at MIT by encouraging them to undertake UROP (Undergraduate Research Opportunities Program) projects; undertake substantial B.S. theses; present their work in group seminars; talk to professors, research staff, and graduate students in their area of interest; and read relevant literature.

• Improve the communication between undergraduate and graduate students: establish a system of graduate students serving as co-advisors to undergraduate students; establish a formal means of communication between female graduate and undergraduate students (such as monthly lunches); organize a meeting of undergraduates interested in applying to graduate school in which they have an opportunity to speak to graduate students in their areas of interest.
4. A Positive Note

Although the experiences described in this report have affected all the women in Computer Science, some women have found supportive research groups in which to work. They were respected as members of a group. Other members of the group consulted women for their technical opinions, cared about their work, and treated them as equals. These women worked closely and successfully with their supervisors. Since their supervisors demonstrated respect for them by encouraging them to take on significant responsibilities within the group, other colleagues were apt to show them respect as well.

The following comments provide a glimpse of the supportive atmosphere that could surround every research group, but unfortunately surrounds only a small percentage of them. These kinds of experiences should be part of every graduate student's training:

- At technical seminars, when questions arise in my area, my supervisor always refers the questions to me, even though he is certainly capable of answering them himself.

- When visiting scientists come to see my supervisor, and are interested in work in my area, he always includes me in the discussions.

- I have had several discussions with my advisor, in which he spent considerable time with me, discussing possible paths that I might follow. He discussed how I could best prepare myself for each option. These talks made me feel that my advisor respected my goals and was concerned about ensuring that I would be prepared to meet them.

- One semester, I was put in charge of organizing a weekly informal seminar dealing with my research area. My responsibility was to select a paper weekly and lead the discussion. This experience was valuable to me in many ways; not only for the professional skills I acquired, but also for the confidence I gained. In particular, the interest and commitment of the other participants was especially gratifying.

- A professor invited me to present a guest lecture on the work of my group in his undergraduate course. The respect from this professor that this gesture demonstrated and the subsequent respect that I received from his students meant a great deal to me and helped to build my self-confidence.

- If my supervisor is unable to attend a conference in which he was asked to speak about our work, he always suggests that I take his place.

- When I first started, some senior graduate students and research staff had just begun implementing a large project in my area of interest. They invited me to participate in this project, and we found some small problems I could work on. The project was a valuable experience for me since I had had no research experience in that area. I received an excellent introduction to my area of interest by being able to participate in and contribute to an ongoing effort. It was especially important to me that the students and staff took the initiative to include me and help me get started.
• I once took a course in an area that was somewhat removed from my area of research, but which I found very interesting. I took an active part in the class, regularly asking and answering questions. Toward the end of the semester, the professor encouraged me on a couple of occasions (before the entire class) to attend the regular seminars of his group, if I was more interested in their research. This type of encouragement can really go a long way in developing a woman's self-image.

• Whenever my supervisor finishes a new paper, he gives it to me to read, not because he needs a proofreader, but because he is genuinely interested in my technical opinion of the work.

• When I started as a graduate student, I had no background in the particular area that I chose to pursue in my research. My supervisor was not concerned about this. It was apparent to him that I had a good general technical background and that I showed enthusiasm for the subject. He gave me a small project right away, encouraged me to read the literature, and was confident that things would work out. They did.

With the same positive stimulation, encouragement, and respect that men receive, women are as successful as men in pursuing professional careers in computer science. Senior women in research groups may also serve as role models for new women, which often leads to the perpetuation of women in the group and the continuation of a supportive environment for women. MIT and other academic institutions have the potential and the responsibility to provide equitable training for female computer scientists by promoting the kind of positive, educational experiences reflected in the above comments.
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7. Pierce, M. Report on Women Graduate Students in EECS. Memorandum to Arthur C. Smith, Chairman -- EECS Committee on Graduate Students.


I. Appendix - Authors

The original list on which this report is based was prepared by the following graduate students and research staff. This report should not be cited according to any one of the authors' names but rather as: "MIT Computer Science Female Graduate Students and Research Staff."

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All the authors listed above are associated with either the Laboratory for Computer Science or the Artificial Intelligence Laboratory. All the women who were Computer Science graduate students in residence at MIT in 1981 participated in writing this report.

In addition, Ronni Rosenberg, a former Computer Science graduate student, edited the report.

We also would like to acknowledge the care and effort given by the many people who read and reviewed this document during preparation. They are too numerous to list here, but their contributions were of great importance to us.
II. Appendix - Background

Efforts to address the special problems of women in EECS can be traced back at least to 1976. They are documented in Table II-1. Many members of the Computer Science Area have made significant efforts to integrate women into the academic and professional community on an equitable basis. Had the women who produced this report not been certain of the commitment and support of those members, they would not have felt it possible to publish a document of this nature.
Barriers to Equality

The statistics presented in Tables II-2 and II-3\(^4\) indicate the continuing scarcity of women in Computer Science at MIT. The low ratio of women to men contributes to many of the problems described in this report. As discussed in Section 1 and shown in table II-2, the percentage of female graduate students in the EECS Department has risen very slowly over the last decade. In particular, the increase has been slower in Computer Science than in the rest of the Department; the number of women in Computer Science has grown less than threefold in ten years, while the number of women in the rest of the department has grown almost tenfold. In addition, the number of women in the Computer Science Area appears to have reached a plateau over the last five years, whereas the remainder of the department continues to increase both the number and the percentage of female graduate students. Table II-3 shows that there is a smaller percentage of women in Computer Science than in any other area of the EECS Department.

\(^4\)The numbers in both of these tables include women in the co-op program. No female co-op students in our Area were on campus in the autumn of 1981. For this reason they did not participate in the original list or this report. This accounts for occasional inconsistencies between the figures in the tables and other figures mentioned in the report.
Barriers to Equality

Table I-1: A Partial History of EECS Women at MIT

<table>
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<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1976</td>
<td>Prof. Arthur Smith, Graduate Officer in EECS, held a meeting with female EECS students to uncover issues concerning the female students.</td>
</tr>
<tr>
<td>1978-79</td>
<td>Ms. Marilyn Pierce, Administrator in charge of EECS graduate students, met individually with the female graduate students to continue the discussion.</td>
</tr>
<tr>
<td>1979</td>
<td>Ms. Marilyn Pierce produced a report documenting the female students' complaints and making suggestions for improvement.</td>
</tr>
<tr>
<td>Spring 1981</td>
<td>Ms. Candace Sidner, third female recipient of an MIT Ph.D. in Computer Science, published a paper about the difficulties encountered by women at MIT and the prevailing attitudes that make it hard for women to succeed.</td>
</tr>
<tr>
<td>Fall 1981</td>
<td>Ms. Marilyn Pierce and Ms. Emily Weidman, Special Coordinator for Women's Students' Interests, sponsored monthly lunches for the female EECS graduate students, at which the severity of the problems facing Computer Science women became apparent.</td>
</tr>
<tr>
<td>Fall 1981</td>
<td>Female graduates student and research staff members of the Laboratory for Computer Science and the Artificial Intelligence Laboratory (the report authors) began meeting weekly to discuss their common problems in greater detail.</td>
</tr>
<tr>
<td>Fall 1981</td>
<td>From their experiences as EECS graduate students, the report authors compiled a list of representative incidents and comments that had contributed to an inhospitable environment for women. Items on the list were phrased so as not to reveal the identities of the participants.</td>
</tr>
<tr>
<td>Spring 1982</td>
<td>The report authors met with Prof. Peter Elias, the Associate Head of the EECS Department, to discuss the list and investigate future courses of action.</td>
</tr>
<tr>
<td>April 1982</td>
<td>The list was distributed to the Computer Science faculty and was the topic of two of the weekly faculty meetings. As invited guests, Ms. Marilyn Pierce attended the first meeting and Ms. Mary Rowe, MIT's Special Assistant to the President, attended the second.</td>
</tr>
<tr>
<td>May 1982</td>
<td>The report authors met with Prof. Peter Elias, Prof. Michael Dertouzos, Director of Laboratory for Computer Science, and Prof. Patrick Winston, Director of the Artificial Intelligence Laboratory, to discuss the impact of the list and the need for further action. It was proposed that: (1) the list be circulated among all members of the two laboratories; (2) an open forum for discussion among all members of the community be held; and (3) this report be written.</td>
</tr>
<tr>
<td>May 1982</td>
<td>A revised version of the list was circulated to all Computer Science faculty, staff and graduate students.</td>
</tr>
<tr>
<td>May 1982</td>
<td>The MIT Computer Science community came together in an exceptionally well-attended lunch meeting to discuss the issues raised by the list.</td>
</tr>
</tbody>
</table>
### Table II-2: Fall Registration Statistics for Female EECS Graduate Students

<table>
<thead>
<tr>
<th>Year</th>
<th>In all of EECS %</th>
<th>In CS %</th>
<th>In EE (Non CS) %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Number</td>
<td>Number</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in women in 10 years</td>
<td>558%</td>
<td>55</td>
<td>286%</td>
</tr>
<tr>
<td>1982</td>
<td>11.9</td>
<td>12.1</td>
<td>11.8</td>
</tr>
<tr>
<td>1981</td>
<td>10.8</td>
<td>8.8</td>
<td>11.5</td>
</tr>
<tr>
<td>1980</td>
<td>9.8</td>
<td>12.6</td>
<td>8.6</td>
</tr>
<tr>
<td>1979</td>
<td>9.5</td>
<td>12.7</td>
<td>8.3</td>
</tr>
<tr>
<td>1978</td>
<td>9.2</td>
<td>13.7</td>
<td>7.5</td>
</tr>
<tr>
<td>1977</td>
<td>6.1</td>
<td>10.2</td>
<td>4.4</td>
</tr>
<tr>
<td>1976</td>
<td>5.2</td>
<td>8.0</td>
<td>4.0</td>
</tr>
<tr>
<td>1975</td>
<td>4.5</td>
<td>6.3</td>
<td>3.1</td>
</tr>
<tr>
<td>1974</td>
<td>4.5</td>
<td>4.1</td>
<td>4.7</td>
</tr>
<tr>
<td>1973</td>
<td>2.8</td>
<td>6.0</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Barriers to Equality
Table II-3: Fall 1981 Enrollment of Graduate Students in the Six Areas of the EECS Department

<table>
<thead>
<tr>
<th>Area</th>
<th>Number of graduate students:</th>
<th>Percentages of total who are women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area I (Systems, Communication, and Control)</td>
<td>Total: 97  Women: 9</td>
<td>9.3%</td>
</tr>
<tr>
<td>Area II (Computer Science)</td>
<td>Total: 149  Women: 13</td>
<td>8.7%</td>
</tr>
<tr>
<td>Area III (Electronics, Computers, and Systems)</td>
<td>Total: 120  Women: 12</td>
<td>10.0%</td>
</tr>
<tr>
<td>Area IV (Energy and Electromagnetic Systems)</td>
<td>Total: 55  Women: 6</td>
<td>10.9%</td>
</tr>
<tr>
<td>Area V (Materials and Devices)</td>
<td>Total: 70  Women: 8</td>
<td>11.4%</td>
</tr>
<tr>
<td>Area VII (Bioelectrical)</td>
<td>Total: 55  Women: 9</td>
<td>16.4%</td>
</tr>
<tr>
<td>Other (Operations Research)</td>
<td>Total: 14  Women: 3</td>
<td>21.4%</td>
</tr>
<tr>
<td>Other (Technology Policy Program)</td>
<td>Total: 5  Women: 1</td>
<td>20.0%</td>
</tr>
</tbody>
</table>
III. Appendix - Contributions by Other Members of the Community

The following four subsections present reactions by members of our community at MIT. Prof. Peter Elias is Associate Head for Computer Science of Department of Electrical Engineering and Computer Science. Dr. Mary Rowe is Special Assistant to the President. Prof. David Reed is on the Computer Science faculty of the Department of Electrical Engineering and Computer Science. The final contribution is by a men's discussion group that is one of the outgrowths of the activities chronicled in this report.

III.1 Peter Elias -- The Department

When I saw the report written by the women graduate students and technical staff I was surprised and dismayed at the extent of the problems they had found in our environment, but felt that other members of the community would share my surprise and concern, and that the report could make a great contribution to producing a more satisfactory environment for women in computer science at MIT. I invited my colleagues to read the report and discuss it at a lunch meeting of computer science faculty and research staff on April 1, 1982. In the memo announcing the lunch I wrote:

It is tempting to shrug off some of these problems as merely showing oversensitivity on the part of the women involved. I don't think we can afford to do that, however, for three reasons.

First, many of our women graduate students heard before they came that MIT was a difficult place for women. Others, who did not apply or did not come, may have been frightened off by such reports. The percentage of women in graduate work is roughly the same in Area II as in the rest of EECS, although we have almost twice the percentage of undergraduates.

Second, the women note in their letter that many women graduate students feel uncomfortable enough here to avoid their research group or laboratory. They thereby lose a principal component of graduate education.

Third, a larger number of complaints of this general character arise from Area II than from the rest of EECS. This may be due in part to our distinctive geography and work style. Whatever the cause, it gives us a greater incentive to take the problem seriously.

The lunch was very well attended, discussion was intense and largely sympathetic and interest was sufficiently great that we agreed to have a second meeting with Mary Rowe present, to give us a better MIT context within which to place the situation here. That meeting, on April 29, 1982, also had a large and very vocal audience, including some of the women faculty and research staff. The women's group then held what I believe was the first meeting for all of the members of the...
Barriers to Equality

laboratories. The Laboratory for Computer Science and the Artificial Intelligence Laboratory, including students, research staff, support staff and faculty, on May 20, 1982. Again discussion was intense and revealing.

Certainly the net result of all this activity will not make the problems faced by women in computer science at MIT all disappear. However I do believe that there was a significant increase in the sensitivity of many of us among the students, faculty and staff to many of those problems, and that the report and the following activities were a useful and important first step.
III.2 Mary Rowe -- Subtle Discrimination

I believe that subtle discrimination is a major barrier to equal opportunity -- and can cause serious damage, for the following reasons.

- Subtle discrimination often leads to more explicit discrimination. Thus, ignoring women is a habit that may lead to overlooking a woman who might be the best-qualified person for a job or promotion or to underpaying women.

- Because the provocation for discrimination -- one's gender -- cannot be changed and has nothing to do with one's work, one inevitably feels helpless.

- Subtle discrimination takes up the victim's time. Sorting out what is happening and dealing with one's pain and anger take time. Extra time is also demanded of many women and men to help other women deal with the pain caused by subtle discrimination.

- Discrimination prevents people from doing work that is as good as they are capable of doing. If a secretary or graduate student is unreasonably overloaded with menial work for a supervisor, the overloaded person may be prevented from doing the kind of excellent work that prepares her for promotion. Subtle forms of discrimination can cause much damage before it is recognized.

- Subtle discrimination is particularly powerful as negative reinforcement because it is hard to identify. This means that these inequities are hard for a victim to "turn off." It also means that frequent victims, like women, experience a range of emotions from legitimate anger to paranoia. The experience of being uncertain about whether one was insulted causes displaced and misplaced anger. It also causes one to ignore some real insults, so that they persist.

- Subtle discrimination often is not intentional, even when objective observers would agree that it exists and that an injury really took place. This is another reason it is hard for a victim to respond to it. We are all socialized to believe that intent to injure is an important part of injury, and it is certainly critical to our dealing with injuries at the hands of others. Faced with a subtly discriminatory act, the victim may not be certain of the motives of the aggressor and may be unwilling to start a fight where none was intended. When uncertain about motives, most victims at times do not get angry when they should, which perpetuates the injuries and may weaken the victim's self-image. At other times, they protest when no injury was consciously intended, even though it occurred. The latter situation can be salutary for all concerned, especially if the aggressor reacts by acknowledging an unconscious intent to injure. However, sometimes the aggressor is so totally unaware of aggressing that, even though observers agree that an injury took place, he may respond with anger, feelings of betrayal or bewilderment, or worse.

- Subtle discrimination seems petty, in a world where redress by the less powerful often seems heavy-handed or too clumsy. Unionization, going to court, and appeal to the President's office may seem heavy weapons against subtle discrimination. The perceived lack of appropriate weights of redress helps perpetuate subtle discrimination.

- Subtle discrimination of some types may have a negative Pygmalion quality. That is, the expectation of poor performance, or the lack of expectation of good performance, may be
Barriers to Equality

itself do damage because students and employees have a strong tendency to do what is expected of them. As Sartre noted throughout his book on anti-Semitism, the anti-Semite creates the Jew.

The question is frequently raised whether subtle discrimination does not just "happen to everyone?" Are we not just describing the general inhumanities of large organizations? Frequently, I will talk with a powerful white male who openly says "I harass everybody, Mary. I don't discriminate." Let me raise here hypotheses as to why subtle discrimination might be worse for women in paid employment (especially for women in traditionally male employment), than for the average white man. Some hypotheses as to why subtle discrimination may do more damage to women are analogous to the hypotheses as to why they do damage at all.

- "General" harassment often takes specifically sexist forms when applied to women. One might say to a man "Your work on this experiment has been inexcusably sloppy; you'll never make it that way!" When addressed to a woman, the same criticism might come out as "My God, you think no better than my wife; go home and have babies!" The harassment of women piles up in allusions to sex roles. Like the dripping of water, endless drops in one place have profound effects.

- Discrimination often is perpetuated by more powerful people -- most of whom are male -- against less powerful people -- most of whom are female. Since less powerful people by definition have less influence, it is difficult for them to stand up against discriminators who happen to be their supervisors or advisors.

- Some traditional white, male environments support and reinforce certain kinds of discriminatory behavior, like the telling of aggressive and humiliating dirty jokes in a lab.

- Men may overlook some sexist behavior because it is so "normal." Many male supervisors are acutely uncomfortable around secretaries and consequently ignore them, but neither they nor male bystanders notice this. Pornography on walls, sexist jokes, and the use of sex in advertisements and announcements are so ubiquitous that many people do not consciously notice it.

- Women in non-traditional positions have a more acute role-modeling problem, because they witness subtle discrimination against others like themselves. Disproportionately more women see people "like them" put down or ignored by their superiors. In most work environments, the principal, same-sex role models for women are clerical and hourly workers, who are the groups that most frequently report subtle discrimination. This inadvertent role-modeling is made stronger because nearly all women are at one time or another assumed to be clerical workers (or waitresses or saleswomen, depending on the situation). A young female engineer says "I am constantly being taken for what I am not. I constantly feel a struggle to develop my own self image, but it is not affirmed by most of the world around me, as it is for my male colleagues."

- It is harder for women to find mentors to help them deal with subtle discrimination. There are so few senior women in most organizations that junior members of most communities cannot find as many high-status, same-sex mentors as white males can find. Sometimes,
higher status women try to compensate by spending extra time as same-sex mentors. However, it is inevitable that the burden of dealing with discrimination falls on women who are already disproportionately drained of energy by caring for others.

- It is particularly difficult to find an appropriate mentor when one has been the victim of sexist discrimination. Listeners of the opposite sex may not understand. Listeners of the same sex may be so discouraged, angry, or full of denial that they are worse than useless. I believe that it is often more difficult for women to find adequate help in dealing with the minutiae of sexism than for average members of the community to deal with "general inhumanities."

I believe there are many reasons why the problem of subtle discrimination for women goes beyond the general inhumanities of large organizations. This point may become clearer to male readers if they imagine being a child-care worker in a large, conservative, inner-city, day-care system. The "general harassment" might include questions and comments about your sexuality. You might hate always being asked by visitors why you are there. Other white males might find you odd. Women might distrust your skills, simply because you are male. You might find the constant assumption that women care for children better than men to be very oppressive -- the advertisements, the jokes, the pictures on the walls, the fathers deprived of custody. Since you might in fact be inept in some ways at the beginning, this criticism might hinder your professional development. You might be very sensitive to the just run-of-the-mill anger of your cross-sex supervisor. You might have no one like yourself to turn to.

In summary, I believe that subtly discriminatory behavior causes pain and, for women, the pain often occurs in an environment they cannot easily control, evade, or ameliorate. Continued experience of destructive situations which cannot be improved can start unhappy cycles of behavior ranging from declining self-esteem to withdrawal, resignation, poor work, fantasies of violence, and so on. At the very least, it takes a lot of energy to deal with an environment perceived as hostile, or to continue to deny the difficulties.
III.3 David Reed -- One Man's Reaction To The Report

When I read an early version of this report, and encountered the reactions it engendered among the faculty, staff, and students in the area, I wrote the following paragraphs to the reports' authors. I think they bear repeating, as one man's reaction to the report. I would only like to add that I am proud of the effort put in by both men and women here in discussing these problems openly and honestly. There are complicated and deeply held feelings at the root of these issues. The old rules of "correct" behavior between man and woman are based on assumptions of inequality. As we destroy these old assumptions, the rules change for all of us, and we must examine even our most fundamental instincts.

I am very glad that you put in the effort you did. It is always hard to speak up when you feel oppressed, harassed, or beaten down--you wonder whether it is all your fault (especially when there are those who will imply that it is), or whether it is worth exposing yourself to more of the same, or whether it will do any good.

Certainly the reaction has been mixed, and with the extended distribution you will continue to get reactions. However predictable such reactions seem to be, and however defensive, denying, misunderstanding, insensitive, or uncaring, it is clear that you have had a significant effect. I have attended both faculty lunches where these issues have been discussed, and it is clear that most men there have learned a lot, as I have, about how individual women may perceive their actions--e.g., that discomfort at being an object of undesired attention is not just a "minor" problem to be solved when the women "adjust" to the norms of M.I.T.

Personally, I feel that your list has broken the ice between women and men who work here. These problems will not be solved quickly, and some men will say in a defensive reaction "these women don't deserve to work here if they have such thin skins." That these men are so defensive is a good sign of sorts--they used to feel it unnecessary to defend such behavior.

As for me, I learned a lot. I am not a woman, so I have not always been sensitive in the way I have behaved (I remember one time in anger sending a system message containing graphic language it embarrasses me now to recall, and I am sure that I have said things that could be heard as imputing that women could not be as successful as men [though I don't believe that]). I know now about some situations that have occurred that I might be able to help prevent in the future by expressing my disapproval as a faculty member and group leader. I will never be able to neuter myself (nor should any man) at work, but I hope that I can learn from you to listen with some understanding of how it feels to you.
Barriers to Equality

I have heard a rumor that several of the women involved in preparing the report are planning now to leave after their S.M. because of their feelings about the things in the list. I feel sad that some of you find that necessary after making a strong contribution towards improving life here. One of the reasons I am writing this is to let you know that there are those who care that you stay. M.I.T. need not be inhuman to be excellent.

Thank you all.

David P. Reed
III.4 Another Male Perspective on Discrimination

This section was written by a group of male lab members who have been meeting regularly to discuss the problems and issues presented in the main body of this report. Our group has included students, faculty and staff members. Several of the women responsible for the report have also shared their perspectives with us.

Due to the sensitive issues addressed by the women's original report, reactions ranged from defensiveness to joking belittlement to astonishment that women here face the problems they do. Some men expressed similar frustrations in their own professional lives, and were surprised that the women considered their situation different. But as a result of publication of the report, many people here have begun to think more seriously about discrimination in our workplace based on racial, cultural and educational differences as well as on gender. Thus we see reason to hope that this report will be a step toward a better working environment for all.

In discussing the specific problems which occur here, we came to the realization that sexism encompasses more than active, intentional discrimination. Women can be inadvertently discriminated against without anyone being consciously aware of it. For example, a subliminal assumption that men are generally more technically competent can hurt women because men will tend to approach other men for technical discussions. As a result, women find themselves separated from the main flow of professional ideas, their professional development becomes more difficult, and their professional opportunities are subtly restricted.

The longer we discussed such issues, the more obvious it became that their solution involves more than the adoption of new departmental or laboratory policies. We concluded that neither formal institutional change nor individual changes in behavior and attitudes alone can fully address these problems.

As it became clear that personal change was a significant issue, we began to consider what kinds of changes in our own attitudes and behavior were most important. The following list of priorities, arrived at after some effort, is far from definitive but was useful as a starting point.

- We need to recognize the legitimacy of other people's feelings. The high value we place on aggressiveness and the willingness to engage in intellectual combat should not lead to a lack of respect, understanding or empathy among us. The attitude that "it doesn't bother me, so why should it bother anyone else?" is especially inconsiderate and counterproductive. Professional competence is not always associated with a high degree of assertiveness and a confrontational style of discussion.
Barriers to Equality

- We need to take responsibility for our own actions. Although it is difficult to be constantly on guard against saying or doing something which is offensive to others, we have no one to blame but ourselves if we do so. We specifically reject the idea that men must be provided a list of dos and don’ts in order to be held accountable for their behavior -- sensitivity should come from within and not depend on criticism from others. If one carries a positive attitude toward others, the temptation to do something inappropriate is diminished, and far less “watchfulness” is necessary.

- We need to take a stand. When one of our colleagues engages in inappropriate behavior, it is all too easy to look the other way. But it is everyone’s responsibility to speak out about what he or she feels is right, even though it may feel awkward or offend one’s friends.

Discrimination is a severe and deep rooted problem. No place is immune from its occurrence, and no amount of denial or superficial dismissal will make it go away. In reacting to the women’s report and talking with each other, we are learning to perceive gender-based biases and other prejudices more clearly. The obstacles women face here reflect wider societal patterns, and the explicit rejection of traditional role models is critically important in changing these patterns.

We appreciate the time and commitment the women have invested in developing their report.

Steve Berlin  
Dan Carnese  
Oded Feingold  
Walter Hamscher  
Chris Reeve  
Sunil Sarin  
Mark Shirley  
Jon Sieber
Why Are There So Few Female Computer Scientists?

Ellen Spertus

MIT Artificial Intelligence Laboratory
Women pursue education and careers in computer science far less frequently than men do. In 1990, only 13% of PhDs in computer science went to women, and only 7.8% of computer science professors were female. Additionally, the percentage of female computer science students appears to be increasing at only a slow rate or even decreasing. Apart from ethical concerns at women’s lack of participation in computer science, the demographics of the country are such that the United States will not have enough engineers and scientists unless underrepresented groups increase their participation. This report examines the influences against a woman’s pursuing a career in a technical field, particularly computer science. Such factors include the different ways in which boys and girls are raised, the stereotypes of female engineers, subtle biases that females face, problems resulting from working in predominantly male environments, and sexual biases in language. Finally, I discuss effective and ineffective ways to encourage women. A theme of the report is that women’s underrepresentation is not primarily due to direct discrimination but to subconscious behavior that tends to perpetuate the status quo.
Why are There so Few Female Computer Scientists?

© Ellen Spertus

Abstract

Women pursue education and careers in computer science far less frequently than men do. In 1990, only 13% of PhDs in computer science went to women, and only 7.8% of computer science professors were female. Additionally, the percentage of female computer science students appears to be increasing at only a slow rate or even decreasing. Apart from ethical concerns at women’s lack of participation in computer science, the demographics of the country are such that the United States will not have enough engineers and scientists unless underrepresented groups increase their participation. This report examines the influences against a woman’s pursuing a career in a technical field, particularly computer science. Such factors include the different ways in which boys and girls are raised, the stereotypes of female engineers, subtle biases that females face, problems resulting from working in predominantly male environments, and sexual biases in language. Finally, I discuss effective and ineffective ways to encourage women. A theme of the report is that women’s underrepresentation is not primarily due to direct discrimination but to subconscious behavior that tends to perpetuate the status quo.

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Introduction

Only a small percentage of computer scientists and computer professionals are female. In the most recent years for which statistics are available, women received a third of the bachelor’s degrees in computer science, 27% of master's degrees, and 13% of PhDs. Not only do women make up just 7.8% of computer science and computer engineering faculties, only 2.7% of tenured professors are female [Frenkel 1990, page 38] [Gries et al 1991]. Even worse, these numbers seem to be improving only very slowly or even dropping [Leveson 1989, page 3]. Many girls are still steered away from math and science or choose not to pursue careers in these fields. Additionally, many women who go into computer science are conscious of being treated differently from men or feel that they face additional barriers. This report describes some of these barriers.

As someone who has loved math and computers ever since I was a little girl, I have always found it strange that so few females share these interests. At the computer camp I attended, the boy-girl ratio was six to one. It was similar at high school math club and the math summer program I attended. At MIT, only about 20% of the computer science undergraduates are female, while other departments, such as biology, are at least 50% female. I researched this report to explore why females so consistently stay away from computer science, why people of both sexes seem to expect less from women, and why a woman is considered unfeminine if she is an engineer. Because math and computer programming came easily to me and to many other women who have had the opportunities, women clearly are not inherently unable to do well in them. Instead, girls and women are choosing, consciously or subconsciously, not to go into or stay in computer science. While one cannot rule out the possibility of some innate neurological or psychological differences that would make women less (or more) likely to excel in computer science, I found that the cultural biases against women’s pursuing such careers are so large that, even if inherent differences exist, they would not explain the entire gap. In this paper, I describe the biases that women face in pursuing careers in computer science and how they deal with them.
Organization

My report examines the following topics, each occupying a chapter:

1. Societal pressure against women’s being successful, particularly in engineering.
2. Ways in which the male-dominated environments discourage women.
3. Inequalities in language, their causes and effects.
4. Negative consequences of some attempts to help women.
5. Conclusions and recommendations.

At the end of the report are appendices which contain additional information, such as the methods I used for data collection and implications of recent research on sex-based intellectual differences. Finally, there is an annotated bibliography.

The report does not directly address the problems of racial minority group members, such as blacks and hispanics, who are also underrepresented in computer science. Readers should not interpret my lack of material on this subject as implying that no bias exists against these groups. On the contrary, I have been told by a black female computer scientist that the color barrier is greater than the sex barrier. In many parts of this report, such as Section 1.2.1 on subconscious bias, the experience of people of color is analogous to that of women.

Readers are welcome to contact the author with questions or comments. To do so, send electronic mail to ellsens@ai.mit.edu or use the following address:

Room 630
545 Technology Square
Cambridge, MA 02139

Acknowledgments

Because many contributors wished to remain anonymous, I cannot thank them by name. I am pleased, however, to have this opportunity to acknowledge Prof. Sherry Turkle, who encouraged me and supervised the early stages of this project, and my friend Nate Osgood for his support and thoughtful comments. Additionally, I am grateful to Dr. Vicki Almstrum, Danielle Bernstein, Joost Bonsen, David Chaiken, Prof. Judy Goldsmith, Prof. Eric Grimson, Dana Henry, Magdalena Leuca, Prof. Barbara Liskov, Prof. Nancy Leveson, Dr. Fanya Montalvo, Philip Spertus, Prof. Lynn Stein, Christine Tsien, Dr. Kim Wallen, Janet Wixson, Liz Wolf, and Mary Ellen Zurko for their comments on earlier versions of this paper. I am also grateful to Dr. Anita Borg for managing an electronic mailing list of female computer scientists and to the women on the
list who have helped and encouraged me. Finally, I want to express my appreciation of the many students, staff, and professors at MIT, particularly in Electrical Engineering and Computer Science, who have been wonderfully supportive of this work, especially EECS department head Prof. Paul Penfield, CS head Prof. Fernando Corbató, MIT ombudsperson Prof. Mary Rowe, and EECS administrator Marilyn Pierce. Part of this work was done while I was receiving financial support through a NSF graduate fellowship.
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Chapter 1

Societal Factors

Women beware. You are on the brink of destruction: You have hitherto been engaged in crushing your waists; now you are attempting to cultivate your mind: You have been merely dancing all night in the foul air of the ball-room; now you are beginning to spend your mornings in study. You have been incessantly stimulating your emotions with concerts and operas, with French plays, and French novels; now you are exerting your understanding to learn Greek, and solve propositions in Euclid. Beware!! Science pronounces that the woman who studies is lost — R. R. Coleman, M.D., 1889.¹

In this chapter, I will describe various ways in which women are steered away from professional success, particularly in traditionally male fields such as engineering.² Girls and women are subject to societal pressure to stay away from such subjects or to accept themselves as "unfeminine". Academically successful women are generally seen as being less attractive and less happy than less highly-achieving women.³ Additionally, there are still people who believe, consciously or subconsciously, that women are incapable of being top scientists and who take women less seriously in general.

¹Coleman, R. "Woman's Relations to the Higher Education and Professions, as Viewed from Physiological and Other Standpoints." Transactions, Medical Association of Alabama (1889), page 238. Quoted in [Ehrenreich et al 1978, page 128].
²Readers outside of the field may be confused by my use of the term "engineer" to include computer scientists. I do this because the field of computer science does not fit neatly into either engineering or science. Despite the "science" in the name, university computer science departments are often attached to electrical engineering departments or are part of the school of engineering. Additionally, computer programmers and designers tend to think of themselves more as engineers than as scientists, although some individuals and organisations consider computer science as a branch of the mathematical sciences.
³Of course, the stereotype also exists of male engineers being less attractive than other males. See, for example, [Weipert et al 1988, page 2], [Turkle 1984, Chapter 6], and [Holland 1990, pages 164–165].
1.1 Stereotyping

1.1.1 Background

Currently, most people in positions of power and respect are male. Men are rhetorically asked in [Sandler 1986, page 3]:

Imagine that your lawyer, your doctor, your priest, rabbi, or minister, your Senator and Representative, your mayor, the president of your institution, most of its trustees, almost all of the deans and most of your colleagues were all women. How would you feel?

Not only are these positions held by men, but the media propagate stereotypes of women. A recent study found that “women are often still depicted on television as half-clad and half-witted, and needing to be rescued by quick-thinking, fully clothed men” [Adelson 1990]. Whether or not people realize it, many of their expectations of men and women are based on what they have observed and by what messages their culture presents. As one Usenet\(^4\) reader wrote:

This group [comp.society] has been discussing various stereotypes for a long time now. The problem is that we haven’t acknowledged the importance of stereotypes to human cognition. We could easily call stereotypes heuristics. A heuristic is a device that allows a processor to use some sort of knowledge to reduce a search. In very rough terms, stereotypes allow the wetware in our heads to do less search when looking for evaluations of people and behaviors to events.

The human brain is the best known implementation of these heuristics. In fact the human brain is so reliant upon heuristics, that when presented information that contradicts such a heuristic we feel confusion and discomfort.

So where is all this going? For better or worse, humans will continue to make stereotypes based on input from their environment. Since the average person rarely meets programmers, and the only programmers that people see are male geek actors on the TV, we will still have the geek image. I have to admit, most programmers I know are not ex-jocks. Most programmers I know are male, have interests in math and the insides of computers and will allow their personal appearance to slip during those wonderful, coffee-filled, marathon programming sessions. See, I have the disease too. (disease = stereotype)\(^5\)

I believe that the author of the message is unusual not in having biases but in being aware of them. It has been empirically shown, as will be described in the

\(^4\)Usenet, a large electronic bulletin board system, is described in the appendix on methods.

following sections, that many people expect less of females without realizing it. These stereotypes are not as harmless as the author implies however, as they sometimes impair people from seeing past the stereotypes. Additionally, people tend to live up or down to the expectations that are communicated to them.

1.1.2 Bias in Children’s Toys and Computer Games

The social biases that influence females begin in childhood, where boys and girls are often treated differently on the basis of sexual stereotypes. From the earliest ages, girls are given different types of toys than boys. For example, one study of children from one to six years of age found:

Boys had more vehicles, toy animals, military toys, educational-art materials, sports equipment, and spatial-temporal objects. On the other hand, girls had more dolls, doll houses, and domestic objects [Rheingold et al 1975].

The difference in toys cannot be explained purely by the children’s preferences — the expectations of parents and other gift givers play a major role. Numerous studies, cited in [Pomerleau et al 1990, page 360] have found:

When interacting with an infant who was introduced as a girl, adults used feminine toys (for instance, a doll) and talked more to ‘her’. When the infant was presented as a boy, they used masculine toys (e.g., a hammer) and encouraged more motor activity.

These stereotypes are perpetuated by toy companies, which market toys in a stereotyped manner. A 1969 Life ad contained:

Because girls dream about being a ballerina, Mattel makes Dance-rina ... a pink confection in a silken blouse and ruffled tutu ... Barbie, a young fashion model, and her friends do the ‘in’ things girls should do — talk about new places to visit, new clothes to wear and new friends to meet.... Because boys were born to build and learn, Mattel makes Tog’l [a set of blocks for creative play].... Because boys are curious about things big and small, Mattel makes SuperEyes, a telescope that boys can have in one ingenious set of optically engineered lenses and scopes [Komisar 1972, page 305].

While such an ad would not appear today, it indicates the environment in which today’s young scientists were raised.

As recently as 1985, a study found:

[T]he content of toy catalogues and the pictures of children on the packages of toys are still strongly stereotyped. In catalogues and in stores, special sections are reserved for sex-stereotyped toys. Girls’ sections contain dolls and accessories, doll houses, arts and crafts
kits, toy beauty sets, and housekeeping and cooking toys. Building sets, sports-related toys, transportation toys, workbenches and tools are featured in the boys sections (Schwartz et al 1985) in [Pomerleau et al 1990, page 365).

In addition to marketing toys in a stereotyped manner, such factors influence the design of toys. It was reported that:

Jaron Lanier, head of VPL, gave a talk at UIST in 1989 about his experience productizing the data glove for Nintendo games....[H]e said that [the] toy manufacturer was very strictly divided from the very highest levels into the girl’s toy division and the boy’s toy division. He strongly resisted the glove from becoming either a girls’ toy or a boys’ toy, but he lost. He said that they immediately categorized it as a boys’ toy and put all kinds of black Darth-Vader-ish, sports-car-like paraphernalia all over it to make it appeal to boys. He also said, had it been categorized as a girl’s toy, it probably would have been pink and frilly.

Not only are there differences in varieties of “old-fashioned” toys given to children, but these biases are carrying over into the realm of computerized toys and games. These games are both based on traditionally male interests, such as war and sports, and are marketed toward boys. [Kiesler et al 1985, pages 456-457] reports:

On one rack [in a computer store], covers in comic-book style depicted such games as Olympic Decathlon (4 male athletes on cover), Cannonball Blitz (3 men in battle), Swashbuckler (9 male pirates), Thief (1 male detective), Alien Typhoon (1 male space explorer) and Money Munchers (1 man in a suit). In all, 28 men and 4 women were illustrated on the covers. The women were on the covers of Monopoly (2 men and 2 women playing the game), Palace in Thunderland (1 very fat queen), and Wizard and the Princess (1 wizard standing, 1 princess in supplicating position on floor).

Girls’ lesser usage of computer games could be a factor in their being less positively disposed toward computers and in their lack of interest in computer courses [Lockheed 1985, page 118], particularly as students who have played computer games are more likely to do well in their first college computing course [Kiesler et al 1985, page 457].

It should be noted that nobody with whom I have spoken proposes that a conspiracy exists among manufacturers and advertisers to keep females in their place. Rather, companies aim their products at the largest segment of the population that is predisposed to use them. Additionally, females are more willing to buy products advertised for males than vice versa [Courtney et al 1983].
1.1.3 Stereotypes of Boys and Girls

Anecdotal evidence suggests that when an infant is dressed in blue, passers-by say how smart he looks; if the same baby is dressed in pink, people say how pretty she is. Boys' clothing is often decorated with cars and trains; girls' clothing rarely is. More rigorously, numerous studies of sex stereotyping of infants are reviewed in [Stern et al 1989], including:

Parents in one study, for example, were asked to rate and describe their newborns shortly after birth when the primary source of information about the baby was his or her gender (Rubin et al., 1974). Although the infants did not differ on any objective measures, girls were rated as littler, softer, finer featured, and more inattentive than boys. Other studies have revealed that parents treat male and female infants differently.... Fagot (1978) observed that parents of toddlers reacted differently to boys' and girls' behaviors. Parents responded more positively to girls than boys when the toddlers played with dolls, and more critically to girls than boys when the toddlers engaged in large motor activity [Stern et al 1989, page 502].

Expecting different behavior from boys and girls can be a self-fulfilling prophecy: If one sort of behavior is expected and encouraged, the child will be more likely to continue it.

Children also have been shown to have formed sexual stereotypes as early as at two years old [Weinraub et al 1983, page 33]. For example,

Preschool children also have a good grasp of adult-validated sex-stereotyped beliefs about children's behavior. When asked in an interview-like situation which of two paper dolls — 'Michael' or 'Lisa' — would like to do certain activities in nursery school, end up in certain future roles, and have certain character traits, children 2½ to 3½ years old showed an impressive depth of knowledge (Kuhn, Nash, & Brucken, 1978). Children believe that girls like to play with dolls, help mother, cook dinner, clean house, talk a lot, never hit, and say 'I need some help'; they also believe that boys like to play with cars, help father, build things, and say 'I can hit you' [Weinraub et al 1983, page 34].

The careers that children imagine for males and females are influenced by sex stereotypes. By the age of three years, most children "know that girls will grow up to clean the house, be a nurse, or be a teacher, and boys will grow up to 'be boss'" [Weinraub et al 1983, page 38]. These stereotypes affect the careers that children picture for themselves:

Even preschool children express future aspirations along sex-stereotyped lines. Both preschool and elementary school girls choose a
parenting role significantly more often than boys (Looft, 1971; Vondracek & Kirchner, 1974). In addition, the range of occupational choice is more restricted for girls, with nurse and teacher being the most popular answers (Vondracek and Kirchner, 1974; Beuf, 1974). Boys' choices include more action oriented occupations (police officer, sports superstar) and more prestigious careers (doctor, public servant, pilot).

Taking the question one step further, Beuf (1974) asked children 3 to 6 years of age what they would do if they were of the other sex. Approximately 70 percent of the children replied with a job considered appropriate for the imagined sex. More interestingly, boys frequently imagined themselves as nurses and girls imagined themselves as doctors when asked, ‘What if you were a girl (boy)?’ Several girls confided that they really would prefer to be doctors rather than nurses when they grew up, but couldn’t because they were girls [Weinraub et al 1983, page 44].

Thus, from an early age, girls and boys learn to think of most careers as being appropriate for either men or women but not both. This will influence not just their career choice but how they view males and females aspiring to “inappropriate” roles.

Unfortunately, these stereotypes are so pervasive that it is difficult for unprejudiced parents to prevent their children from accepting the stereotypes:

- A female computer scientist told me:

  We ... have a rather non-traditional household, and I'm surprised at how traditional my two daughters seem to be turning out.

  Both my husband and I work full-time, but when we are home, [John] does almost all the cooking (I make a meal maybe once every three weeks), he cleans up after himself while cooking so I don't do much of the cleaning in the kitchen, I do the laundry (sometimes), and we let everything else go until a friend comes to clean our house and dig us out from under the laundry I never can seem to get to....

  [Once,] I asked my 5-year-old who did most of the work around the house, me or her daddy. She said “you”. Now, this kid is totally guileless — she has not learned yet how to say one thing to one person and another to another, so I'm sure she wasn't just telling me this because I was the one who asked the question. So I said, “What kind of work do I do around the house? In the living room, in the kitchen?” She said, “You clean the kitchen.” I couldn't believe it! I might have believed her if she said I occasionally picked up in the living room — but
cleaned the kitchen? Her dad's domain? Where did that come from???

- Another parent reported:

  When our daughter was very young — about 3 years old — we audiotaped an interview about what she would be when she grew up. After mentioning a number of possibilities my wife said, 'What about a doctor?' Jessica replied, 'Yeah, I could be a doctor.' Our son who was 5 at the time interrupted saying, 'I think you mean a nurse.' 'Yeah, a nurse,' Jessica said. My wife said, 'She could be a doctor if she wanted,' and our son replied, 'I don't think so...I've never seen any, at least not in Iowa.'

Stereotypes also exist specific to the computer world. One paper reports:

We have even found that some young children believe computer games and computers are for boys. In one nursery school, Pratto (1982) asked girls and boys aged 3 to 5 to name the toys they played with. Both girls and boys reported that boys played with Atari; it was never mentioned as a game for girls. We returned to that school and asked 42 children whether they thought computers were for girls, and then we asked whether computers were for boys. Most children answered this question. Although the majority thought computers were for both genders, the boys were not as sure of this as were the girls (71% of the girls and 57% of the boys). Of the minority, more children thought computers were for boys only (14% of the boys and 11% of the girls) than thought computers were for girls only (7% of the boys and 4% of the girls) [Kiesler et al 1985, page 456].

The point of this section can be illustrated by the following incident:

A group of parents arranged a tour of a hospital for a group of twenty children: ten boys and ten girls. At the end of the tour, hospital officials presented each child with a cap: doctors' caps for the boys, nurses' caps for the girls. The parents, outraged at this sexism, went to see the hospital administration. They were promised that in the future, this would be corrected. The next year, a similar tour was arranged, and at the end, the parents came by to pick up their children. What did they find, but the exact same thing — all the boys had on doctors' hats, all the girls had on nurses' hats! Steaming, they stormed up to the director's office and demanded an explanation. The director gently told them, 'But it was totally different this year: We offered them all whichever hat they wanted'” [Hofstadter 1986, page 156].
1.1.4 The Effects of Stereotypes on Teachers and Advisors

Additionally, stereotypes influence people who advise students, such as their parents, guidance counselors, and teachers. For example, [Stewart et al 1989] showed that, when given artificial case studies, high school teachers were more likely to advise male students than otherwise-identical female students to take courses that would prepare them for post-secondary institutions. Another study showed that high school girls “said that they had chosen business and commercial courses in order to prepare themselves for clerical jobs because they believed these were the jobs open to women” [Stewart et al 1989, page 261]. In response to a survey of female scientists,

[M]any women felt they had been given inadequate advice on careers and choices of subject — careers advisers seemed to be fixated on nursing and teaching, and some were completely floored by requests for information about nuclear physicists or process engineers [Ferry et al 1982, pages 27–28].

Interviews with high school guidance counselors yielded similarly prejudiced advice to girls:

A counselor in her early 30’s: ‘Well, if they bring me their registration card with (an AP [advanced placement] science course) listed I'll check to see if that's really what they meant... but I would never encourage it. I mean, it's usually their last year and there are so many fun things going on. I think they'll be busy enough and they can get into the serious work in college.'

A counselor in her 20’s: ‘I just hate to see a girl get in over her head. I always try to place students at a level where I know they'll be successful. I mean, wouldn't it be frightful to spoil a beautiful record by doing poorly in a course your senior year.’

A male director of guidance, mid-forties: ‘Sure, I'm for the AP Program in general, but not for encouraging girls in science necessarily. Have you looked at the Bureau of Labor Statistics? It's a contracting market. There are men with Ph.D.'s in physics all over the place who can't get jobs. Why should we encourage girls? Why, if they're successful, they'd be taking jobs away from men who need them. No, it wouldn't be fair to the girls' [Casserly 1979, page 12].

Unfortunately, as the author of the interviewer goes on to report, “these comments were chosen not because they were unique but because they represented all too commonly the attitudes of the counselors in many schools”.

Additionally, even when girls are in science classes, teachers sometimes treat them differently, as shown by the following remarks from an interview of junior high school girls:
So this teacher came down from the high school to give a demonstration in physics and said, 'Now this is going to make a pretty big noise, so any of you girls who don't like loud noises better cover your ears.'

He said, 'Now this is going to be dirty so we'd better have a boy do it.'

And he (a high school science teacher performing a demonstration to a sixth-grade class) said, 'Now this will help you boys who fix your own bicycles, so pay attention!'

(See also [Marriott 1991] and [Hall 1982].) The girls then go on to describe the difficulties they had in getting their parents to buy them tinker toys and chemistry sets, which are routinely bought for their brothers [Casserly 1979, page 9].

1.2 Ways that Males and Females are Treated Differently

In addition to the people who consciously believe women less capable, there are those who acknowledge that women can succeed at engineering but consider female engineers to be "somehow suspect" [Turkle 1984, page 200]. I will examine several aspects of this problem: First, based on their preconceptions of women, people often exhibit subtle forms of subconscious bias that cause them to treat women differently from men. Second, men and women are often held to different standards. Strange as it sounds, behaviors — such as succeeding — are sometimes considered attractive in men but not in women. Third, there is something about our culture's view of male-dominated fields such as engineering that causes female aspirants to be considered unattractive.

1.2.1 Subtle Bias

In [Sandler 1986, Sandler 1988, Hall 1982], there are summaries of several studies of subtle, subconscious bias — that is, people observably acting in a biased manner but unaware of their doing so. I was apprised of the importance of subtle bias by the number of respondents who objected to my call for "egregious examples", writing that they thought the subtle behavior to be more damaging. [Hall 1982, Sandler 1988] report the following biases, of which both men and women are guilty:

- Women are interrupted more than men.
- Faculty members make eye contact with male students more often than with female students.
Faculty members are more likely to know and use the names of their male students than of female students.6

Women are often asked fewer or easier questions than males. As Sandler writes, "Singly, these behaviors probably have little effect. But when they occur again and again, they give a powerful message to women: they are not as worthwhile as men nor are they expected to participate fully in class, in college, or in life at large" [Sandler 1988, page 149]. Unfortunately, the message appears to have sunk in. Studies have shown that, when engineering students are asked to predict the academic performance relative to that of male and female colleagues, "both sexes anticipated that men would outperform women. This was paradoxical, since the average female student had both a higher grade point average and higher class rank from high school than the average male" ([Ott 1975] in [Zappert et al 1984, page 4]). Another study found that, when male and female college students were asked to predict their midterm test score before taking it, men had higher expectations for themselves than women did for themselves, even though the two groups actually performed the same [Erkut 1983, page 229]. Studies have found that women are more likely than men to attribute success to luck instead of skill [Deaux et al 1974] and to attribute failure to lack of skill [Ernest 1976, page 599]. Women's lack of confidence, and one consequence, is illustrated by an incident at Columbia, reported by Professor Joan Birman:

I learned last year, to my astonishment, that for about four years running the honors calculus course had been all male, in spite of the fact that admission was based on an open competitive examination. This fall, one of the senior mathematics majors and myself made an intensive effort to encourage women to try the exam! The typical answer was, 'I know I won't pass it,' — to which we replied over and over, 'Well, if you try it, at worst you will confirm what you already know, and only an hour of time will have been lost.' After three days of such advising, the big day came, the exam was given, and this year the class has five men and five women! [Ernest 1976, page 604].

Not surprisingly, girls at single-sex schools study physical science and math more than in comparable coed schools, "even though girls' schools frequently have less adequate laboratory provision than mixed schools" [Kelly 1982, page 497]

Even more ominously, [Sandler 1986, page 6] reports:

In one study, first done in 1968 and then replicated in 1983, college students were asked to rate identical articles according to specific

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6The experience of women I have talked with is that if females are in an extreme minority, they stand out so much that the teachers are likely to know their names.
criteria. The authors' names attached to the articles were clearly male or female, but were reversed for each group of raters: what one group thought had been written by a male, the second group thought had been written by a female, and vice versa. Articles supposedly written by women were consistently ranked lower than when the very same articles were thought to have been written by a male [Goldberg 1968, Paludi et al 1985, Paludi et al 1983]. In a similar study, department chairs were asked to make hypothetical hiring decisions and to assign faculty rank on the basis of vita. For vitae with male names, chairs recommended the rank of associate professor; however, the identical vita with a female name merited only the rank of assistant professor [Fidell 1975].

Anti-female bias is strongest in traditionally male fields [Top 1991, pages 96–97]. When discussing the results of such studies with fellow students, I found that the males have tended to be more surprised than the females, because many females recalled specific instances of biased behavior, several categories of which are represented below.

In some cases, a woman was viewed as less serious than a man in a similar position:

- A female computer science graduate student had the following experience:

  I was working at a fairly small company whose communal coffee was awful. A group of 6 of us (4 men, 2 women) bought our own coffee maker and had decent coffee which we paid a few cents for to defray the costs of coffee and cream. Anyway, I usually bought the coffee and my male coworker usually bought the cream. A new member to the group (male) approached me and told me we were out of cream. I told him that M2 usually bought the cream. Later that same day, M1 again comes up and tells me we are out of cream. I once again tell him that M2 gets the cream. To this he says, 'But how can I bother M2 with something as insignificant as buying cream?' Needless to say, I told this fellow exactly what I thought about that...

- One female graduate student in mechanical engineering sent the following two stories:

  1. When I first started the [graduate] program, the head of the department (male) was assigning desks to graduate students... ([T]here were two entering females to the particular program at that time.) As he ran out of desks, he said, 'Well, just put the girls together on a desk.'

  2. That same professor put me (a newly graduated math major) into the slower (undergraduate) statistics class, and put a guy who had had
a vague introduction to stats 8 years earlier in the faster (graduate) class.

Both events took place in the past two years, a time period which she has found “very frustrating”.

- A female computer consultant wrote:

Most of our users ask for and accept help from whichever consultant is available, but some insist on talking with one of the male consultants (only 2 of the 10 consultants are male). One user persisted at this, even after Alan explained to her that he didn’t know the package she was working with, and that she would be better off asking me because I specialize in that particular software. Another user did ask me her question, but when she didn’t like the answer I gave her (I explained what she could not do and why), she insisted on taking her problem to David (a higher authority?), who proceeded to tell her exactly what I had just explained. What is interesting about the latter incident was that she did not seem to be after a second opinion, because she could have gotten that from a number of people (all female). She apparently specifically wanted a male opinion.

- When a female computer science undergraduate visited one of the graduate schools to which she had been admitted, she and a male prospective student met with a male graduate student to discuss the school. Whenever the woman asked a question, the graduate student directed his answer to the male prospective instead of to her, i.e. by making eye contact and gestures toward the male prospective. This treatment surprised the woman, as she had not encountered such behavior at her undergraduate institution. After the meeting, she delicately pointed out the behavior to the graduate student, and he apologized profusely and sincerely, clearly unaware of the bias while it was occurring. When they met later in the day, his behavior was markedly better. The same woman, however, in a later meeting with two other graduate students, one male and one female, found herself addressing most of her questions to the male until she recognized her behavior and corrected it.

1.2.2 Different Expectations for Men and Women

The following examples show how people sometimes expect women to be less interested or competent in technical areas than they actually are:

- According to a survey of female scientists:
Women in mainly male environments are always being taken for secretaries or junior laboratory staff: queries may be addressed to a male technician rather than his female boss. An engineer offering to help a telephone caller was told 'No dear, this is a technical enquiry. Can I speak to someone who can help me?' [Ferry et al 1982, page 28]

- A female computer science professor told me this story:

  I was visiting a university and arrived before my (male) host. I approached the departmental receptionist to try to make certain arrangements. In one case, I suggested that my host might have made some provision — 'or,' I said cordially, 'maybe not.' 'Oh, probably not,' replied the receptionist. 'After all you know those professors...' Boy was her face red when she realized what she’d said.

- A female undergraduate at a women’s college wrote:

  The summer after my first year at [X] I took Linear Algebra at [a coed college] nearby. Out of probably twenty people in the class, I was one of two women. I found that the mood of the class was stifling. It was obvious that the men of the class expected me to sit quietly in my chair and contribute nothing and ask no questions. It was also made obvious to me that, in general, they felt they were far superior to me. Because I had had no contact with them outside of the classroom, I must assume they were basing their decision solely on the fact that I am female. In addition, I found the material relatively easy and was getting an A in the class, so they could not be basing it on my academic performance. One day as we were going over a difficult problem set we had had for homework, the professor asked if anyone was able to do a particular problem which I had been able to solve. When I raised my hand, [a student made] the comment ‘What?!?! How could you have solved that problem?!?!’ He in no way hid his hostility or his feelings that if he, a far superior man, could not solve the problem, I could

1It is fascinating to read about how female professionals and secretaries interact with each other. One professor reports that she used to sneak to the typewriter and type her own letters, rather than ask a secretary to do the work for her. Correspondingly, secretaries generally do not like to work for women. "They experience women’s authority as 'unnatural', whereas men's authority is taken for granted" [Pringle 1989, page 58]. Additionally, as hinted by a comment in [MIT 1983, page 21], female secretaries feel demeaned when female professionals complain about being mistaken for secretaries. On the other hand, most of the secretaries I have worked with have treated me the same as they treated my male colleagues, and one has even told me outright how happy she was to see women as computer professionals.
I was completely shocked that he could make such a comment. No one else seemed to be. It is no wonder that women tend not to contribute in a male-dominated classroom.

- A female computer scientist sent me a copy of the cover of a prestigious computer periodical that showed a family (parents and a boy) looking at a computer. A bubble next to each shows what they are thinking. The mothr is imagining her son using the computer to learn math and the father using it to figure taxes. The son and the father both imagine using the computer to play space war games.8

These diverse examples illustrate how women are sometimes treated as less capable or interested in technology than men, instead of being treated as individuals. Of course, there exist professors and administrators who treat their male and female students equally as well or even devote extra effort to encouraging women. However, negative events are still common enough to be of substantial concern. Moreover, the above behaviors are the symptom of a more fundamental problem: lower expectations for females. Many of the above events are too blatant to have the insidious effect of subtle discrimination (which probably accompany them). Even if the perpetrators could be coerced into not so openly displaying sexism, it would not eliminate the fundamental biases which would be displayed less directly.

1.2.3 Different Standards for Men and Women

As Sandler writes, the same behavior is viewed differently in women than in men:

He is ‘assertive’; she is ‘aggressive’ or ‘hostile’. He ‘lost his cool’, implying it was an aberration; she’s ‘emotional’ or ‘menopausal’.

Thus, her behavior is devalued, even when it is the same as his

[Sandler 1988, page 151].

This claim can be illustrated by a recent lawsuit by a woman who “repeatedly heard that she had not been given a partnership at [a] huge accounting firm because she was too macho, universally disliked and in need of ‘a course at charm school’” [Lewin 1990]. This is despite having brought in more business than any of the other 88 candidates for partnership. “Comments from the lawsuit [say] that she should wear makeup and jewelry and learn to walk, talk and dress ‘more femininely’” [Lewin 1990]. A survey of female scientists found:

Most think their male colleagues are more forceful and aggressive than they themselves want to be; some have resigned themselves to low status rather than changing their personalities, while others

have decided to fight with men's weapons — and are often labeled unfeminine as a result [Ferry et al. 1982, page 30].

One study found the same behavior judged more harshly in female professors than in males:

[According to] Susan Kay's classroom studies... male students were far more likely to give lower ratings to those female faculty perceived to be hard graders... This finding is consistent with a series of experiments at the University of Dayton that indicated that college students of both sexes judged female authority figures who engaged in punitive behavior more harshly than they judged punitive males... ([Martin 1984, pages 484-485] in [Koblitz 1990]).

See also [Kierstead et al. 1988] and [Bennett 1982].

A “halo” effect seems to exist where people tend to interpret behavior according to their preconceptions. The same action is often interpreted differently, depending on whether it is performed by a woman or a man, as the following stories illustrate:

- When a high-ranking female engineer was at the airport to make a business trip, she saw a male acquaintance who worked for the same company. He asked where she was going, and she answered San Francisco. He then said something like, 'Oh, going to do some shopping?' She told me how angry his remark made her, as she works extremely hard at the company, putting in long hours and taking frequent business trips, with too little free time for her to go on out-of-state shopping trips even if she were inclined to do so.

- A female computer science graduate student told me that it is common to see different reactions to men and women dropping a class. According to her, when a woman drops a class, people remark that the class must have been too difficult for her; when a man quits, people say he must not have found it interesting.

These examples are troubling because they show one way in which stereotypes are perpetuated. In each case, someone interpreted the actions of a woman based on their prejudices, reinforcing their own stereotypes.

Additionally, women at American universities are often the victims of other cultures' stereotypes. Foreign nationals outnumber Americans as students in doctoral engineering programs [Widnall 1988, page 1740], and there are many foreign-born professors. In one survey, female graduate students at MIT “reported that foreign-educated faculty — many from cultures where women are not held in high esteem — pose problems for women in graduate programs, both in class and in research” ([MIT 1987] in [Baum 1990, page 49]).
1.2.4 Career-Related Success Unfeminine

Not only are some strong traits considered unfeminine, but “femininity and individual achievement continue to be viewed as two desirable but mutually exclusive ends,” a shocking position argued in [Horner 1970, page 46], based on empirical research and interviews. In one of Horner’s studies, females were given the sentence “After first-term finals, Anne finds herself at the top of her medical school class.” Males were given a similar sentence with a male name. Subjects were asked to write a story about the student. While only 8 of the 88 male subjects exhibited fear of success through negative stories, 59 of the 90 females did. Horner divides the negative stories into three categories and includes sample stories, of which I include a subset:

1. Fear of Rejection — “Anne doesn’t want to be number one in her class. She feels she shouldn’t rank so high because of social reasons. She drops down to ninth in the class and then marries the boy who graduates number one.”

2. Concern about Normalcy or Femininity — “Anne is completely ecstatic but at the same time feels guilty. She wishes that she could stop studying so hard, but parental and personal pressures drive her. She will finally have a nervous breakdown and marry a successful young doctor.”

3. Denial — “Anne is really happy she’s on top, though Tom is higher than she — though that’s as it should be... Anne doesn’t mind Tom winning” [Horner 1970, pages 60-62].

Additionally, when questioned about Anne, “[m]ore than 70% ... described Anne as having an unattractive face, figure, or manners” [Horner 1970, page 63]. Females thus consider success to lessen their femininity, a sacrifice many are not willing to make [Horner 1970, pages 69-72]. See also [Mednick et al 1975].

This attitude can also be illustrated by the following incident, reported in [Franklin et al 1981, page 20]:

One woman earned high grades in a traditionally male field. Her professor announced to a mostly male class that this represented an unusual achievement ‘for a woman’ and was an indication, first, that the woman student was probably not really feminine, and, second, that the males in the class were not truly masculine, since they allowed a woman to beat them.

Instead, the proper area for a woman’s success is seen as her ability to attract high-status men. In a study for the National Institute of Education, researchers Holland and Eisenhart found:

Men’s prestige and correlated attractiveness come from the attention they receive from women and from success at sports, in school
politics, and in other arenas. Women's prestige and correlated attractiveness come only from the attention they receive from men [Holland 1990, page 104, emphasis in original].

This attitude is exemplified by the way one college woman attempted to insult another: "[You] may be able to do calculus, but I'm dating a football player" [Holland 1990, page 104, brackets in original]. The study found that female friends often did not even know each other's majors [Holland 1990, page 14], although they spent large amounts of time together discussing other matters, primarily boyfriends [Holland 1990, page 14].

1.2.5 Implications of Gender Double Standards

The double standards discussed above should be a significant concern. Aggression, competitiveness, and even some brashness are necessary for a graduate student, for example, who must compete with other students for equipment, funding, and attention from professors. One doesn't get far by politely waiting to be noticed or for other people to stop using the computer. In her paper on being a female graduate student at MIT, Candace Sidner addresses some stumbling blocks women face:

Receiving an advanced degree, in fact, any degree, from MIT is rather like being admitted to a fraternity. One has a certain set of rituals to go through, and both the process and one's performance define one's position in the fraternity in the years that follow....

It surprises no woman to say that women are socialized differently than men in our cultures. What is surprising is the effect of that socialization when women take roles traditionally held only by men. The most significant role change centers on developing confidence and competence. Part of the process of hurdle jumping is not just the getting over, it is the form which one presents in doing it. For the MIT fraternity ritual, the form is confidence; a woman student must use what I call strutting behavior, that is, she must look and act like she knows what she is doing.

While developing confidence from accompanying competence, is difficult for all initiates, for women there is a subtle, but remarkable difference; women in the everyday world are not supposed to appear very confident and competent.... As a result, women must not only build and show confidence and competence, just as their male counterparts do, but unlike the men, they must decide first to unlearn their normal behavior patterns....

The strutting behavior appears slowly; there are stops and starts, forward and backward progress. A woman student begins to act from a little bit of confidence in her competence, and tests out this confidence among her peers and superiors. Two more difficulties
follow. First, a woman feels less feminine, because in fact she is less feminine according to the prevailing behavior patterns. In her personal life, her feelings may be communicated to her partner(s) who may find her less attractive. This threatens her personal status. Eventually a woman can learn to find personal friends who value her confident image, but the time in between is frightening [Sidner 1980, pages 2-3].

Empirically, a comparative study of male and female Stanford graduate students in technical areas [Zappert et al 1984] found that women were less self-confident and assertive than their male peers:

[W]omen less frequently than men reported that they felt free to disagree with their advisors...and that their ideas were respected by their advisors [Zappert et al 1984, page 9]....

[W]omen more often reported having trouble saying “no” and in giving criticism. Women also more often reported having difficulty sticking up for themselves and tended to let annoyances pile up [Zappert et al 1984, page 12].

1.2.6 Specific Stereotypes Against Female Engineers

As if the culture-wide inhibitions to success were not enough, there are additional barriers in engineering. Nowadays, high school girls from middle- and upper-middle-class families are expected to go to college and to do reasonably well, but going to a technical institute or majoring in a technical field is still considered unfeminine, as these anecdotes indicate:

- When a female student at an engineering institute went home for vacation, her mother leafed through the book of photographs of the freshman class and exclaimed in surprise, “Why, some of these girls are pretty!”

- A male computer professional wrote:

  Back in 1983, I was a freshman here at [X] and one of my friends was a genius who happened to be a pretty blonde girl....

  She was also a freshman and spent one of her first days here searching for her advisor’s office. While hunting around [Y] Hall, a man in his early 30’s came up to her and asked if she needed help. She said that she was looking for her advisor’s office. The man responded with a puzzled, ‘What major are you?’ When she answered, ‘I’m in Electrical Engineering.’ The man smiled at her and oozed, ‘Oh, you’re far too pretty to be an EECS major.’ [She] immediately left and told us in the dorms about this slimy guy.
The next day we went to our first lecture for [the introductory computer class]. [She] gasped as one of the lecturers entered the hall. He was the same slimy guy she had encountered the day before....

I'll never forget the quote, "Oh, you're far too pretty to be an EECS major." 9

- A male computer professional wrote:

I used to teach undergraduate computer science classes, and saw a number of cases in which very promising and talented women abandoned computer science, much to my disappointment since they were some of my better students.... At least where I was teaching, the discouragement from that field was given more by other women, particularly in the sororities, rather than from within the field itself.

It is worth repeating, however, that the stereotype of male engineers is almost as bad. Jokes and television portray male engineers as unattractive, unpopular, awkward, and either unsuccessful with or uninterested in women. 10 However, I believe that in our culture, females are more susceptible to such stereotypes. This is in large part because, as described earlier in this chapter, femininity is considered to be at odds with success, while masculinity is not.

While the stereotype that female engineers are inherently unattractive seems to be without rational basis, scientific fields may well be in conflict with some values traditionally thought of as feminine and currently held by a majority of females. The situation seems not to have changed since the following was written:

I think [women's lack of achievement] comes from the general orientation of girls, young women, and even older women, toward 'others' (in David Reisman's sense of being 'other directed'). Women are constantly urged to consider 'Am I doing the right thing?' and 'What shall I be or do that will please my husband, children, and parents?' Occupational success never comes out as the positive answer to these questions. Pleasing others and doing the 'right thing' always means holding back, and retreating from a position of strong ambition and career commitment [Epstein 1974, page 15].

I would add that being other-directed might steer women away from objective sciences into the humanities and the more people-oriented social sciences. Thus,

9 In a later note, the writer added: "[The teacher] was fired two years after this incident. According to my advisor at that time, his attitude toward female students was one of the reasons. (He was not tenure track. He was a lecturer only.)" This story was later confirmed by a former professor from the university.

10 See [Turkle 1984] for an interesting discussion of the male engineering student's self-image.
the values that are encouraged in women would not only make them less career-oriented but more likely to avoid the sciences.

1.3 Summary

In our society, males and females are regarded very differently. Assertiveness, confidence, and high achievement are considered consistent with masculinity but not with femininity. In addition to the stigma associated with success in general, technical fields are considered particularly unattractive for females. These factors can influence a girl not to pursue an interest in math or engineering, and they can sabotage a woman's career because either she acts feminine, e.g. demure, and is not taken seriously, or she acts masculine and is met with disapproval. Of course, as mentioned in [Sidner 1980, page 3] and [Horner 1970, page 70], confident females eventually find male and female friends who like and respect them. The problem is thus not insurmountable. Still, it is an additional barrier that females face, and the playing field will not be level while these stereotypes exist.
Chapter 2

The Masculine Environment

I do not see that the sex of the candidate is an argument against her admission... After all, we are a university, not a bathing establishment — David Hilbert, arguing unsuccessfully for the appointment of Emmy Noether to the faculty at Göttingen.¹

Currently, the majority of professionals in computer science departments and workplaces are male. As a consequence, these places often have masculine environments in which women feel uncomfortable or unwelcome. The behaviors described in this chapter are generally not meant to be harmful to women, which makes the participants often hostile toward criticism. Such behaviors include the display of nude pictures, discussing sex, telling dirty jokes, and expressing negative stereotypes of women in an attempt at humor. Additionally, other activities are morally faultless, such as coworkers playing basketball together, but they may tend to make a woman feel less part of the group if she does not enjoy the same activities.

2.1 Sexist or Sexual Humor

Often, men make sexist or sexual remarks in attempts at humor. As the following examples show, this happens in classrooms, computer magazines, and at conferences. In most of these cases, the speaker probably means no harm. However, the behavior makes some women feel uncomfortable. In order to highlight the effect such statements have on women, their reactions have been included where available.

• A female graduate student had the following experience:

[A professor] in the introductory part of a guest lecture on robotics to the graduate core AI class: (approximate quote) 'Pretty soon we'll have robots that are sophisticated enough to wander around in shopping malls and pick up girls.' I didn't listen to the rest of the lecture, so I don't know what else he had to say.

• A female computer science professor wrote:

When I was in graduate school, the professor in automata theory introduced the topic of decomposition by saying: 'Machines are a lot like women — many forms for the same function (wink wink).’ As the only woman in the class, you can imagine that I felt terrific. And all of a sudden the guys sitting next to me sort of tensed up — instead of a fellow student, his remark had made them see me as something else, something kinda dirty.

• The narrator of the industry gossip column in the trade journal Infoworld is an adult male with a young girlfriend Pammy, shallow and uninterested in computers, whose silly statements and actions pad the columns, such as her return to beauty school. ("[A]t 21 she's older and can handle the pressure now.")

• A female computer science professor wrote:

[A]t a conference in France, a male speaker (French), who was speaking about the importance of testing, showed an overhead slide of a naked woman with a caption of the sort — 'Would you buy this product without testing it first?' There were only 2 or 3 women in the audience (of about 150), but I had fleeting feelings of having accidentally walked into a stag party and wondering if he had either not expected any women to be there or had discounted the importance of directing his remarks to the women in the audience.

What these examples all share is that the male speaker or writer was attempting to make a cute statement but that females (and some males) had negative reactions.

2Cringely, Robert X. “Notes from the Field”. Infoworld, September 17, 1990, page 108.
2.2 Sexual Displays and Discussions

2.2.1 Different Reactions

At the workplace, many women feel uncomfortable with the “locker room atmosphere”, which includes pictures of nude or partially nude women on posters or computer screens and the telling of dirty jokes. Unlike the sexist remarks described above, however, there is disagreement among women on how inappropriate these actions are, with a significant number of women not personally offended by the behavior (although some of these women oppose it on the grounds that it upsets other women). This point is illustrated by the different reactions in the following examples:

- When a graduating engineer was touring a company that wanted to hire her, they took her through the laboratory, which had a pin-up on the wall. The other people in the lab (men) and the men showing her around seemed oblivious to the poster and to her discomfort. She felt uncomfortable with the idea of working in a laboratory with a picture like that up and ended up refusing the offer, partly for this reason.

- When a graduating computer scientist was taken out to lunch by engineers of a small computer company, one of the topics the employees (all male) discussed was a series of lingerie shows in the region. The student did not feel uncomfortable about the subject matter, and it did not affect her decision about the company, but she thought it was something which might make other female interviewees uncomfortable.

- When a computer science undergraduate had recently begun working in a research group at her university, some male graduate students entered the office and began playing an “adult” computer game, “Leisure Suit Larry,” crowding around the screen, discussing the game loudly. The undergraduate left the office because the situation made her too uncomfortable for her to work there. When she recounted the story a year later, she said that she would not react the same way now and would either be able to keep working or would say, “Hey, get out of here, guys.” The change was due to her feeling more confident about her position in the group and knowing the individuals personally.

One female computer science student explained one reason that some women are offended by sexual humor while others do not understand what the fuss is about:

I have noticed that how offended I am by [gender-related humor] depends very strongly about how comfortable it is to be female and in the present environment.
When I first entered grad school in the CS [X] group at [Y], there were some women graduate students, but only a couple. A secretary deliberately placed me, when I arrived, sharing a desk with a male graduate student who was at that time desperately trying to find a woman (she was trying to be nice) — a professor had a 'funny' newspaper article about [a sexual topic] posted outside his door. Don’t get me wrong, I found nearly no-one among the faculty and graduate students who was anti-women or took me or my work or my concerns any less seriously than any other first-year student. Still, the graduate students were 90 percent men, and they talked all the time about how hard it was to meet 'available' women, and as a first year student trying to establish myself within their community, I found the 'locker room' atmosphere oppressive and daunting. If someone had sent around [a sexist joke through email] that year, I think I would have hit the roof. In a world where I was struggling to find my place, it would have just helped to undermine it.

Today the graduate student population in CS [X] has quite a few more women, and is much more comfortable. Instead of the "guys" in school here, it's the 'people' in school here.... In my current environment I might have easily [passed along the joke] to my [male] office-mate.

2.2.2 Attempts at Changing Behavior

Some computer science graduate students and staff at Carnegie Mellon were sufficiently disturbed by the display of nude pictures as backgrounds on computer terminals that they got together and tried to change the situation by publicly appealing to the community. [CMU 1989] is a fascinating report describing their appeal and the friendly and hostile reactions. Their appeal included the following passage:

When a woman sees such a display on your workstation, is she likely to believe that you take her seriously as a fully contributing member of the department? Rather, she may feel that you could be a source of sexual harassment, and feel hostile towards you, or nervous about working with you. If so, that is a loss for you, for her, and for all of us. Among the visitors to the department, some of whom are prospective students, staff, or faculty, there are surely some who will view us as unprofessional if they see these displays, and this hurts us all, too. Conversely, an environment more hospitable to women — specifically, one in which relations between women and men are less strained — is of clear benefit to men as well.

For some people, displays of naked women on workstations, or elsewhere in offices, remind them of the forces in our culture that view
women as sexual playthings, not as men's peers. For others, such reactions do not occur. People who are offended will interpret such displays as derogatory, even if that is not your intent. We therefore ask you to refrain from using them out of respect for those who are offended, even if you believe the offended people are just overly sensitive [CMU 1989, page 2].

The appeal closed by making clear that they were not advocating banning such displays but were requesting that people voluntarily remove them out of sensitivity to others. Responses about the appropriateness of the displays and of the appeal were mixed and are categorized in the report. Negative reactions included the position that the writers were advocating censorship “like the Nazis or the Ayatollah Khomeini,” that people should not be asked to change their behavior merely because of what others might think, and that a public appeal was inappropriate but instead should have been made by individuals to individuals. Of those agreeing, the majority of responses said that the request was reasonable and not an attempt at censorship, that it prevented people from unintentionally giving offense, and that it was effective at raising consciousness. In response to the criticism that individuals should complain personally, several women wrote that “[w]omen asking for changes in behavior individually are exposed to ridicule and abuse” [CMU 1989, page 4]. This point was echoed by a woman quoted in a paper about the “Garden”, a laboratory in the MIT Media Lab:

[W]hen comments are made about the offensive nature of the music or movies, they are often ignored, or belittled, or are chortled at. Ironically, once you are labeled a feminist in the Garden, your comments are taken less seriously, because you are considered radical and your judgment less fair [Tidwell 1990, page 14].

Both the Carnegie-Mellon and Garden papers conclude that the attempts at changing people’s behavior were somewhat, but not highly, successful.

2.3 Behavior Due to Sex-Correlated Differences

An additional category exists of behavior that is not directly based on sex but which nevertheless discourages women. While attempts at changing sexist behavior are partially effective, there seems little that can be done about this category.

2.3.1 Socializing with Co-workers

Through no real fault on any side, a woman sometimes feels out of place being one of the few women in a semi-social gathering with a group of men, even in
the absence of any behavior directly related to the sex of the participants. One reason is that, in our culture, men are often interested in activities or topics that women tend not to relate to.

A female graduate student complained about her experiences as a teaching assistant (TA) for a course in a particularly male-dominated area of computer science. She wrote:

Perhaps because the percentage of males is often high, men tend to dominate non-academic discussions with topics of interest to them, such as sports and cars, topics which women are often uninformed about or uninterested in. The resulting inability to participate in discussions can make it difficult for women to bond socially, and often leads women to feel outright alienated... This is exactly what happened to me at each T.A.-faculty meeting.

Another female computer science graduate student described a similar experience:

My first summer at [a certain computer company], I worked in a group that was otherwise all male. While I got along okay with them and never had any behavior to complain about, I didn't socialize with the group. For example, every day after lunch, they would go outside to 'shoot some hoops' [play basketball], an activity that I just did not relate to. For my next summer, I joined a group that had other female programmers and a female manager. I was much happier in that group. We would have barbecues, celebrate people's birthdays, and socialize in other ways that I related to better than 'shooting hoops'. My third summer, I chose to return to this group and not to the first one or to find a new group.

However, when she casually discussed her social dissatisfaction in an exit interview with the department head, he pointed out that, coming from a different country, he did not relate to American sports either. This raises the important point, which holds for all examples in this section, that dissatisfaction with certain activities is not strictly divided by sex. There are individual women who enjoy sports and are better at them than some men. Sex-based differences are a tendency, not a fixed rule. Sex-correlated preferences in our society, however, are strong enough that these phenomena tend to work against women (or whoever is underrepresented in a group).

Additionally, female group members do not always feel comfortable joining male group members who go out drinking together. Not only might they not enjoy drinking, but some men are inclined to making lewd remarks after a few drinks. Thus, there are often times when women feel unable to take part in activities to which, as group members, they are invited.

Another problem is that some men do not feel comfortable socializing in a professional manner with a woman, as this anecdote illustrates:
I was ... the first full-time woman faculty member in my department. There really was difficulty among my male colleagues in associating with a woman as a colleague. I think they literally did not know how to talk to me, and as a consequence often just did not talk to me. They would ignore me. They would not invite me to have lunch with them, which was a very ordinary experience there ... they would walk past my office and ask the next person and never ask me. [Years later] I asked one of my colleagues why this was so. And he said, 'You know what would happen if I asked you to lunch ... People would talk' ([Clark et al 1986, pages 36-37] in [Sandler 1986, pages 7-8]).

2.3.2 Different Communication Styles

The language that women use often differs from that of men in subtle ways. As discussed in [Hall 1982, page 9], specific constructions appear more frequently in women’s speech than in men’s:

- hesitation and false starts ('I think...I was wondering...')
- high pitch
- ‘tag’ questions ('This is really important, don’t you think')
- a questioning intonation in making a statement ('The second chapter does most to clarify the theme?')
- excessive use of qualifiers ('Don’t you think that maybe sometimes...')
- other speech forms that are excessively polite and deferential ('This is probably not important, but...')

As Hall concludes:

If, for example, a woman student begins her comments hesitantly and uses many qualifiers, she may be immediately perceived by her teacher and by her classmates as unfocused and unsure of what she wants to say. Her ‘overly polite’ style may seem to ‘invite’ interruptions by, or inattention from, both teacher and other students. Indeed, even the most insightful points made in this manner — especially by a woman — may be taken less seriously than the identical points made by a man or delivered in a more ‘masculine’ assertive style [Hall 1982, pages 9–10].

See also [Lakoff 1975].

A large part of Jenifer Tidwell’s report on the Garden [Tidwell 1990] describes how men and women react differently to the same treatment, due to their expectations of communication styles:
The persons I interviewed did not believe that women were treated worse than the men were, nor vice versa, when I asked them directly. ('Everyone is treated equally badly,' said one male informant.) Yet some informants, both male and female, commented that women may not be able to deal with the Garden's harshness as well as the men do — not because of any inherent weakness, but simply because they have not been brought up with the same expectations of 'toughness' (in one man's terms) that men have. Furthermore, it seems more acceptable for anyone there — male or female — to try to solve all one's problems by oneself than to habitually ask for help. All of the women that I interviewed commented on this expectation of independence (whereas almost none of the men did); they did not like it [Tidwell 1990, page 9].

Tidwell writes that the attitude is that "[what could be construed as] harassment may just be social incompetence" [Tidwell 1990, page 15, brackets in original].

Anecdotal evidence suggests that women tend to be more sensitive than men to general obnoxiousness [Widnall 1988, page 1744]. When a female computer science student told me that a male TA had been inexcusably rude to her in front of the class, I looked up the student evaluations of the TA and found this comment, by another student:

[He] knows his stuff cold, but he's too rude. Honestly, once you humble yourself and tolerate this, he is an excellent source of help.
I owe a lot to him.

A student unused or unwilling to being treated rudely would not be able to interact with such individuals.

When I sent electronic mail to a group of women asking for criticism on the first version of this report, one woman replied that my request was unlikely to draw many responses. Instead of asking for "criticism", she told me, I should have asked for "feedback to help me improve the report", something women would feel more comfortable supplying.

Steven Levy's *Hackers: Heroes of the Computer Revolution* extensively describes the hacker culture, including the hackers' apathy and even antipathy toward women.

Maybe it would have been different if there had been more women around TMRC [Tech Model Railroad Club] and the ninth floor — the few that did hang around paired off with hackers.... There were not too many of these women, since outsiders, male or female, were often put off by the group: the hackers talked strangely, they had bizarre hours, they ate weird food, and they spent all their time thinking about computers [Levy 1984, page 72].

Levy goes on to describe the poor hygiene of one of the most admired hackers, a young man who did not bathe [Levy 1984, page 73].
Male computer environments that exclude women have occurred as early as in preschool:

Even in preschool, males dominate the school computers. In one preschool, the boys literally took over the computer, creating a computer club and refusing to let the girls either join the computer club or have access to the computer. When the teachers intervened and set up a time schedule for sharing computer access, the girls spent as much time on the computer as the boys [Kiesler et al 1985, page 454].

While it is not clear that one can justify the stereotype of the engineer and computer hacker as socially backwards, women are deterred by the environment.3 (See [Markoff 1989], for example.) Additionally, whether the stereotype is accurate is to some extent irrelevant: If females believe that to study or work with computers requires hanging around socially incompetent nerds, the stereotype, true or false, may influence their decision.

2.4 Finding a Mentor

Having a mentor or sponsor can be of vital importance to a graduate student or junior professor:

The sponsor may serve many functions for the protégé. First, the sponsor introduces and initiates the protégé in the customs, demands, and expectations of academic life. Second, the sponsor shares his or her wisdom and knowledge with the protégé, and provides encouragement and comments on his or her work. Third, the sponsor can provide career assistance for the protégé by making recommendations to his or her colleagues at other institutions, or simply by sharing a bit of the deflected glow from his or her own shining reputation. Perhaps most important, the sponsor helps to form with the protégé the sense of him or herself as a member of the profession, encouraging and fostering a self-image as a legitimate member of the community of scholars [Simeone 1987, page 101].

Despite the importance of having a mentor, there are few formal policies to ensure that every graduate student or junior faculty member receives mentoring. Although every graduate student, for example, has a thesis supervisor, the supervisor typically devotes different amounts of energy to different students. It is reported that “women are more likely than men to be excluded from this sort of relationship with senior faculty” [Simeone 1987, page 102] [Hall 1982, page

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3It is worth noting, however, that some men are disgusted by the hacker culture, such as MIT professor Joseph Weizenbaum [Levy 1984].
There are several possible reasons for this exclusion. First, as discussed above, some men feel uncomfortable dealing with women as professionals. Second, some "faculty men may see women as being different from themselves, less intellectually able, less committed and dedicated, or simply inappropriate for academic careers" [Simeone 1987, page 103]. Third, when men and women work closely together, there is the risk of their being suspected of having an affair [Simeone 1987, pages 82-83]. Additionally, many people like to help people who are "like" them, i.e. of the same sex or race. (Indeed, that was a motivation for my writing this report.) As long as most of the people in positions of power are men, and as long as differences in sex are considered to be of great importance, junior men will benefit.

2.5 Behavior Specific to Technical Events

Computer trade shows and technical conferences are often even more male-dominated than the workplace and university. Some of the specific problems of these events are discussed in this section.

2.5.1 Trade Shows

Men far outnumber women at industry and academic conferences. At trade shows, particularly, companies have "historically employed attractive women to draw attention to product exhibits or booths" [LaPlante 1989]. While this practice has been declining, an industry journal article about Comdex 1989 reports:

A number of companies still insisted on hiring scantily clad female models to attract attention to their booths. And a party thrown by Fujitsu went far beyond questionable taste, seriously offending Comdex attendees of both sexes [LaPlante 1989].

Additionally, when women do attend, they are suspected of not being legitimate attendees:

[PFS Inc. president Mary] Rich remembers attending the National Computer Conference (NCC), a now-defunct computer convention, where the male attendees outnumbered the female ones by a ratio of 300 to 1. Convention officials as well as hotel staffs were extremely suspicious of single women, Rich said. Women were often suspected of being prostitutes trying to solicit show attendees. Rich said she once tried to go to the hotel room of a colleague for a drink only to be kicked out by security when trying to get in an elevator.

Rich, who co-chaired the 1986 NCC with another woman, said that as recently as three years ago one of the primary concerns was how
women were being treated at the show. 'We still had problems with security not believing [the credentials of] women trying to get onto the show floor,' she said [LaPlante 1989].

2.5.2 Technical Conferences

Women are treated better at technical conferences than at trade shows. While I have never seen any reports of a female speaker or attendee being mistaken for a prostitute, people sometimes assume a woman to be the wife of an attendee and not an attendee herself. Additionally, female computer scientists complain of being propositioned by male attendees. While this probably happens at trade shows too, it happens at conferences leads to particularly touchy situations because the women do not want to offend potentially important men in their field and feel obliged to find delicate ways to reject indelicate offers. Because of this, many women act cold to men they meet at conferences, which has the side effect of discouraging friendship with colleagues who could be useful contacts.

A female computer scientist, with experience in several fields, described another problem with being one of the few attendees who needed to bring along their child:

One difference between biology and computer science that I have noticed is that it is not unusual for childcare to be provided at professional conferences in biology, while I have never seen it offered at AAAI [American Association for Artificial Intelligence], IJCAI [International Joint Conference on Artificial Intelligence], Cog Sci, or ACM [Association for Computing Machinery] conferences. I have a baby that I won't be able to leave overnight for about 2 years (because of breastfeeding), but it is difficult to make daytime childcare arrangements for an out of town conference oneself. Even with an older child, it can be difficult to make the night-time arrangements at home if the child is left behind (traveling spouse, single parent, etc.), so bringing the child along might be preferable if childcare were available.4

Additionally, another female computer scientist told me that "some conferences organize 'spouse events' which tend to run to fashion shows, shopping, etc. My husband finds this strangely unappealing!"

Presumably, conference hosts do not mean to discriminate when they fail to provide childcare or provide activities of interest to wives of attendees — I assume that, if the issue crosses their minds, they assume that the number of exceptional attendees would be too small to justify the expense of providing for them. This is an example of how, entirely in the absence of any bad intentions and purely due to the ratio, conditions can be such that a class of attendees cannot conveniently take part in a professional event.

4I have been told that childcare was arranged for this year's AAAI.
2.6 Different Priorities

2.6.1 Family Life

Having a support spouse, usually a wife, is a boon for anyone but especially for pre-tenure professors, for whom it is not unheard of to work hundred-hour weeks. Since women rarely have a spouse willing to tend house for them, while male professors and graduate students sometimes do, the women are often at a relative disadvantage. Additionally, wives are often more willing to relocate for their husbands than vice versa [Ferry et al 1982, page 29]. As one computer scientist said:

There was an article in Chronicles of Higher Education about 3 years ago by a male professor who wrote about how he and his wife (also a professor) needed to have a third party — a wife... The gist of his argument is that faculty workload is based on antiquated notions of unquestioning, full-time support from a spouse, and that universities need to revise their expectations of professors [Frenkel 1990, page 41].

Women in academia have the additional problem that the years in which they must work to get tenure are a significant portion of their child-bearing years. In [Frenkel 1990, page 41], one woman gives this as a reason for choosing industry over academia. Additionally, some women “prefer to take a less demanding job than their qualifications fit them for, because they feel that the time and attention they can afford on top of their responsibilities at home is limited” [Ferry et al 1982, page 30]. This might be one reason that female computer science PhDs are less likely than their male peers to enter academia, more often choosing industry instead.

Not only are some women unwilling to sacrifice family for work, a choice that men rarely have to make, but when women do decide to put their career first, it is still assumed that they do not take their career seriously. According to a survey of (English) female engineers and scientists:

The most trying moments in almost every woman’s life seem to have been spent in interviews. The women in our survey have nearly all taken the trouble to equip themselves with a qualification that might suggest they had ambitions beyond boiling nappies [diapers] and making their husbands’ tea. Yet time and again they have found themselves being pulled apart on the subject of whether or not they are likely to leave soon in order to marry or have children [Ferry et al 1982, page 28].

Similarly, a study of the hiring of scientists and technical staff at the National Health Service found that employers often assume
that all women will leave to have babies and that wastage due to
pregnancy is greater than for any other reason. The pervasiveness of
[this myth] was shown by the way in which they influenced practices
at selection (for instance, only women were asked questions about
marital status and dependent children). They also influenced notions
of who can be a manager [Homans 1987, page 90].

So even if a woman chooses not to have children or not to take time out to
raise them, employers will often assume otherwise and treat her accordingly.
Furthermore, pregnancy does not always cause women to miss much work. An
army study found that "even when pregnancy leave is included, [enlisted women]
take less time off than men, who lose it to sports and auto injuries and drug,
alcohol and discipline problems" [McNeil 1991].

Power can be another factor in why women choose not to be professors. The
following was written by a woman who had been a professor but had switched
to an industrial research position:

A year ago I would probably have agreed with the popular conclusion
that academia is difficult for women because of the time demands,
coincidence of tenure with child-rearing, etc. After a little more than
a year in industry, I've discovered another reason that academia can
be difficult for women. I now believe that to be highly successful in
academic research, one has to be very interested (invested?) in hav-
ing power. Power over grants, over students, over committees, etc.
I often heard professors referred to as empire-builders, something
that I see very little of where I am now. Often the most success-
ful researchers in my current environment are the ones who actively
avoid politics and power-struggles and just 'do their work'. As a
woman I don't think that I am especially comfortable or adept at
the power-games that I witnessed in the university.

Of course, there are also men that dislike power and women who revel in it.
Nonetheless, the tendency of women to be less comfortable with power than
men may hold in our current society.

2.6.2 The Hacker Culture

Some hacker subcultures have the property that the hackers spend nearly all of
their waking hours, and miss sleep, to use the computers. In his discussion of
the absence of female hackers, Levy writes: "There were women programmers
and some of them were good, but none seemed to take hacking as a holy calling
the way Greenblatt, Gosper, and the others did" [Levy 1984, page 72].

Another hacker classic, Tracy Kidder's Soul of a New Machine describes the
intensity of the designers of a new computer:
Going to work for the Eclipse Group could be a rough way to start out in your profession.... You don't have any time to meet women, to help your wife buy furniture for your apartment, or to explore the unfamiliar countryside. You work.... You're working at a place that looks like something psychologists build for testing the fortitude of small animals, and your boss won't even say hello to you.

New and old hands told the same story. Chuck Holland: 'I can hardly say I do anything else now. It takes about three days to get Eagle out of my mind, so if you have a three-day weekend, you're just sorry to see Monday come.' Microkid Betty Shanahan, the group's lone female engineer: 'You can end up staying all night. You can forget to go home and eat dinner. My husband complained that the last three times he's had to do the laundry.' Jon Blau: 'I've had difficulty forming sentences lately. In the middle of a story my mind'll go blank. Pieces of your life get dribbled away. I'm growing up, having all those experiences, and I don't want to shut them out for the sake of Data General or this big project' [Kidder 1982, pages 60-61].

I have been told that, after this book came out, MIT students lined up to interview with Data General, so the described work environment does appeal to some computer science students. In our society, however, women are often less willing or able to devote all of their life to a job, particularly because working full force is often difficult without a support spouse to take care of other parts of one's life.

When reading how intensely and single-mindedly the hackers work with computers, it is hard not to question the people who love the computer to the exclusion of all else, an opinion expressed by the writer of the following letter, written in response to [Markoff 1989], but equally applicable to the environment described in Hackers and The Soul of a New Machine:

To the Editor:

You regretfully wonder why women have not done as well at computers as men. You define the issue inside out. The problem is not women's experience with computers but men's. If a 'passionate romance' with the machine is the key to excelling, we should pity the men who do rather than the women who don't.

I am not a feminist crank at either end of that interesting spectrum, but no girl or woman I know is so alienated from her fellows that she 'spurns the real world to master a universe locked inside a computer.'

Machines do seem better suited for use than for passionate romances. So why regret women's attitude toward them? Why not
worry about yet another generation of men who are sealing themselves off from human contact [Harrigan 1989]?

It is important to remember that women who do not throw themselves into the computer world might not be inferior to men but that sacrificing everything to computers might not be something that a psychologically healthy human being does. Perhaps men and women alike would be better off if some jobs and hacker cultures did not require giving up the rest of their lives.

2.7 Sexual Harassment

Because I take it for granted that readers consider sexual harassment to be offensive and harmful, I am writing little on the subject. It remains, however, a serious problem. A recent survey of Harvard students and faculty revealed:

Thirty-two percent of the tenured female professors, 48 percent of those without tenure, 41 percent of the female graduate students, and 34 percent of the undergraduate women reported having been sexually harassed by a person in authority at least once during their time at Harvard. Fifteen percent of the graduate students and twelve percent of the undergraduates reporting harassment consequently changed their academic plans because of it. Most did not report the incidents [Simeone 1987, page 115–116].

Other studies, such as [Baker 1990] find even higher percentages of women sexually harassed. See also [Gross 1991], an account of the hostile environment for women at Stanford Medical School, which was recently called to attention by the resignation of a female neurosurgeon.

2.8 Summary

Because computer workplaces are often overwhelmingly male, women find themselves in what sometimes feels like a locker room environment, having to put up with behavior they might find offensive, such as sexist or sexual humor and female pin-ups. Additionally, some men use sarcasm or insults to communicate more than women do, causing women to interpret the environment as hostile, even when no offense is meant. Also, because males often have different interests than females do, such as in sports, women may not feel as though they fit in. These factors can cause a woman to feel out of place in a computer workplace and make it difficult for her to picture herself as a computer professional.
Chapter 3

Gender in Language

If a woman is swept off a ship into the water, the cry is 'Man overboard!' If she is killed by a hit-and-run driver, the charge is 'manslaughter.' If she is injured on the job, the coverage is 'workmen's compensation.' But if she arrives at a threshold marked 'Men Only,' she knows the admonition is not intended to bar animals or plants or inanimate objects. It is meant for her — Alma Graham.

The Sapir-Whorf hypothesis of linguistics states that the limits of human thought are determined by the nature and the structure of the language in which thought occurs. One corollary, on which this chapter is based, is that the English language's use of gender forces people to think in terms of male and female, with its gender-specific third-person singular pronouns and its different titles, in some cases, for males and females. While it is not necessarily bad to be immediately aware of the sex of someone being discussed, the connotation of male and female terms differ so greatly that the distinction not only implies difference but inequality. Biases in language are important because they show both the biases people hold and how they are communicated.

3.1 Referring to Unknown People

The English language has two sets of pronouns for the third-person singular: he/him/his and she/her/hers. It is practically impossible to talk grammatically about individuals without implicitly mentioning their sex. While this can seem benign, it has several significant implications, which will be examined in this chapter.

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2 Of course, many languages are even worse than English [Hofstadter 1986, chapter 7].
When A mentions a person unknown to B ("my biology teacher"). B must find out whether the third person is male or female in order to know how to phrase questions ("How is he/she?"). If A does not provide the information, B will usually guess the default pronoun from what is known — e.g. "he" for a professor, and "she" for a secretary. Most often, this is done subconsciously, showing the speaker's preconceptions. It seems reasonable to expect that when children hear their parents using their best guess for people discussed, they will subconsciously conclude that a man's being a scientist, for example, is normal, while a woman's being a scientist is unusual.

It is common for female scientists to be incorrectly addressed. They tend to consider these incidents humorous, and they trade horror stories:

- One [female] computer scientist with an ambiguous first name wrote:

  
  My favorite case in this regard occurred about two years ago, when I received a letter addressed to Mr. [Name], saying 'Dear Mr. [Name]: I attended your presentation at the [A] Conference on [B]. Please send me copies of your related technical reports. Sincerely, Dr. X'

  Usually, my only response to such incorrect usage is to sign my return letter as Dr. [Name], but that one was too much for me to let slide unremarked. So I sent a reply as follows:

  Dear Dr. X: While I am accustomed to receiving letters addressed to Mr. [Name] from colleagues who have never met nor seen me, I found your letter quite puzzling. You began by saying you attended my presentation at the [A] Conference on [B]. Surely you must have noticed that I am female! If this was a secretarial error, you might alert your secretary that female computer scientists exist and that in cases of doubt, "Dr." is a genderless form that is unlikely to offend (and may in fact be correct). Sincerely, Dr. [Name].

  I neither expected nor received a reply, but I felt better, and maybe I saved some other female computer scientist from one of those letters.

- Ironically, when a science magazine ran a survey of its female readers, the female journalists who received the responses found that about half the women had addressed the replies, "Dear Sir" [Ferry et al 1982, page 27].

- A female computer science professor told me:

  When I was applying for jobs, two of the computer science departments requested letters of recommendation for Mr. [Jane Linda Smith]. One almost immediately sent a followup letter, explaining that they were terribly sorry, that they indeed knew that [Jane Linda Smith] was female, and that they would
certainly read the recommendation letters more carefully than they'd proofread their own request. The other department was the one in which I was then a graduate student.

- When I received an award from the MIT EECS department for the first version of this report, the award letter was addressed to “Mr. Ellen Sper-
utus”.

These examples show that some people expect scientists and science writers to be men to such a great degree that they blatantly misaddress female scientists. Perhaps the most unusual story in this category is that of a woman who was elected to the National Academy of Sciences in the late seventies:

The scroll that [geneticist] Vivian [Davidson] received from the Academy had her name engraved on it, and then went on to announce that Vivian Davidson was being honored for ‘his’ accomplishments, and that ‘he’ was now entitled, and ‘he’ could, and ‘he’ should. She was so amazed at all the ‘he’s’ that she sent a letter to the Academy inquiring whether the source of the problem might be that the engraver was British and had taken Vivian for a man’s name, or was it perhaps that the printing process was lagging behind the process of election of women to the Academy. The letter she received back from the Academy secretary (a man) was an angry one informing her that she was the first person ever to complain, the scroll was an honor, its plate had been struck in 1868 by Abraham Lincoln, and it had a historic value the Academy was not about to tamper with.

At the next Academy meeting in Washington, Vivian raised the matter of the scroll’s wording with some of the other women scientists. Each one said she had never noticed the use of ‘he’ instead of ‘she’ on the scroll. ‘That’s probably true,’ Vivian said sadly. ‘They’re so grateful to be allowed into the club, they wouldn’t dream of making waves. In all likelihood they haven’t noticed’ [Gornick 1990, page 115].

Also of interest are the experiences of a male professor whose first name is also a woman’s name:

I think having that name has made me more sympathetic to problems women face, as in e-mail it is almost always assumed that I am a women. That means I get a rash of mash notes from the Math/CS students when they first learn e-mail and pick my name out of the user list.... It also means that I get a great response every time I post a computer problem to a usenet group. Since I haven’t done the control condition where I have a male’s name, I’ll never know for sure, but the tone of so many responses are so solicitous that I have
to wonder (even followups to see if everything worked out okay). The worst case was in a scientific exchange through the mail where the other scientist was being exceedingly patronising. It was only when he came to [X] for a convention and tacked on his room and phone number and invited me for a drink that it dawned on me that he thought he was corresponding with a woman. For me I can laugh about these occurrences (as well as the female roommates I routinely get assigned at meetings), but it would certainly be different if it never went away.

3.2 Masculine Terms as Default

3.2.1 The Inequality of Masculine and Feminine Terms

Because male and female pronouns have different connotations, an individual is immediately categorized into a set and assumed to have certain characteristics as soon as their sex is known. The English language forces us to divide people by sex, and, because people have different assumptions depending on whether someone is male or female, preconceptions are applied to them. Were it not for these differences, asking someone’s sex would have no greater import than asking how to properly pronounce a person’s name, and suggesting that females need female role models would make no more sense than arguing that green-eyed people need green-eyed role models. While there is no reason that specifying the sex of an individual is necessarily bad, it is in a culture where people associate so many characteristics with sex.

When masculine and feminine versions of the same word exist, the connotations often greatly differ:

- A teacher writes of trying to describe one of her brightest students:

  I found myself saying ‘She’s really a prince.’ Appalled as I was at my own pro-masculine description, I just couldn’t say that she was a princess because princess connotes someone who is fussy and spoiled and accustomed to living in the lap of luxury [Miller et al 1980, page 58].

- A female computer science student told me:

  When I was at [X], I derived a good deal of satisfaction from watching my male friends describe my performance in [electrical engineering courses] — ‘She’s a .....goddess?’

  Additionally, “woman” and “man” are not symmetrical:

- As observed in [Hofstadter 1986, page 155]:
If I write, ‘In the nineteenth century, the kings of nonsense were Edward Lear and Lewis Carroll’, people will with no trouble get the message that those two men were the best of all nonsense writers at that time. But now consider what happens if I write, ‘The queen of twentieth-century nonsense is Gertrude Stein’. The implication is unequivocal: Gertrude Stein is, among female writers of nonsense, the best. It leaves completely open her ranking relative to males. She might be way down the list! Now isn’t this preposterous? Why is our language so asymmetric? This is hardly chivalry — it is utter condescension.

- One female computer science professor told me:
  
  I got a recommendation from a college professor stating that I was ‘one of the top female students’ in his class (100 students, 10 women, the women were not all at the top of the class, and I was).... I’m sure he meant it as a compliment.

- Annie Edson Taylor is described as “the first person to go over Niagara Falls in a barrel”, while Neil Armstrong is “the first man to walk on the moon”.

Because masculine and feminine terms have such different connotations, the distinctions make females separate and unequal.

3.2.2 Intentional Use of Masculine Terms

Some men consider “being a man” to be high praise even to a woman, and expect her to be flattered at being called one. Here are some examples of women’s reactions to being called a man, two from biographies (not of computer scientists) and one in response to my call for data:

- Henry Hazlitt said to Ayn [Rand] one day: ‘I just talked with Lu Mises a few days ago. He called you “the most courageous man in America.”’ ‘Did he say man?’ asked Ayn. ‘Yes,’ he replied. Ayn was delighted.3

- [A] story — which as far as I know, is all it was, — once went the rounds of Israel to the effect that Ben-Gurion described me [Golda Meir] as the ‘only man’ in his cabinet. What amused me about it was that obviously he (or whoever invented the story) thought that this was the greatest possible compliment that could be paid to a woman. I very much doubt that any man would have been flattered if I had said about him that he was the only woman in the government!4

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• [This incident] was ... entertaining. I and another undergraduate were head teaching fellows for a computer course and we were working our butts off. He had one final that he was pretty worried about, so I greeted him afterwards with a six pack. His remark, "[Jane], you’re such a guy."

— A female graduate student.

In all cases, the original speaker thought he was giving the woman a high compliment. What stands out from these quotes is the different reactions: glee in one case, indignation and amusement in the others. Accepting such compliments is psychologically dangerous because it entails a woman’s looking down upon her own sex. For example, Ayn Rand, the only female above to be proud of being "a man", is known for her misogyny, an unhealthy trait for a woman. The same phenomenon occurs among some women in male-dominated careers. One female computer science graduate student used the term “male-identified” to describe women who scorn other women and who aspire to be “one of the guys”. Some examples of such statements are:

• A male computer professional wrote:

  One way [bias is expressed] is the attitude of women themselves. A female programmer here found out that the company next door, run by women, installs PC systems in offices. Her comment was, "That's pretty good for a couple of women." Her words, not mine.

• A female computer science student, when one of two female students in a high school advanced placement physics class, said: "I judge how hard a class is by how few females are in it."

While the above comments are shocking, they should be no less shocking than a man’s expecting a woman to be flattered by being called a man. In the context of a society which praises women for being “like a man,” it is no wonder some women accept the role.5 [Persing 1978] contains many examples of masculine terms in everyday use.

3.2.3 Unintentional Use of Masculine Terms

Other terms exist besides “being a man” and “one of the guys”. A male high school teacher who recognized the sexism in “dividing the men from the boys,” told the class that he intentionally replaced the terms with “wimps” and “studs,” a usage he did not consider to have gender implications. Indeed, “stud” is now a popular way to compliment someone from work well done. What’s ironic is that “stud” is an extremely male word. Its primary definition is a male animal used

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5I have been able to find nothing in the literature about male identification of women in science, although the phenomenon is widespread. Most women seem to outgrow it and feel ashamed of their former misogyny, but the subject merits deeper study.
for breeding. It is absurd that some consider it a gender-free way to express admiration. When a female professor expressed skepticism that anyone could think “stud” a neutral term, it was called to her attention that a few months earlier, she had told a roomful of female students that they would have to “gird their loins” and get to work. This also derives from male terms.

3.3 Gender-Neutral English

One area currently under debate is gender-neutral English. Above, I discussed the issue of how to discuss a specific unknown person, but it is another question how to discuss a generic person, i.e. with “he” or “he or she”, etc. Related to this is whether to use terms like “chairman” and “man-hours” when one does not wish to exclude females.

3.3.1 Background

The most convincing argument that terms like “he” and “man” are not truly neutral comes not from abstract arguments but from empirical research:

In 1972, two sociologists at Drake University, Joseph Schneider and Sally Hacker, decided to test the hypothesis that man is generally understood to embrace woman. Some three hundred college students were asked to select from magazines and newspapers a variety of pictures that would appropriately illustrate the different chapters of a sociology textbook being prepared for publication. Half the students were assigned chapter headings like “Social Man”, “Industrial Man”, and “Political Man”. The other half was given different but corresponding headings like “Society”, “Industrial Life”, and “Political Behavior”. Analysis of the pictures selected revealed that in the minds of students of both sexes use of the word man evoked, to a statistically significant degree, images of males only — filtering out recognition of women’s participation in these major areas of life — whereas the corresponding headings without man evoked images of both males and females. In some instances the differences reached magnitudes of 30 to 40 per cent. The authors concluded, “This is rather convincing evidence that when you use the word man generically, people do tend to think male, and tend not to think female ([Miller et al 1980, pages 19-20]).

Additionally, “a number of studies have shown that young people are influenced in their job preferences and their willingness to apply for advertised jobs by the sex of the person advertising the job.”

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6 There is another whole issue as to what the corresponding female term would be and why none are flattering — i.e. one based on sexual prowess. Brood sow? Whore? Nymphomaniac? This is too far off the subject to explore here.
jobs by gender bias in the wording of the advertisements" ([Bem et al 1973] in [Frank et al 1983, page 90]).

Several sentences can be found that demonstrate that "man" is often unintentionally used to exclude women:

David Moser once .... observed that in books you will find many sentences in this vein: 'Man has traditionally been a hunter, and he has kept his females close to the hearth, where they could tend his children.'.... So much for the sexual neutrality of the generic 'man'. I began to look for such anomalies, and soon ran across the following gem in a book on sexuality: 'It is unknown in what way Man used to make love, when he was a primitive savage millions of years ago' [Hofstadter 1986, page 145].

Consider also the 10th commandment. 

3.3.2 Examples of Usage in Transition

In an approximately one month period of observation, I was able to find many examples of people waffling on the issues of gender nonspecific language at and around the MIT Artificial Intelligence (AI) Lab. I consider ambivalence more revealing than conforming to the old ways, because it shows that many individuals are trying to grapple with the issues but are unable to do so in a consistent manner. These examples are presented not because the behavior was egregious but to show the conflict within individuals:

- A conference was held in one of the most male-dominated areas of computer science. Nevertheless, a few women played prominent technical roles. Relevant incidents were:

  1. A male attendee asked a female speaker: "How many [pause] engineer-years did this take?" His pause was not sarcastic; he evidently decided mid-sentence to use a neutral term instead of "man-years". One guesses he would have used the latter term if asking the question of a male.

  2. A female was introduced as a "chairperson" but, like the other (male) chairpeople, wore a ribbon that said "chairman".

- During a talk, a professor showed a slide which said "he/she" for the generic computer architect, but said "he" when speaking.

- An announcement was sent to members of the AI Lab, containing "I am looking for a few brave men (or women) willing to help..."

It is not entirely fair to put all the blame on the word "man". It is also easy to find sentences such as "People won't give up power. They'll give up anything else first — money, home, wife, children — but not power" [Miller et al 1980, pages 33-34].
In a recent issue of a journal, a book reviewer referred to the prototypical researcher as "he", parenthetically adding "typically he is a he".8

As mentioned above, the trait all these examples share is ambivalence. Many people use neither the old way nor the new way but some mixture. On such melanges, Douglas Hofstadter writes:

This is not progress, in my opinion. In fact, in some ways, it is retrograde motion, and damages the cause of nonsexist language. The problem is that these people are simultaneously showing that they recognize that "he" is not truly generic and yet continuing to use it as if it were. They are thereby, at one and the same time, increasing other people's recognition of the sham of considering "he" as a generic, and yet reinforcing the old convention of using it anyway. It's a bad bind [Hofstadter 1986, page 150].

3.3.3 Reversed-Expectation Writing

Several writers, in order to argue for non-sexist writing, have written essays with other biases than the traditional male/female ones, and the results are (intentionally) shocking. In this section, I describe three such forays.

Douglas Hofstadter has written an essay ostensibly arguing for traditional usages but from an imaginary standpoint with different terms for whites and blacks analogous to those for men and women in our culture. For instance, "white" is used for "whites and blacks" (as "men" is used for "men and women"), and blacks have different honorifics and pronouns. Here is an excerpt of his (long) essay:

Most of the clamor, as you certainly know by now, revolves around the age-old usage of the noun "white" and words built from it, such as chairwhite, mailwhite,... The negrists claim that using the word "white", either on its own or as a component, to talk about all the members of the human species is somehow degrading to blacks and reinforces racism. Therefore the libbers propose that we substitute "person" everywhere where "white" now occurs. Sensitive speakers of our secretary tongue of course find this preposterous. There is great beauty to a phrase such as "All whites are created equal." Our forebosses who framed the Declaration of Independence well understood the poetry of our language. Think how ugly it would be to say "All persons are created equal", or "All whites and blacks are created equal".... [Hofstadter 1986, page 159]

Bobbye Sorrels Persing, in [Persing 1978], has written a powerful essay of an office scene with the male and female roles reversed. Not only are male workers called “boy” and “sir chairwoman” (corresponding to “girl” and “madame chairman”), they are treated and talked about as men stereotypically treat women who work for them [Persing 1978, pages 1-5].

A recent example exists in the computer world. In MacTech Quarterly (now MacTech Journal), “she” is used instead of “he” as the generic pronoun. An editorial justified the policy and announced that it would be used henceforth by the magazine [MTQ 1989A].

Further examples of reversing expectations appear in Section 5.1.3.

3.3.4 Reactions to Nontraditional Language

It is telling to look at the reaction to MacTech Quarterly’s policy, printed in the issue following the editorial announcement [MTQ 1989B]. A follow-up article wrote that responses poured in, “impassioned on both sides”. Some readers canceled their subscriptions, while others pledged to buy as much as possible from the parent organization. One of the most interesting positive letters was from a female novice programmer who wrote:

[A]s a woman who is a bit intimidated by her love of math and computers, I deeply appreciate being able to open the MacTech Quarterly and have the articles addressed to me, personally, a woman.

Negative letters condemned the (male) editor for abusing his editorial position. One particularly angry writer repeatedly called into question the editor’s manhood:

Ms. Hines,

You seem to be suffering from severe gender confusion. As a private matter, that’s fine. Everyone has their foibles. But when it becomes editorial policy it’s offensive in the extreme....

When I feel like listening to emasculated male apologists I can always turn on Donahue. He’s easy to turn off and I don’t have to pay for broadcasting his silly ideas. So unless you will be adopting a more well-thought-out policy, cancel my subscription and send my refund. And I will suggest MTQ adopt the subtitle, “A Magazine for High Tech Women and Eunuchs”.

If you’ve got even a dim memory of when you had balls, you’ll print this.

(Note too the use of “balls”, i.e. something women do not possess, as a metaphor for fortitude.) The letter illustrates that a man is sometimes considered to be a sell-out for taking a feminist position. (While some men praised the editor for
his decision, apparently all of the harshest critics were male.) In addition to the above *ad hominem* letter, there were more carefully-reasoned objections:

1. Because of its long usage as the neutral pronoun, the sex of "he" is much less blatant than that of "she".

2. Using the less grammatical "they" for the singular neutral pronoun is a reasonable choice, particularly as it appears to have been used centuries ago for this purpose.⁹

3. Most of the readers of the magazine are male.

Even in the most carefully-reasoned negative letter, however, the writer expressed his intention not to renew his subscription.¹⁰ This is clearly a point on which people have strong opinions.

In response to my call for information, a man wrote:

I'm the co-author of the [X] Guide;... One of the decisions that I made was to remove all the sexist language, e.g. “when the user types his command” sort of stuff. It wasn't that hard to do, and I figured that it was appropriate.

A couple of the reviewers ... noticed this — I suppose my prose wasn't quite as seamless as I thought it was — and commented on it. They both suggested putting the male gender pronouns back in since "most of the users are men, anyway". I didn’t take this suggestion; but what struck me was that these folks actually noticed the lack of male pronouns.

### 3.3.5 Summary

Many people are not sure whether to use traditional or neutral terms. The large number of mixed examples implies that people do not just disagree with each other, but that individuals are unsure how best to express themselves. Additionally, many defenders of male terms do not appeal to tradition or claim that the term is neutral, but they say that the generic person would probably be male. Thus, an empirical rather than theoretical criterion is used, suggesting that the pronoun would change if enough females entered the computer world.

### 3.4 Summary

The language used in the academic and industrial world, as in much of society, is biased toward male terms. A girl must have a strong vision to see herself in a career considered masculine, and a woman must have strong character not to

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⁹See, for example, [Frank et al 1983, page 88] or [Miller et al 1980, pages 121–123].

¹⁰Of course, these observations are based on the letters the editor chose to print.
be affected by all the masculine assumptions about her. Still, there are some things to be thankful for. As Grace Murray Hopper has pointed out, when the computer industry began, many women worked with computers, so job titles, like "programmer" and "analyst", were gender neutral. That is one barrier less to fight. Additionally, the ambivalence about whether to use gender neutral English and the empirical, as opposed to principled, arguments used by many to support the old way, suggest that changes may be made for the better.
Chapter 4

Problems with Solutions

She never knew whether it was her turn or not, the game was in such confusion — Lewis Carroll, Alice in Wonderland.

Unfortunately, many attempts to encourage women in male-dominated fields at least partially backfire. Specifically, special treatment can imply, in a number of ways, that women cannot compete with men. Also, programs implemented to ensure equal opportunity often get misrepresented as having lower standards for select groups. Additionally, consciousness-raising can lead to hypersensitivity and false accusations, which then causes falsely-accused males to be skeptical of women’s claims.

4.1 The Perception of Lowered Qualifications

One of the biggest misrepresentations of recent times is that affirmative action is synonymous with lowered standards for favored groups.\(^1\) While some affirmative action programs do involve a deliberate lowering of test scores required for entrance, many programs do not. The goal of many affirmative action programs is to ensure that all applicants are considered in an unbiased manner.

4.1.1 The Need for Affirmative Action

As discussed in Section 1.2.1, women are often judged as less qualified than men when their performance is identical. For example, in one controlled study, department chairs were given nearly identical curricula vitae of supposed male and female applicants and asked to recommend their faculty rank. They chose assistant professor if they thought the applicant was a woman and associate professor if they thought it was a man [Fidell 1975]. The following examples show how these contradictions are rationalized:

\(^{1}\)I made this mistake in the first version of this report.
• A man is described as 'serving on two departmental committees and even
on one institutional committee,' while a woman with the identical expe-
rience is noted as 'serving on two departmental committees but only on
one institutional committee' [Sandler 1986, page 6].

• A woman who has published only three articles is denied tenure. ('Yes, the
articles are high-quality, but she should have published more than that in
5 years.') Later, a man in the same department is awarded tenure. ('Well,
he's a slow starter, but he shows a lot of promise.') [Lattin 1984, page 227].

These studies contradict the assumption that, without affirmative action, all
decisions are purely merit-based. In fact, few would dispute that "before affir-
mative action programs were developed, women were routinely turned down
for many faculty and most administrative positions, regardless of their creden-
tials" [Lattin 1984, page 228]. For example, "Gerty Cori, the first American
woman Nobel Prize winner (for medicine or physiology in 1947) ... was not pro-
moted to full professor until the year she won the prize" [Hunt 1991]. See also
[Gornick 1990] and [Selvin 1991, page 28]. Clearly, something is wrong with the
way people make decisions, and they must bend over backwards to make sure
they consider each candidate equally.

College admissions were also frequently discriminatory before affirmative
action:

  The admissions policy of the University of North Carolina, for
example, was openly discriminatory [until the early seventies]: 'Ad-
mission of women on the freshman level will be restricted to those
who are especially well qualified'. ... The American Council on Edu-
cation reported that freshmen who entered four-year colleges in 1968
had widely divergent high school grades: more than 40 percent of
the girls had averages of B+ or better but only 18 percent of the
boys could boast the same.

  The attitude of some male alumni certainly indicates that they
would find nothing at all strange in having disparate admission stan-
dards: In congressional testimony in 1970, Ann Sutherland Harris
reported the following: 'At Yale, when the new women undergradu-
ates protested the quota on women and made the modest demand
for fifty more women undergraduates the coming year at an alumni
dinner, an alumnus was cheered when he said: "We're all for women,
but we can't deny a Yale education to a man."' And when Harris
was questioned by Congressman William D. Hathaway of Maine on
school admissions policies, the same bias become apparent: 'Mr.
Hathaway: If you take the college administration and they have so
many kids that they can take into school and they know that 90
percent of the men, for example, in our society have to get a job,
Yes, the answer in that instance: ‘Well, 84. page 14) With attitudes like this, clearly some sort of program is needed.

4.1.2 Distrust of Qualifications

As mentioned earlier, many people consciously or unconsciously have lower expectations of women. This is exacerbated by affirmative action. If it is suspected (even falsely) that women can get jobs or university positions with lower qualifications, people will be suspicious of their skills. Walter Williams, a black economist opposed to affirmative action, writes about this phenomenon:

- “Today’s quota policies raise real doubts in the eyes of many whites who wonder whether some blacks have earned their status, or whether they had it handed to them. Like sickle cell anemia, this ‘How do you know?’ problem has become a sort of black man’s disease.
- It’s not exclusively a black man’s disease, however. Women and others who have been given special treatment also are victimized by it. Recently, I had the occasion to take a short commuter flight. Upon boarding the aircraft, I saw a woman sitting in the right hand side of the pilot’s compartment. There I was, faced with the ‘How do you know’ problem, with pretty high stakes in the balance. The recent press coverage of Supreme Court nominee Clarence Thomas shows how unreasonable people can be about quota programs. Newspaper after newspaper reported that, because Holy Cross College and Yale Law School had aggressive minority quotas when Thomas was admitted, he necessarily “benefited from minority preference admissions policies.” The implicit assumption is that, if a quota system was in effect, none of the admitted blacks were qualified. While some of the blacks may have been unqualified, it would be ridiculous to assert that none were, and, specifically, that Thomas was unqualified. Additionally, as just discussed, Yale’s pre-quota admissions did not even purport to be purely merit based.


4.1.3 Low Self-Confidence

When women suspect (even falsely) that they have gained something through affirmative action, their self-confidence often suffers. One female MIT student wrote:

As a freshman I was told I got into MIT because I was female. When I was a sophomore, people told me I would get into 6-A [the industry co-op program] easier because I was female. When I applied for permanent jobs, I was told companies would hire me just because I was female [Anu 1990].

As noted in [Anu 1990], hearing such statements repeatedly can harm a woman's self-esteem and cause her to question her ability.

No feminist I have spoken with has favored admitting less-qualified women to university positions. It is easy to see that, in addition to breeding the distrust described above, admitting unqualified women would, in general, be harmful to the people one wants to help: If a woman is admitted to a school for which she is not qualified, she will probably be less happy and successful than if she attends an institute for which she is qualified.

4.1.4 Uncritical Faith in Test Scores

Another point of confusion in the affirmative action debate is how much weight to put on objective test scores. While many people assume that someone with lower SAT, LSAT, etc., scores is less qualified, this is not necessarily the case:

The SAT is marketed as a predictor of first-year college grades. Yet women, who earn higher first-year grades than men, score lower on the SAT math and verbal section....

Moreover, women perform as well as, if not better than, men on New York State’s Regents exams for algebra, geometry and trigonometry. Yet women consistently score lower than men on the SAT math section. The manufacturers have no explanation why women score lower than men on the SAT verbal section. It is well known that females perform better than males in high school English classes [Horner et al 1990].

For example, statistical analysis done at MIT shows that although male undergraduates have higher average board scores than female undergraduates, women graduate at a higher rate than men and receive grades that are just as high, even when adjusted for major.

*I've always found it ridiculous that the person with the highest recorded IQ claims to be the smartest person in the world.
4.1.5 Conclusion

While there is a need for affirmative action programs, they have large negative effects that must be considered. Even if a program does not entail lower standards for women, doubts are cast on a woman's qualifications in a society that already mistrusts them. Programs with lower qualifications may be a tactical mistake (in addition to being unjust) because people may be put in situations for which they are not qualified, giving them less overall success and self-confidence than they would have had otherwise. These negative effects should be weighed when considering implementing an affirmative action program.

As phrased in [Ernest 1976, page 607]:

We strongly support such affirmative action to ensure that all potential female candidates are considered. Such increased recruitment efforts can only enlarge the list of qualified candidates and thus result in the raising of standards. To immediately dispose of a red herring, let us state emphatically that none of us believe a less qualified [scientist] should be hired, just because she is female.

4.2 Informal Special Treatment Harmful

Not only can institutionalised special treatment be harmful, but so can individual initiative. Many instances exist of mixed attempts to encourage women:

- A female professor taught an electrical engineering course and announced that she especially wanted the women in the class to do well. During tests, she went around to the few women in the class and would try to help them. The female student I talked to said this behavior made her very uncomfortable, and she felt that the men in the class resented it.

- A female computer science graduate student had these experiences:

  My undergraduate advisor consistently encouraged me to go on to graduate school, to apply for scholarships and fellowships, and basically gave me a strong consistent message that I was good at this stuff....[While I have had many bad experiences.] I have had a number of friends, bosses, advisors, over the years who have been very supportive, some seeming to disregard my gender, others aware of it and patting themselves on the back for being so good about recognizing my talent anyway. The classic example of this is the well-meaning professor who asks every woman student he has opportunity to talk with, about whatever topic, 'How are things here for you as a woman?'

- When a female computer science student visited a top graduate school to which she had been admitted, she told me that a male graduate student
presented each of the women with a rose and told each that he wanted her to come to that school. When I heard this story, I asked a female graduate student in the department whether this student was trying to sabotage female recruitment. She answered:

It turns out a bunch of people who were doing a lot of work on organizing the recruiting weekend had decided, off the cuff, that they thought this could be nice (as in: what should we do with the leftover roses). So it wasn’t this one grad student working on his own, and it was not an attempt to sabotage recruiting.

Its effect, however, was slimy and sabotaging. As you note. Some of the women decided it was the one unsocialized nerd, others thought it was strange but disregarded it, and others realized fully how totally inappropriate it was even as the rose presentation was happening. One of these let the deliverer know, too, what she thought of it.

All these cases have in common that women are conscious of being treated differently from men by someone who is trying to encourage women. Most women do not like this sort of treatment, although they are grateful for encouragement when it is sincerely offered. Nevertheless, it would also be wrong to suggest that professors not encourage women if it does not come naturally to them and that computer professionals should be as obnoxious to women as they often are to men. Additionally, people disagree on when special treatment is positive and when it is negative. For example, one woman objected to there being a class entitled “Women and Computers”:

I think the class is very poorly named, and I for one would not sign up for such a course. It assumes that women have different/special issues with regard to computers than men have, solely because of their gender. This gives exactly the wrong message to both men and the more ‘traditional’ women. What we as liberated women should be doing is asserting over and over until we can make it so that, except for a few basic physical differences that we unfortunately can’t deny (e.g., size and upper body strength), women and men are the same. By naming a course ‘Women and Computers,’ all you are doing is helping to perpetuate the myth that women are somehow ‘different’ and should be treated differently. That’s how we got where we are in the first place!иг

This behavior is closely related to condescension, a problem described in [MIT 1983, page 9], from which the following quotations are taken:


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• "Often, when I ask a male graduate student how to do some task, particularly something on the system, he will do it for me rather than explain to me how I can do it for myself."

• "I asked a male graduate student a technical question and got an answer that seemed to be aimed at someone with little or no knowledge of computer science, as if it were being explained to a high school student rather than a colleague."

Thus, in attempting to help women, people sometimes end up implicitly insulting them.

### 4.3 Special Awards for Women

#### 4.3.1 Separate Categories for Males and Females

Some people propose female-only competitions as a way to benefit women. However, the psychological effects of such contests are sometimes negative. One female undergraduate wrote:

> I [disagree] with the suggestion that they have different contests for boys and girls. I believe this has a negative effect. My high school was big on "top boy" and "top girl". I think it is from traditions like that I got the idea (now mostly eradicated) that I would be smarter if I were male. Until recently, I couldn't stand not being the top girl in a category (i.e., being beaten by a girl), but I didn't mind a guy's beating me. The award categories seem to imply that females can't compete with males. Wouldn't people find having separate competitions for whites and blacks offensive, particularly if the blacks weren't allowed to enter the white contest?

It should be mentioned, however, that some women believe that the contests are worthwhile by providing rewards and encouragement to highly-achieving females. Thus, no consensus can be said to exist on the issue.

#### 4.3.2 Fellowships for Women

One popular way of encouraging female graduate students is through special fellowships for women. Again, the opinions are divided on the psychological effects. On the negative side, the same student who complained about female-only contests wrote:

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4 The quotations from this section are largely taken (with permission) from a discussion within a large electronic mailing list of women in computer science.
I am a senior, applying to graduate programs in computer science, and was just offered a fellowship from [X]. At first, I was very pleased and proud (called my parents, went out to celebrate), but then I went back to my fellowship application material and saw that certain fellowships are awarded particularly to women and minorities in fields in which they are most underrepresented. (I can't tell if my fellowship is in this category. I will try to find out.) While I can understand how such awards might be good for women who were very worried about costs, the offer has left me feeling more bad than good. For a few hours, I was thinking of myself as the best of the best — i.e. as having won the fellowship on merit — but now I feel like I wasn't allowed to play in the big league.

In contrast, I was offered a RA [stipend and tuition waiver in exchange for research] next year by my bachelor's thesis supervisor. That made me feel great. If I thought the offer were related to my being female, I would have rejected it.

She reported that a male friend of hers said:

I'm glad I'm not in a similar position — you know I'm trying to improve my self-confidence, and I'd feel so unsure in a world that wouldn't tell me whether I was good or just the recipient of a less-deserved award.

Another female graduate student wrote:

I don't want anyone ever to think that I got where I am because of special favors granted to me because I'm female. I decided ... that I would not apply for any fellowships or special programs for women. I [don't want people to] think that I don't have to work as hard as a man to succeed in my chosen career.

The majority of women who expressed an opinion, however, supported special fellowships and urged women to accept them. One female computer science professor wrote:

While I was a graduate student at [X], I got a fellowship that was earmarked for women. Initially I felt ... that while I was glad to get the fellowship, ... it was second class in some way. Two things have changed my mind on this. First, I found out that my fellowship was in fact harder to get because it was a national contest rather than a intra-university contest. This solved my initial problem with respect to the particular fellowship.

The second thing completely changed my attitude about what it takes to be successful. Now that I am faculty, I realize how hard it is to raise money. I now actively search for sources of funding that
are slightly unique to me: funding for women, funding for first year faculty and so forth. And why not? Others look for funding that is particular to VLSI say.... [W]e are judged on our output, and ... we should take advantage of any opportunity that comes our way. That initial ... fellowship has caused doors to open for me all along my career — job offers, research funding, etc. In hindsight I would have been an idiot to decline it.

I now realize that my initial feelings about the fellowship said more about my attitude toward women than reality. That fellowship wasn't second class, I just thought something special for women must be. I've been taught an important lesson.

Many people do not realize how competitive some fellowships for women and minorities are. The competition for the top women and minorities fellowships is now so intense that a female computer science student I spoke with was not surprised when she failed to win a special fellowship for women but won the most coveted fellowship that was open to both sexes. Because outside funding makes graduate life easier and because any stigma associated with special fellowships seems to be decreasing, they are almost certainly a worthwhile way to help women further their education.

Another issue is whether such programs are morally justified. There would be an outcry against a publicly-funded scholarship for which only men were eligible, so a women-only scholarship program might not be morally justifiable. On the other hand, as this report has documented, women face so many biases that there is reason to believe that practically all women are unfairly handicapped in some way relative to men. Different people will have different opinions on whether a biased program is a legitimate response to existing bias in a community.

4.3.3 “Heck, We Want More Girls”

Perhaps the most insidious form of sexism is practiced by men who are eager for more women to enter computer science, but for social reasons. The following quotations from female graduate students are from [MIT 1983, pages 14–15]:

- “A male graduate student said, ‘The problem with this place is that there aren’t enough attractive, available female graduate students.’ Enough for what? I’m not here to be available and attractive.”

- “A graduate student said, ‘Men are tired of only seeing men. They want to see women in dresses, not women who look like men.’”

More recently, in a public discussion on women in computer science, an ostensibly sympathetic male wrote, “Sigh. I’d love to see more girls [sic] as my classmates!” The “sic” was added by the moderator of the newsgroup (who can
edit messages before they are posted), in protest of using that term for college-aged females. This sort of message is not uncommon. In another discussion, a man wrote:

At the time, we were really trying to hire some females into the software side and I was interviewing a bunch of new grads — mostly girls. There was this girl whose resume looked good and since she was as they say — easy on the eyes, I was trying hard to find reasons to hire her.7

Such examples occur not only in informal exchange but also in published books. On several occasions, in The Psychology of Computer Programming, Gerald Weinberg expresses opposition to sexism, decrying prejudice (page 98) and scoffing at the initial failure to treat women seriously (pages 147–148). The chivalry of his appeal, however, undermines his point:

Each prejudice has its price. In a programming project, the exclusion of anyone from any position on any basis besides lack of competence robs the project of the best possible performance. Moreover, once one faction begins to feel that they are being judged differently from others, they will begin to act differently. Possibly the greatest single action to relieve the shortage of programming and programming management talent would be to start treating women as true equals — if indeed they are only that (page 112).

Additionally, at another point in the book, he refers to a female employee as "an attractive young thing" (page 48). Most women would probably consider themselves better off without allies like this.

4.4 Bad Consequences of Raising Consciousness

While consciousness-raising is beneficial overall, it has several negative effects. After hearing how other women have been mistreated, women sometimes become hypersensitive, particularly because they do not necessarily know which person made which egregious statement that they have heard third-hand. Men, too, also can become unnecessarily inhibited in their actions with females, and the victim of hypersensitivity could cause them to be suspicious of just complaints.

4.4.1 Female Hypersensitivity

One consequence of increasing awareness of sexism is that women may then expect it and treat men with more suspicion. For example, at MIT, there

7Chow, Stanley T. H. Article 17988 of alt.folklore.computers, date unknown.
were many cases of men misinterpreting women's friendliness as expressions of romantic interest [MIT 1983, page 14]. While women should know that their behavior could be misinterpreted, such knowledge has negative effects as well:

Some women react by becoming wary of all new men they meet. Thus, some men are confronted with negative reactions from women to seemingly innocuous, friendly overtures [MIT 1983, page 4].

Men who have been overreacted to are likely to, on the basis of a misinterpreted event, treat women's complaints with skepticism. This phenomenon is also illustrated by the following letter from a male computer science student:

First, let nothing I say leave you with the impression that I don’t believe sexism or racism exists. However, I think that many incidents are incorrectly interpreted.

I am TAing the introduction to AI this semester. After I graded and returned the first assignment some woman and her boyfriend questioned me about the grading. Her grade was somewhat below his (about 5 out of 30 points I think). Her homework was one of the sloppiest ones in the class, and probably deserved a lower score but I had been instructed to grade generously for the first assignment. Among her arguments was something about how hard she had worked on it (there was no evidence of hard work). And something about how she and her boyfriend had done it together. Ignoring the possibility that this was cheating (cooperation was not allowed) I felt that there was some implication that she felt I was giving her a low grade because of her gender....

Since then I have talked to her several times. At first I think she may have worried that my grading was gender biased, but I don’t think she now believes that.

By the way, I did a very rough check of my grading records some time ago. By sorting the class by average grade and eyeballing the result I think that about 1/3 of the women are in each of the top, middle, and bottom thirds of the class.

Also, there have been cases where women have gotten upset at unwanted physical contact, such as being patted on the back by a man, before finding out that he treats both men and women in that manner. (Of course, there are many more cases where men only try to touch their female colleagues.)

Because of consciousness of discrimination, sometimes people who are “obnoxious to everyone” get falsely accused of sexism or racism. For example,

‘General’ harassment often takes a specifically sexist form when applied to women.... Instead of saying to some average white male, ‘Your work on this project has been inexcusably sloppy, you blinking
"idiot; you’ll never make it that way!’, the remark may come out, ‘My God, you think no better than my wife; why don’t you go home and have babies!’ [Rowe 1990, page 159]

Additionally, reports and anecdotes are filled with anonymous examples of sexist statements by male professors, staff, and students. After hearing such things, a female student has no idea which people around her hold such disturbing attitudes and is likely to distribute her distrust among the guilty and innocent alike.

4.4.2 Male Hypersensitivity

After men are made aware that women are unhappy with receiving unwanted and improper attention from male colleagues, there is the risk that they will be hesitant to socialise with females. This phenomenon followed the distribution of the MIT report on discrimination [MIT 1983, page 19]. Because informal interaction is an important part of the educational process, this represents a serious loss. For example, it is not uncommon for professors to have meals with their students. It would be a shame if they failed to invite their female students, out of fear of being misunderstood.

Hypersensitivity on both sides occasionally escalates an innocent incident into a colossal misunderstanding. When “Jane” was interviewed for a job by “John”, she found the interview style strange. John spent almost all the time talking about the company and appeared uninterested in hearing Jane say anything about herself. Jane mentioned she thought this style odd. Later, she spoke to a friend “Mark” who had worked at the company and was friends with John. He said that John had said that Jane was suspicious at the interview and seemed to think that she was being interviewed purely for quotas — i.e. that they were not interested in her qualifications. This idea had never crossed Jane’s mind — until that point. After Mark made some further statements about how the company’s leaders were opposed to affirmative action, Jane decided it was likely that the reason she had not been asked many questions was because they did not want to hire a female. She felt confident of this conclusion when they offered a job to a male whom she considered to be of equal skill to herself. A few days later, however, they invited her for a plant visit and offered her a job. Thus, both John and Jane incorrectly leapt to conclusions.

4.5 Summary

Even when people genuinely want to encourage women in computer science, their plans sometimes backfire or have mixed effects. Good intentions do not always lead to good results. This is emphatically not an argument against working to help women; rather, I mean to alert people to carefully consider the
consequences of their plans and to work to minimize any negative effects. My recommendations for effective behavior are in the next chapter.
Chapter 5

Recommendations and Conclusions

A taste for the abstract sciences in general and above all the mysteries of numbers is excessively rare; one is not astonished at it; the enchanting charms of this sublime science reveal themselves only to those who have the courage to go deeply into it. But when a person of the sex which, according to our customs and prejudices, must encounter infinitely more difficulties than men to familiarize herself with these thorny researches, succeeds nevertheless in surmounting these obstacles and penetrating the most obscure parts of them, then without doubt she must have the noblest courage, quite extraordinary talents and a superior genius — Gauss to mathematician Sophie Germain.¹

As the data from women's career studies and anecdotes from personal experiences of women professionals begin to accrue, one of the questions that arises is not 'Why are there so few successful professional women?', but rather, 'How have so many been able to survive the vicissitudes on each rung of the career ladder?' — Dorothy Zinberg²

There are a large number of factors that discourage women from becoming computer scientists and computer professionals. From early childhood, females are treated differently from males, and, to become computer scientists, they often have to face problems that males do not have to deal with. In this chapter,

I suggest how people can work to counteract these effects. Because this chapter is based so heavily on material earlier in the report, I recommend that earlier chapters be read first.

5.1 Recommendations

The recommendations are divided into four categories: programs that could encourage women in technical fields, ways for women to build their self-image as scientists, ways for women to deal with biased behavior, and suggestions for men and women who wish to encourage women in the sciences.

5.1.1 Programs and Policies to Encourage Women

Programs that could be implemented to encourage women are discussed by [Keith et al 1990, Leveson 1989, Sandler 1986], and interested readers are urged to read the full suggestions in these documents. Many of the following suggestions are from these sources. While the suggestions are geared to universities, most can be adapted to industry as well. Recommended actions are:

- **Making clear that sexual harassment will not be tolerated.** Individuals in supervisory positions, such as professors or managers, should make it clear that they will not tolerate sexual harassment. Not only would this discourage such behavior, but harassed females presumably would feel more comfortable reporting any problems that do occur to supervisors who have made it clear that they are aware of the possibility of sexual harassment and want to fight it. One way an EECS department head did this was by announcing during a graduate orientation session that sexual harassment was unacceptable and that any harassment victims or witnesses should alert someone in a position of authority. See [Rowe 1981, Rowe 1985] for advice on implementing effective programs to fight sexual harassment.

- **Educating all members of the academic community — including board members, administrators, faculty, students, and staff — about professional climate issues; the various forms differential treatment takes; and the institution's commitment to ensure equitable treatment** [Sandler 1986, page 17]. One way many schools do this is by teaching about subconscious discrimination when training graduate students to be TAs.

- **Establishing a dialogue with women in the department to make sure their concerns are being communicated and addressed.** Many women have given thought to how their department could be improved but are never asked.

- **Regularly gathering data by sex, race, and age covering areas such as salary, benefits, promotional analyses, special perquisites, awards, grants,
courseload, advising load, committee assignments, and so on to determine if men and women at all ranks and within all units are treated equitably with regard to responsibilities and rewards [Sandler 1986, page 18].

- Making equitable treatment of women and minorities part of the formal reward structure. For example, when evaluating performance, give commendations to individuals and extra positions to departments that excel in this area [Sandler 1986, page 19].

- Providing a method for individuals to turn off the tenure clock so they can have children without sacrificing their career.

- Providing opportunities for professors to serve as mentors to students or for graduate students to mentor undergraduates.

- Making sure that female students are involved in research. Much of the information about research opportunities, particularly at the undergraduate level, is communicated informally, and some students may be left out. Additionally, if pre-college experience is a prerequisite for undergraduate research, women and minorities, who tend to enter with less experience, may fall further behind. This could be avoided by informing students what knowledge is needed for interesting jobs and encouraging them to take such classes early, or by setting aside money for research groups that are willing to provide training.

5.1.2 Ways for Women to Build Self Image

As described throughout this report, being a woman in computer science is unusual in that the majority of one's peers are male and many people, consciously or subconsciously, expect the men to perform better. These expectations are subtly communicated to both males and females. Fortunately, there are many ways that a woman can increase her self-confidence and her self-image as a computer scientist.

Attending Classes with Other Women

A female computer science student often find herself in a classes where she is one of the only women. Additionally, she is likely to have few, if any, female professors. Even in the absence of being treated differently, this is likely to affect a student's self-image and perceptions of women. In reality, females in coed classrooms are usually treated differently from the males:

[T]eachers praise boys more than girls, give boys more academic help and are more likely to accept boys' comments during classroom discussions... While girls sit patiently with their hands raised, boys literally grab teacher attention. They are eight times more likely than
girls to call out answers ([Sadker et al 1985] in [Van Nostrand 1990, page 187]).

(See also Section 1.2.1.) By taking classes at women's colleges or in women's studies, which almost always have a large majority of women, female students feel free to more actively participate in the classroom and are taken more seriously by teachers and other students. While advising technical females to consider single-sex high schools and colleges may appear counter-intuitive, particularly because these schools often have less adequate laboratory facilities, studies have shown that females at single-sex schools study more science and mathematics than those in coeducational schools [Kelly 1982, page 499], are more likely to continue in science [Ferry et al 1982, page 27], and are disproportionately successful compared to other women [Gilbert et al 1983].

Another advantage of women's studies programs is their emphasis on women's achievements. One female computer science student had the following experience:

> When I entered my first women's studies class, on literature written by women, I expected to encounter second-rate works that were only being taught when the ground rules eliminated male competition. Instead, the books were first-rate, and I wondered why I had never read them before. The class taught me that women's achievements had often been overlooked. (I had been pretty misogynic before that.)

Because of men's numerical and figurative dominance in engineering classes, a student in a women's studies course can find herself listening to vocal female students for almost the first time since entering college.

Another benefit of women's studies programs is that they document the barriers women have faced. It is important for women to realize that the paucity of women in the field does not imply that women are inherently unable and that negative behavior they encounter may be due to their sex and not to any actual shortcomings on their parts.

Female Role Models

Finding female role models and mentors can also be helpful to a woman's self-image. While male mentors are certainly useful, and many women are happy with male advisors, female role models serve the additional purpose of providing a living example of a successful female scientist. One study found that “[f]emale graduate students who identified female professors as role models viewed themselves as more career oriented, confident, and instrumental than did female students identifying male role models” [Gilbert et al 1983, page 597], although, as the report notes, self-selection may also have been a factor [Gilbert et al 1983, page 605]. As noted in [Leveson 1989, page 20]:

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The importance of mentoring and role models cannot be stressed too much. One female student ... wrote about her experience in a summer job working for a female manager who she described as: ‘one of the most respected people in the company. I had never expected that having a female role model would change the way I felt about myself, but it did’.

Thus, a female student should consider finding a senior woman in her field to work for at school or during a summer job. While a person’s sex should not be the primary factor in choosing a mentor, spending some time with a female role model can be psychologically beneficial. (See also [Simeone 1987, pages 104-109].)

Women’s Groups

In part because female computer science students so outnumber female professors, one-to-one contact is not always possible. Many schools have get-togethers for women in computer science or engineering, ranging from informal annual meetings to regular meetings of the Society of Women Engineers. Women find these activities useful for receiving encouragement and advice, and they “generate a lot of good feeling” [Leveson 1989, page 23].

Perhaps the most effective group currently existing for women in computer science is an electronic mail discussion group with over seven hundred members which provides women with a “forum for discussion of both the problems and joys of women in our field and a medium for networking and mentoring” [Frenkel 1990, page 36]. Women share advice on female-specific topics such as the best time in one’s career to have children, how to dress for conferences, and how to deal with sexism, as well as general-purpose networking. The list is particularly important to women in computer science because they are so dispersed and might not otherwise be able to interact with many other female computer scientists and engineers. Being part of a discussion group with hundreds of female computer scientists can change a woman’s default image of a computer scientist from male to female (or neutral) — quite a difference from a student’s academic experience, where two thirds of the computer science departments have zero or one female professors [Gries et al 1991].

5.1.3 Ways for Women to React to Biased Behavior

In cases of blatant sexual harassment, a woman can usually complain to some authority. In less clear-cut but nevertheless offensive situations, this option is often not open. While acting as a group and writing a report was effective for women at MIT [MIT 1983] and Carnegie-Mellon [CMU 1989], often women must react individually to behavior they find unacceptable.
Reacting to Subtle Discrimination

As discussed in Section 1.2.1, women are often the victims of subtle subconscious bias. For example, a woman may find that comments are primarily directed to men in a group, unintentionally leaving her out. If the woman does not feel comfortable directly confronting the individuals in question, there are more diplomatic methods of calling the behavior to the person's attention:

- In a meeting of three computer science students, the sole female found herself ignored by one of the male participants. Whenever she asked him a question, he directed his answer to the other male present. (See page 12 of this report.) After the meeting, the woman took him aside and mentioned that she had noticed he had directed his answers to [John] and asked, in a concerned way, whether she had done anything to cause this behavior. When he replied that she had not done anything wrong and began to apologize, she dismissed his apologies by saying that she was just relieved she had not given him any negative signals. He continued to apologize.

The indirectness of her approach allowed the man to save face while still communicating the point. It appears to have been effective, because, when she saw the man later in the day, he made eye contact and spoke directly to her.

- At a social occasion, a young woman found that a male relative directed serious discourse almost exclusively to her brother and not to her. When the woman was alone with the relative, she said to him, 'I hope I haven't given you the idea I'm not interested in your opinions on [X]. I noticed you directed your comments about it to [John]. I want you to know I am interested in what you have to say on the subject.' The male relative replied, sincerely, that he had not realized she was interested in the topic and would include her in the future.

While some people might object to these oblique methods, as they involve the victim's pretending to put the blame on herself, they are effective in situations where the woman does not feel comfortable being more direct, and they often elicit an apology.

Reacting to Overtly Sexist Comments

Indirect methods are also often more effective than direct means for dealing with offensive sexist and sexual comments. As mentioned in Section 2.2.2, the only consequence of complaining is often that one is dismissed as a 'feminist'. In a recent column in The New York Times, a woman described her experience as a college journalist:
Though I was militantly middle of the road in perspective, by the second time I mentioned sexism in print I was pegged. People I met seemed to treat me like a Marxist, a radical, a testosterone-fueled male-basher; others asked me why I suddenly hated men so much; and certain folks at home warned me that I was going to jeopardize my future by scaring off potential male suitors [Kamen 1990].

Two techniques that are often more effective than anger (even when justified) are role reversal, which involves the substitution of other terms for female terms, and humor. Combinations of these two techniques are especially effective.

**Role Reversal** Treating men in the manner in which they treat women can be an effective response to poor treatment:

- One female computer scientist said:
  
  I'm much more often complimented for my dress, my hair, or my accent than for the content of what I say and do. So I just turn the compliments around and tell men how pretty their ties are, or how the cut of their jackets bring out their broad shoulders. They squirm under such scrutiny just as we do [Frenkel 1990, page 41].

- When a group of men were unable to understand why women in the workplace were offended by posters of naked women, a woman put up a huge picture of a naked man. She was asked to take it down, communicating her point.

Substituting terms pertaining to race instead of sex can also be effective:

- Someone who does not understand why it is offensive to call a grown woman "girl" should be asked whether they would call an adult black male "boy", something that also used to be considered acceptable.

- A female computer scientist related the following story:

  [A few years ago,] I wrote to Time Magazine to register my opinion about a 'humor' piece titled 'Women Are Getting Out of Hand', which included lines like 'Women are getting too big for their britches'. I suggested that they would not be likely to publish articles like 'Blacks Are Getting Out of Hand' or sentences like 'Hispanics are getting too big for their britches'.

See also the passages in Section 3.3.3, which, while impractical for conversation, also make the point.

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3 Actually, the reason she was asked to take it down was because a nearby man was afraid he would be suspected of being homosexual.
Humor is effective for several reasons. First, when men make offensive remarks, if someone protests, they retort: “Can't you take a joke?” When a woman uses humor to protest an offensive remark, she can offer the same response if challenged. Additionally, humor breaks tension and often allows one to point out that something is wrong without a direct confrontation.

One female computer professional told the following stories:

- Shortly after my appointment, my boss, V.P. of Administration, called a meeting to discuss the problems of the center. All of the attendees were male and deans or equivalent high positions. The discussion in that meeting was quite heated with adamant remarks about the problems in computing on campus. Towards the end of the meeting, one of the attendees started pounding on the table and reviewed the names of the previous male directors of the center, ending with the comment, 'No offense meant, Jane, but we need a man in this job.' I responded with, 'I'm willing to do almost anything to fix the problems in the Computer Center, but a sex change operation is out of the question.'

That turned out to be the perfect response — I got my point across and it broke the tension with laughter. The moral of this story is, that if you can make your point with humor, the message goes down easier.

- Another time, I received in the mail an advertisement from a company that sells disk drives. The advertisement was included in a box that contained Havana cigars. (Obviously, this company assumed that the mailing list they had of CIO’s were all men). I wrote a letter to the VP of marketing for the company telling him that I thought that one of his competitors were trying to undermine the intelligence of his marketing organization by sending cigars to female decision makers in his company's name. Two days later, I received a federal express delivery from him — it was a bottle of perfume with a letter of apology. I thought his response was a good recovery.

A computer science professor told the following story:

When I first starting teaching 13 years ago, I was married at the time and both my husband and I had teaching positions in the same department. My department head was sitting in my class (at the time we were in a joint math and CS department and my department head was retraining). One day, one of my students referred to me as Mrs. [Smith] in class and I was feeling pretty frustrated by that point since I had noticed that I kept getting called ‘Mrs.’ while my husband was [called] ‘Dr.’, so I looked at him and said ‘What do you call Karl?’, and he replied ‘Dr. [Smith]’. So I told him that I'd appreciate it if he would use the same title for me since I had the same degree. Well, he wasn’t the type to quiet down quickly, so he
retorted, 'And what does Karl think of your feeling that way?,' to which I replied angrily, 'It doesn’t matter what he thinks; it was a helluva lot harder to get a Ph.D. than it was to get married.' Word apparently got out to the students after that because I wasn’t called ‘Mrs.’ for quite some time. (Of course, I was shaking by the time class ended wondering what my department head thought of that reaction. He never did say anything about it.)

Female computer scientists have combined the techniques, role reversal and humor, as in the following incidents:

- A female computer scientist reported:

  A few years ago I was at a workshop held way out in the country.... There were about forty people there. I don’t remember how many were women, but there couldn’t have been many.

  At one point we were sitting around singing, and after a while someone started one of those make-up-a-verse of your own affairs.... It went around for a while, and someone offered,

  I know a girl, her name is Jill.
  dum-de-dum de dum-dum-dum-dum
  She won’t do it, but her sister will.
  dum-de-dum de dum-dum-dum-dum

  Well, I can’t carry a tune in a bucket, but I co-opted the next verse:

  I know a guy, his name is Bill.
  dum-de-dum de dum-dum-dum-dum
  He won’t do it, but his brother will.
  dum-de-dum de dum-dum-dum-dum

  Everyone laughed, and I thought the matter was settled. But some people won’t give up, and a few rounds later, the same fellow came around with:

  I know a girl, her name is Sue.
  dum-de-dum de dum-dum-dum-dum
  She won’t do it for me, but she’ll do it for you.
  dum-de-dum de dum-dum-dum-dum

  Drat! Can’t back down now ... I got as far as:

  I know a guy, his name is Lou....
  when the rest of my colleagues shouted down the offender.

- A female computer science graduate student reported the following incident:
A [campus] career recruitment poster, several years ago ... made quite a splash. The poster portrayed two men in shirts and ties picking up a printout off a line printer, dropping the fanfold paper all over the floor as they ogled at a woman walking by in a miniskirt. The caption: ‘We think about more than just work here at [Company Name].’ Outraged women began tearing the posters off the walls, then (insert light bulb here) they instead made photocopies and put them up in great numbers all over campus. Meanwhile, the recruiters figured out something was wrong and tried desperately to get rid of them. A number of women went to the recruitment talk to disrupt it, and found that they were the only ones there. Several hack posters were created, for example one with two women in businesslike garb poring over a printout while a scantily clad beach-boy type walked by, with the caption, ‘We think about more than just sex here at [Company Name].’ I believe the president of the company issued a formal apology afterward. This one is notable as much for the reaction of the student body as for the poster itself.

5.1.4 Ways for Individuals to Encourage Women

Most of the suggestions in this section involve avoiding behavior that was described elsewhere in the report as potentially offensive. Because the reader is assumed to have read the rest of the report, a minimum of justification appears in this section.

Fighting Subconscious Bias

As described in Section 1.2.1, many people treat men and women differently without realizing it. Once people understand that it is possible for a well-meaning person to unintentionally discriminate, they should train themselves to oversee or spot check their behavior to make sure they do not behave in such a manner. Anecdotal evidence suggests that, once people become aware of subconscious bias, they often catch themselves behaving in such a way. This is true of women as well as of men. Fortunately, once a person is aware of the problem, the behavior is usually easy to change. Examples of behaviors to avoid are:

- Assuming, without any information, that women should be given easier questions or projects than men.
- Paying more attention to remarks made by men than by women.
- Assuming, when introduced to a team, that a male is the leader and primarily addressing comments to him.
- If a man, being more friendly and encouraging to male peers and subordinates than to females, even if it is out of a desire to avoid having one's friendliness mistaken for flirtation.

- Assuming that a woman will not pursue her career as seriously as a man because she will leave her job to have children. While some women take time off for children, all women (and no men) are hurt by this prejudice.

Additionally, one can help counteract another person's subconscious bias by either discreetly calling it to the person's attention or by directly offsetting it. For example, if a female colleague keeps getting interrupted or ignored, one can express interest in what she is saying without directly telling people to listen to her, which might be interpreted as patronizing.

A female graduate student provided me with some positive examples of how her advisor treated her. In addition to generally treating her with respect, by giving her challenging projects and the necessary resources to complete them, there were two specific things he did that especially impressed her:

- When the student was preparing a paper the two of them co-authored for a conference, she made a dozen copies to send in, as required by the program committee. When her advisor saw her collating them, he told her that she should have had the group secretary do that. The student was impressed with this remark because she felt other professors might see nothing wrong with a female's doing clerical work but would have only redirected male students to a secretary.

- When the student proofread a paper for her advisor, he thanked her by name in the acknowledgments "for her careful proofreading of this paper and [acknowledged] her ongoing study of [related research area]." By mentioning her research area, the advisor made clear to readers that, despite her female name, she was not a secretary.

Avoiding Unintentionally Offensive or Discriminatory Behavior

While any well-intentioned person avoids behavior that they know to be offensive, some people do not realize that certain behaviors, discussed throughout this report, offend some women. Good intentions are no guarantee that women will not get the wrong message. For example, a woman might feel uncomfortable with a man who has revealing pictures of women on his walls or computer screen. Additionally, by not using language that could be interpreted as sexist, such as "he" for the generic computer architect and terms like "manpower", women feel more included. One positive example is the name on a sample application for the United States Department of Defense fellowships, included in the instruction booklet: "Smith, Dana Robin." Both "Dana" and "Robin" can be either female or male names. Another positive example is the alternating
usage of "he" and "she" as the default singular program in chapters of the influential *Computer Architecture: A Quantitative Approach*, by John Hennessy and David Patterson. There are many guides to "nonsexist" communication, such as [Persing 1978].

Someone who supervises a research or work group or organizes its events should try to choose activities at which all group members would feel comfortable. While it is not always possible to choose an activity that everyone relates to — for example, some people are uninterested in any sport — an effort should be made to include everyone in at least some of the social occasions. I have seen people repeatedly left out of social activities springing from the workplace because they are poor athletes or disabled, have unusual dietary requirements, or do not drink alcohol. Anyone who cannot socialize with the group will not feel as though they fully belong. (Conversely, anybody who does not want to socialize with the work group, for whatever reasons, should not be made to feel unwelcome as a worker.)

**Encouragement**

Some professors rarely encourage or praise their students, but such encouragement, even if just a few spoken words, is greatly appreciated and rarely forgotten [Widnall 1988, page 1743]. For example, suggesting that a student consider graduate school can make a substantial difference [Leveson 1989, page 23]. In one survey of female scientists, "[t]he encouragement of teachers — along with that of fathers — was the influence most frequently quoted as steering [them] towards science" [Ferry et al 1982, page 27]. In practice, women often do not get encouragement from teachers and guidance counselors ([Cooper Union 1989 in] [Baum 1990, page 48]). While encouragement should be directed to worthy males and females, it has greatest effect with people who receive little encouragement and who have low self-esteem, often women [Zappert et al 1984, page 3]. (See, for example, page 10 of this report.)

Additionally, it is important for parents to encourage their daughters as well as their sons in technical areas. "According to one computer camp director, 'Mothers bring their boys to the classes. Girls have to beg to enroll'" [Hess et al 1985, page 201]. Even if parents do treat their children equally, it is impossible to make girls feel that it's as normal for girls to use computers as it is for boys, with all the biases in our society (Section 1.1.3) and in children's toys and computer games (Section 1.1.2). Nevertheless, it is clearly important to encourage one's daughters, and many female computer scientists attribute their career choice and success to parents who encouraged them.

**5.1.5 Discussion**

Readers will notice that there are many situations for which I made no recommendations. For example, I had no advice for the woman who told me about
dining with a group of men after a conference who then began telling jokes that were specifically degrading of women. I also have found myself with nothing to say when a brilliant female graduate student says she avoids a certain research area because of the specific men at the university involved in it. Unfortunately, there is a substantial class of behavior which is both offensive and non-actionable.

5.2 Conclusions

A common thread through the previous chapters is that, for the most part, people are not consciously trying to discourage women from science and engineering. Instead, people's behavior is often subconsciously influenced by stereotypes that they may not even realize they have. Additionally, when companies direct technical games and products to men, their intent is not to perpetuate stereotypes but to target the largest existing audience. That some women feel uncomfortable in mostly male environments is not primarily a result of men's trying to make them feel unwelcome but of dynamics resulting directly from the male majority and societal sex-based differences in behavior. While perhaps it is comforting to know that no conspiracy exists against female computer scientists, it also means that the problem is harder to fight. The negative influences described in this report are so varied and decentralized that there is no simple way to level the playing field.

One positive factor is that women and other underrepresented groups are becoming a crucial resource pool. The number of white males of college age is decreasing, while the need for engineers and scientists is increasing [Leveson 1989, page 7]. I have been told this is causing even the most conservative businessmen to begin aggressively targeting women and minorities as highly-trained technical workers.

Another reason for optimism is seeing how greatly the situation has changed. Although discrimination against women continues, it is nothing compared to the level earlier this century or in the previous one, as some of the quotations at the beginning of chapters have indicated. Unfortunately, there has been retrograde motion before: In the 1920s, feminist activity reduced sexual discrimination at prestigious universities, but "this trend toward equity was reversed in the 1930s and not resumed until the 1960s" [Simeone 1987, page xi].

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Appendix A

About This Paper

A.1 Data Collection Methods

In this document, I include some anecdotal evidence in addition to quoting other studies and reports. One way I solicited information was through computer networks. I posted requests for information to private and public electronic mailing lists — that is, systems that allow a person to send messages from their computer to the computers of other people. My initial request is included in Figure A.1. It was sent to a private list of women in computer science and the following public “newsgroups” (electronic bulletin boards): comp.society, comp.misc, alt.folklore.computers, comp.edu, soc.women, and soc.feminism. From the net, I got roughly 150 responses. Some of these included pointers to published reports or to examples of sexism or anti-sexism in published works. These letters often included reactions (such as “I found such-and-such upsetting”) and opinions (“I am opposed to such-and-such”). Other letters included anecdotes. Some of these letters were from sources I had reason to trust (friends of friends); for others, I had no way of verifying any stories. Other categories of letters were polite dissent and “flames” — attacks from people who disagreed with whatever they inferred from my call for information. As described in the introduction, I also learned from my critics and attackers.

The data in my paper falls into the following categories:

1. Published statistics.
2. Quotations from computer books or magazines.
3. Events I have personally witnessed or taken part in.
4. Quotations and paraphrases from published and unpublished reports.
5. Anecdotes and opinions from people I know.
For one of my classes ("Women and Computers"), I'm doing a project on ways in which the message "Computers/Science/Engineering isn't for girls/women" (or the opposite) is communicated. Some examples would include:

- Computer ads featuring scantily-clad women.

- An ad I received for a pink calculator that could fit in my "chic little handbag", with large keys to keep from breaking one's "gorgeous nails." (Their words, not mine.)

- Being treated differently by teachers or coworkers.

I've been collecting some of the more egregious examples for the past few years, and I'm hoping some of you have your favorite examples. I am interested in xeroxes or references to items in print as well as anecdotes. Despite the one-sidedness of my examples, I am interested in both pro- and anti- female material. Please email me (erspert@athena.mit.edu) or physically send material to:

Ellen Spertus
MIT AI Lab, room 630
545 Technology Square
Cambridge, MA 02139

I will send copies of my report to anyone who contributes and/or is interested. Thanks in advance for any help.

Figure A.1: Call for Data
6. Anecdotes and opinions from friends of friends.
7. Anecdotes and opinions from people I don't know.

Readers will have their own opinions on how much credence to give to each category. The only category I have qualms about is anecdotes from people I do not know. Consequently, I have never based an argument entirely on them. Unfortunately, anonymity was important to many people who gave stories, and I decided all contributions, except from published or privately-distributed reports, would be anonymous and contain as little identifying information as possible. In my records, I have the source of every piece of data or story, in context. If any reader, for their own studies or peace of mind, needs to know the trustworthiness, coefficient of a given anecdote, they can contact me, and I will provide whatever further information I can without violating anonymity. While false anecdotes could have been passed on by dishonest or misinformed sources, it is highly unlikely that more than one or two, if any, exist. In any case, I have prefaced unvouched-for opinions and anecdotes to indicate the level of indirection, i.e. "a female graduate student wrote such-and-such" instead of "a female graduate student had the following experience".

A.2 The History of the Document

This paper was begun during the spring of my senior year, as a term paper for a course entitled "Women and Computers", taught by Prof. Sherry Turkle. Because the paper was so long and because I had other graduation requirements, I did not finish it until the following January, when I presented the paper during MIT's Independent Activity Period. I also distributed the paper through electronic means, mostly to female computer scientists, some of whom further distributed copies. Because of the interest the paper generated and the support of the department, I decided to turn it into an Artificial Intelligence Laboratory technical report, the simplest way to semi-publish a document.

I had expected negative reactions to my report, on the net and at MIT, but I was pleasantly surprised. Only a few netters sent negative email, and nobody at MIT gave me any trouble. In fact, the head of the EECS department, Prof. Paul Penfield, was supportive of the project, providing xerox money, and read the report. The associate head for CS, Prof. Fernando Corbató, attended my talk. A number of computer science professors, male and female, also read the report and expressed encouragement.

I made many changes between the original and this version of the report. In addition to correcting typos, changes were:

- Correcting misleading statistics.
- Incorporating anecdotes and reactions sent in response to the original report.
• Including material from additional articles and books.

• Reworking the section on affirmative action to correct my prior misconceptions.

• Removing an email conversation with a “flamer” that had been included as an appendix.

• Adding an appendix on advantages women have.

• Adding quotations to the beginning of the chapters.

The differences between the two versions are large enough that I would now prefer people to treat the original as a draft and not duplicate or quote it.

A.3 MIT

“Barriers to Equality in Academia: Women in Computer Science at MIT” [MIT 1983], published in 1983 and describing some of the problems faced by women at MIT was distributed widely. Unfortunately, some people incorrectly inferred that MIT was a worse place for female computer scientists than other schools. There is no reason, however, to think that it was any worse than other CS departments. In fact, it was probably better, since there were enough women at MIT to write such a report and the administration was supportive enough to encourage it. I want to take this opportunity to defend MIT’s reputation.

Specifically, MIT’s CS department is more supportive of women than other schools’ in the following ways:

• There is support for reports such as “Barriers to Equality” and this one.

• The sensitivity of the department has been increased by these reports. This may be the reason I do not see pictures here of nude women on walls or computer screens, still common in other places.

• There is an unusually strict policy against romance between faculty and students. Professors are not even permitted to date students in other departments.

• There are no sexist or harassing professors that female graduate students warn each other about.

• There are four female professors, three of them tenured, all of whom have expressed support of female students in one way or another. As of 1989, only 9 departments nationwide (5.6%) have this many women [Gries et al 1991].
MIT has an outstanding ombudsperson, Prof. Mary Rowe, who deals with bias complaints effectively and tactfully. She is a pioneer in the study of subconscious bias [Rowe 1990, Rowe 1981, Rowe 1985].

Each of these points does not hold for many other computer science departments.

A.4 How to Obtain Additional Copies

Readers are free to make photocopies of this report or sections of it, as long as they are not distributed for direct commercial advantage, and as long as I receive credit as being the author. For information on obtaining additional copies, contact the publications office of the MIT Artificial Intelligence Lab at publications@ai.mit.edu, 617-253-6773, or at the following address:

Publications
MIT Artificial Intelligence Laboratory
545 Technology Square
Cambridge, MA 02139

If you are connected to the Internet and have access to a Postscript printer, you can obtain additional copies of this report through anonymous ftp by following these steps:

1. Change to a directory, such as /usr/tmp, with plenty of free space.
2. Type: ftp ftp.ai.mit.edu, or, if that fails, ftp 128.52.32.6
3. At login prompt, type: anonymous
4. For password, enter your user name (or any string)
5. Type: cd pub/ellens
6. Type: mget womcs*.ps, replying y to the prompts.

If you have access to a Postscript printer but not ftp, send electronic mail to ellens@ai.mit.edu, and I will email you the report.
Appendix B

Sex-Based Intellectual Differences

I deny that anyone knows, or can know, the nature of the two sexes, as long as they have only been seen in their present relation to one another.... What is now called the nature of women is an eminently artificial thing — the result of forced repression in some directions, unnatural stimulation in others. — John Stuart Mill

Dr. Edward H. Clarke's book Sex in Education, or a Fair Chance for the Girls [1873] was the great uterine manifesto of the nineteenth century. It appeared at the height of the pressure for co-education at Harvard, where Clarke was a professor, and went through seventeen editions in the space of a few years. Clarke reviewed the medical theories of female nature — the innate frailty of women, the brain-uterus competition — and concluded, with startling but unassailable logic, that higher education would cause women's uteruses to atrophy.

Research on Biological Differences

A large amount of research has been done on biological sex-based differences in various kinds of intelligence. Sociobiology is a tricky field, because it is difficult to separate the effects of environment and genetics on individuals. As this report has shown, environmental differences can be immense. Many studies in this field have been flawed by the lack of adequate controls. For example, some studies

of differential mathematical ability have failed to take into account that the male subjects had taken more math courses than the females [Petersen 1980, page 33] or used different types of toys as children. Researchers have generally found that men tend to have superior spatial ability, while women have superior verbal ability, with both differences developing at puberty [Petersen 1980, pages 31-33]; however, the interplay between biological and social influences is not yet understood [Petersen 1980, Kramer et al 1990]. As discussed earlier in the report, boys are given more toys that would encourage development of spatial skills, while girls are spoken to more by adults. The argument for biological differences, however, was recently bolstered when Doreen Kimura found “that hormonal levels can affect people’s performance on certain verbal and spatial tests” [Holloway 1990, page 40].

Reactions

People’s reactions to these facts vary. Some people conclude that it justifies women’s lack of participation in traditionally-male fields. However, powerful arguments exist against taking such a stand:

[B]iological factors cannot be the complete answer. In other countries, particularly in Eastern Europe, large numbers of women study science successfully, despite any biological handicap. Nor are biological predispositions necessarily relevant when formulating education policy. Girls usually score better than boys on verbal tests, and boys have more difficulty than girls in learning to read. But schools do not take this as a reason for letting boys drop out of reading classes. Quite the reverse: most schools have remedial reading classes which are used predominantly by boys. Teachers put extra effort into teaching boys to read to make up for any deficiency, whether its origin is biological or social. The same could be done to boost the spatial ability of girls if the problems were considered equally serious [Kelly 1982, page 497].

Additionally, the field of feminist technology argues that technology can legitimately be taught in a manner that plays more to women’s strengths, be they biological or environmental, not relying so heavily on fields like mathematics in which men currently outperform women. For example, Sherry Turkle and Seymour Papert found:

When we looked closely at programmers in action we saw formal and abstract approaches; but we also saw highly successful programmers in relationships with their material that are more reminiscent of a painter than a logician. They use concrete and personal approaches to knowledge that are far from the cultural stereotypes of formal mathematics [Turkle et al 1990, page 128].
Student programmers with the less mathematical style, sometimes men but usually women, are discouraged when in classes that force a more mathematical approach [Turkle et al 1990, pages 131-132]. Turkle and Papert advocate "epistemological pluralism", in which different approaches are allowed to flourish. Similarly, Sally L. Hacker argues convincingly that more mathematics than necessary is required by engineering programs, weeding out students who would be able to succeed as engineers if they did not have to pass timed calculus exams [Hacker 1983]. As one female computer science professor writes:

"[T]here's a committee at the [X] engineering school trying to redesign the school-wide common core curriculum, for freshman and sophomore years. I asked our department's representative to the committee to bring up that the current common core tends to discourage females and minorities because it's too heavily math and engineering oriented (and most of these courses are not needed for CS), and does not provide options to take courses in more people-oriented fields (that are relevant to CS) such as psychology. Apparently the committee chairman said to our representative something to the effect that it is not the mission of this committee to address women and minorities, and thus he would not put this issue on the agenda."

Conclusion

It seems possible that there are biological differences in the way men and women think; certainly, there are current differences in men's and women's thinking styles. There is no way to tell now how great the biological differences are. While they may imply that women will never reach parity with men in computer science and in engineering, there are two major reasons to believe that women's roles can increase greatly from today's: First, as shown throughout this report, females face immense cultural barriers. Second, as alluded to in this appendix, many technical fields play to men's strong areas. Computer science is built, in large part, on mathematics, which relies on spatial ability. Computer programming, however, does not in itself require spatial ability, and some areas of computer science, such as user interface design, require more knowledge of human psychology than mathematics. Additionally, sex-based differences are a tendency, and their degree of effect in an individual cannot be known.
Appendix C

Advantages for Women

When writing in the body of the report of all the disadvantages women face, occasionally an advantage for women would come to mind. In the name of fairness and in order to end the report on a positive note, I am including them here:

- The flip side of a woman’s being less likely to have a spouse devoted full-time to supporting her career (page 32) is that she is more likely to have a spouse who earns money. A female engineer told me how her husband’s income allowed her to quit a job she hated and spend three months looking for one that she loved.

- Although males outperform females in mathematical ability, females outperform males in verbal ability (page 83). In the academic world of “publish or perish,” being able to write clearly and properly is a large plus.

- If people are more likely to help members of the same sex (page 30), and if women are currently raised to be more sensitive than men (page 20), women will get tremendous support from their same-sex peers. (I have found my female colleagues extremely supportive.)

- It is not entirely disadvantageous that girls tend to be taught how to cook and keep house instead of how to fix bicycles (page 9). Being able to cook for oneself at college is healthier and cheaper than having to rely on cafeterias or junk food.

- While all women are to some extent penalised out of the suspicion that they will take time off their career to have children (page 33), they have more freedom to do so than men. A woman’s career can be salvaged if she takes time off to spend with her young children, but a man would be considered insanely irresponsible.
• Ingenuity can transform other disadvantages into advantages, as explained in Betty Lehan Harragan's wonderful Games Mother Never Taught You. For example, she points out that, while women hate being constantly in the spotlight, men "fantasize about how well they could exploit such a favorable situation.... Today's pioneer women can begin taking command of situations by merely accepting their unique position in the spotlight" [Harragan 1987, page 311].

Most important, with a positive attitude, women can make the most of their situation. The successful female computer scientists I know do not say, "I could have gone further if I were a man." They say, "I had to work a lot harder than a man to get where I am." Although the two statements may be equivalent, self-assuredness is psychologically more useful than self-pity. Additionally, even women who have been discouraged sometimes succeed out of spite.
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April 26, 1982

Graduate Students, Area II

Dear Colleagues:

As fellow graduate students, you can certainly appreciate the difficulties of graduate student life. The female graduate students and technical staff suffer not only from these difficulties but also from sexual harassment. A few months ago, the women in Area II prepared a list of incidents that they considered abusive. We are enclosing a slightly revised version of the document and the cover letters that were circulated among the faculty and staff of Area II. Please take a few minutes to read the document and comment on its contents. We have attempted to disguise the incidents so that the people involved cannot be identified. This list is not complete but represents contributions from the female graduate students and technical staff.

Perceptions of sexual harassment differ markedly and many of these incidents may not seem particularly offensive. There are a few points you should keep in mind: 1) Many of these incidents are daily experiences of the women in the department. These irritations might be trivial if they happened only once, but they become significant when they have to be dealt with constantly. 2) Some of these incidents and comments were no doubt meant when they occurred to be compliments or jokes. However, this is not how they were perceived by the women involved. 3) Many of these incidents are context dependent but a full disclosure of the circumstances surrounding the incident would identify the people involved.

We would like you to help. Just by reading this document you will have helped by becoming more aware of these issues. The main thing you can do to help the situation is to consider your own behavior and how it affects the women around you. Don't expect the women to just "learn" to deal with these problems. This is placing an excessive burden upon us and doesn't solve the basic problem. These comments and incidents, which may seem "normal" or "trivial", represent biases against women and create an inequitable learning and professional environment for us. Please discuss the document with your male and female colleagues. We want to discuss and understand the difficulties on both sides of the issue.

Thank you for your time and concern.

Sincerely,

Area II Female Graduate Students and Technical Staff
TO: Area II Faculty and Research Associates

FROM: Peter Elias

RE: Lunch Topic for Thursday April 1, 1982

Our next luncheon meeting will be held on Thursday, April 1, 1982 at noon in NE43-512A.

I enclose a document prepared by all of the women graduate students and technical staff in Area II. It lists problems they have found in developing as professionals in this environment. In a covering letter they note that many of these problems are shared by women on the support staff and women undergraduates, and they ask for our help.

I would appreciate your reading this material and giving some thought to it before our lunch next Thursday, at which it will be our principal topic of discussion. While some of the problems have obvious solutions others are more subtle. Behavior which a male may feel to be courteous or helpful or protective or gallant may be felt by a woman in a professional situation to show a lack of respect for her as a fellow-professional. It is the appropriateness of the conduct to the occasion, not the conduct as such, which is often the issue.

It is tempting to shrug off some of these problems as merely showing oversensitivity on the part of the women involved. I don't think we can afford to do that, however, for three reasons.

First, many of our women graduate students heard before they came that MIT was a difficult place for women. Others, who did not apply or did not come, may have been frightened off by such reports. The percentage of women in graduate work is roughly the same in Area II as in the rest of EECS, although we have almost twice the percentage of undergraduates.

Second, the women note in their letter that many women graduate students feel uncomfortable enough here to avoid their research group or laboratory. They thereby lose a principal component of graduate education.

Third, a larger number of complaints of this general character arise from Area II than from the rest of EECS. This may be due in part to our distinctive geography and workstyle. Whatever the cause, it gives us a greater incentive to take the problem seriously.

PE:rgb
March 25, 1982
Female graduate students and technical staff, Area II.

Faculty and staff, Area II.

Dear Colleagues:

In this document we, the female graduate students and technical staff, present a set of concerns that for the most part center around the male faculty, students, and staff. All of the female graduate students and technical staff compiled the accompanying list in an attempt to communicate to the Area II community where problems lie and how they manifest themselves. This is not to be treated as an action of any single woman in the area. No one of us has experienced all of the items mentioned, but as a group we have.

Many faculty members and graduate students already serve as positive examples for showing how to eliminate or at least alleviate these problems. However, of those whose behavior contributes to the problems, some do not realize that they are doing so; ironically, some mistakenly view themselves as our supporters.

Group leaders set examples for acceptable behavior in their research groups. We ask group leaders and faculty members to recognize and discourage not only overtly offensive behavior, but also more subtle offensive behavior. Both kinds of behavior create a very uncomfortable environment for women, and therefore for everyone.

In order to avoid abuse many women have removed themselves from the community or have consciously avoided visibility, both in their research groups and in the labs as a whole. In addition, women often find that their professional development is not cultivated to the same degree as that of their male counterparts. Through their own behavior and their influence on others, group leaders can help us change these patterns.

Many of us were advised against coming to MIT because of its reputation as a difficult place for women. At times we have found this to be true. Unless we see change, some of us feel that we cannot continue to pursue our professional and personal goals at MIT.

We ask you to be sensitive to the issues raised by the list and to convey your concern to your colleagues. It might prove helpful to inspect closely how you contribute to the professional development of the women in your group.

- Do you discourage women from joining your group?

- Do you give them substantial work that is of import to your project?

- Are they given "space" to work on problems and achieve desired goals without premature interventions?
- Do they receive acknowledgment for their work and encouragement to present it publicly?

- In sum, do you encourage them to be visible as professionals in the department and the technical community?

- If not, why?

We also wish to point out that female secretaries and undergraduates have been subject to many of the problems expressed on the accompanying list. We encourage you to review your dealings with them in this light. We recognize that these problems are not unique to our department or the Institute, but we feel that it is in everyone's interest to take the lead in addressing these issues.

We look forward to your active help and support and await your advice as to how we can most effectively alleviate these ills. We greatly appreciate the working relationships that many of us already enjoy with our advisors and colleagues. We hope through sharing our feelings with you on these issues that we can improve the professional relationships among all members of the laboratories.

Sincerely,

Area II female graduate students and technical staff
1 Professional/Technical Identity

1.1 Not being taken seriously

Specific examples:

- When I was a TA, one of my students missed the lecture and saw me later. He said, "Will you come sit on my lap sometime and tell me what I missed?"

- When my work was published with only my first initial and last name, someone called up to find out more about it. When I said that I was "J. Smith", a long shocked silence followed. He couldn't handle the idea that a woman had done this highly technical work.

- During a technical discussion with a faculty member, he made an inappropriate remark about my clothing when another man entered the room.

- "Why do you need a degree for marriage?"

- A faculty member publicly stated in front of his students that a neighboring group kept a particular female student around because she was a good social secretary. It was supposed to be a joke, but instead it highlighted the fact that there were no women in his group.

- When working in a group on a machine, a male graduate student physically pushed me away from the machine I was working on so he could do his own task.

General examples:

- Any number of times I've heard men chuckle and say "Oh, <name of female grad student>" when a woman's technical opinion is mentioned.

- Bringing up sexual or personal issues in reference to a woman is a way of not taking her seriously in a professional sense. It means the man is thinking of you first as a woman and second (if at all) as a colleague.

- It's very common not to be asked for a technical opinion on a relevant subject.

- Why are we called "girls" so often? Men aren't called "boys."

Feelings and comments:

- Women at MIT are undervalued. The lack of respect rubs off on me. I constantly have to fight the sense that I'm not as good as I should be. It's discouraging.
1.2 Invisibility

Specific examples:
- I have had men ignore my questions about their work, but respond to a man who asks the same questions.
- I have been excluded from discussions. Even have had two people with whom I was trying to have a meeting pull their chairs together and start talking to each other as if they’d forgotten I was in the room.
- In response to being asked about my work, a colleague took over, gave my analysis of the situation, and said how long it would take me to do a task.
- I was in a seminar for an entire semester. When it was decided to continue this seminar, I was not included in the group notified.

General examples:
- Being ignored in discussions is a very common problem.
- I have been ignored, constantly interrupted, and talked over in meetings as if I wasn’t even there.
- Some people don’t listen to my technical opinion.

Feelings and Comments:
- It’s very easy to think, “I must not be doing very good work,” when people ignore me and don’t respect me.
- To some extent, these are problems of all graduate students. Women, however, are more frequently the “invisible” ones. The tendency not to see women as professionals must be addressed. If we make it better for the invisible male professionals at the same time, all the better. This invisibility is not because there is nothing there!

1.3 Patronizing behavior

Specific examples:
- “We’ll see how we can fix things for you so they’re better.”

General examples:
- Some male graduate students do things for me rather than giving me the information necessary for me to do it myself.
- Sometimes when I ask a question, I get an answer aimed at someone with little or no knowledge of computer science, as if it were being explained to a high school student rather than a colleague.
- Some people try to take over our work; they tell us how to do our jobs before we've had a chance to even think about them.

1.4 Easy/Boring tasks

Specific examples:
- "You want to do research? Let me see what I have that you can do...this paper needs proofreading."

General examples:
- Expecting you to "wait a term" and do their junk work.

Feelings and Comments:
- I resent being given what are considered menial tasks for two reasons: first, the dispenser of the tasks often assumes that women should be doing the more menial tasks, and second, the dispenser is making a statement about whomever does the tasks by defining them as menial.

1.5 Qualifications

Specific examples:
- I heard an undergraduate say, "What am I going to do? This is an important course and my TA is a girl."
- "You got into graduate school because Professor X is in love with you."
- I was told that I had a poor background although male students from the same college were never told that.
- When <husband and wife> interviewed, many people, both faculty and graduate students, were saying she was only offered the job because MIT wanted him.
- A member of the graduate admissions committee told me, after the admissions decisions had been made, that there were no well qualified women. When the women arrived it turned out that there were several. It frustrates me that women have to be superstars to be considered mediocre at best by some of the faculty.

General examples:
- "You got into grad school because the department needs more women."
- Many of us have been told "You don't have any background so it will take you longer."
- Many of us have been told "You're trying to have a normal life so it will take you longer."
April 28, 1982

- I have often heard people say, "I really don't think the women students around here are as good as the men."

Feelings and comments:

- We hear about the lack of qualifications so much that we are led to believe it, undermining any semblance of self-confidence we have, and putting that much more pressure on us to have to prove ourselves.

- Much of what determines one's success as a graduate student is the amount of attention or energy your thesis advisor feels you are "worth." These myths about qualifications damn us from the minute we enter MIT.

1.6 Feelings about professional problems

- As an undergraduate, I felt like I belonged. People asked for my opinions; people cared about my work; people treated me as an equal. When I had something to say, people listened. That doesn't happen here. I don't know how much is because of me, MIT, or being female.

- I feel frustrated. I feel stupid.

2 Unwanted Sexual Attention

There is a difference between attention and unwanted attention. Unwanted attention is 1) rude behavior like staring, and 2) "pursuing" after being told no. Such behavior is particularly inappropriate in our office environment since we cannot "avoid" the offender without also avoiding our work and professional community.

2.1 Verbal

Specific examples:

- I have had obscene mail sent over the system by male graduate students.

- I have been called "honey," "girl," and "dear" repeatedly in an insulting tone by an LCS employee. I have asked him to stop and told him it offends me, but to no effect.

- It is embarrassing and uncomfortable for many people to work in an environment where certain phrases, such as "blow me," are continually used.

- A male student said "Gee, I don't think it's fair that the only two girls in the group are in the same office. We should share."

- Men don't ask you for a date here - they just assume. A male student asked me if I would like to join a dinner expedition. It turned out to be all couples and I was his date.
One of the male research associates started taking an interest in me. He went out of his way to find opportunities to talk with me. However, once he found out I was engaged to be married, he completely ignored me. Subsequently, he began to bother my female officemate. He wouldn't leave her alone even though she said no to several dinner invitations. I resent the fact that we were treated as potential dates instead of colleagues.

Messages were sent over the system regarding a female graduate student's sex life.

A male staff member told me "There is a sweepstakes going on to see who can get into woman grad student's pants first."

"You are the student I would most want to lose my job over."

"That's where you belong: on your knees." I was kneeling in the library in front of the card catalog. He walked up and planted himself right next to me such that if I turned to face him, my face would have been just below waist level.

"That's so butch."

I once had 17 offers for dinner arrive in my mail all on the same day from different people. It is ludicrous for the men to assume that any unmarried woman in the department should be pursued. This kind of attention can be overwhelming because of the difference between the number of men and women in the area.

During a tutorial, a male student burst in and asked for my telephone number.

I received continuous dinner invitations from a male graduate student after I'd been turning them down at least twice a week for two months.

General examples:

- Men will come into my office and won't leave.

- Faculty members have referred to personal details concerning women students in class lectures.

- Men often interrupt technical discussions to ask personal questions.

- When male grad students dawdle in my office after I've already asked them to leave, it's hard to get any work done.

Feelings and comments:

- Faculty members should understand that attentions from a faculty member threaten our professional image. None of us wants to fight the "she got through because of Prof. X" syndrome.

- We don't want it to seem like we're saying all attention is bad. We want the men here to treat us as well-rounded people which includes desire for human relationships. The problem with the attentions we receive now is that our freedom of choice is ignored.
2.2 Nonverbal:

Specific examples:

- There was an obscene decoration on display in a professor’s office. When I objected, by pointing out that it might offend some women, my objection was laughed off.

- There is a picture of a nude woman on our system which is printed out and displayed. It is also used occasionally to demonstrate the graphic capabilities of the system.

- On ITS there is a program which when run gives a random lewd limerick from a file of about one thousand such limericks.

- There was a red condom on the door of an office.

- There was an obscene “Playboy-type” cartoon posted on an office door.

- A sexist comic strip was put on an office door and was not removed even after repeated requests. Someone finally ripped it down.

- A grad student sitting next to me leered at me all through a seminar. This happened often enough so that in subsequent seminars I made sure the guys in my group sat around me to “protect me” from this particular grad student.

- Flowers were left on my desk by a male graduate student. This is an inappropriate gesture in a professional setting, especially from a grad student to whom I had repeatedly said no.

- Prof. X and I were working late on a project, and we decided to grab something to eat. I thought we’d go for a sandwich. Imagine how I felt when we drove up to a fancy, candle-lit restaurant. I didn’t want to go in, because it seemed too much like a date situation, but he insisted and also wouldn’t let me pay for my dinner. I felt as if I had been forced into going on a date with him, and after that I always felt nervous about being alone with him.

- When I was sitting at my terminal typing, a male faculty member came up behind me and started rubbing my neck and shoulders. I felt like throwing up.

- I have been grabbed and tickled by another person in my research group with whom I have no personal involvement.

- A faculty member started paying a lot of attention to me—going out of his way to “run into” me, talking to me a lot, and flirting. When I asked another woman student what she thought was going on, she told me he had made advances to a couple of other students. She was surprised I had not been warned about him.

- As a first year student I was followed around intermittently by a professor who was teaching one of my courses. He never said anything and kept his distance, but he was watching. It was unnerving.

- A faculty member continually stared at me all through his lectures.
General examples:

- I hate it when men stare at me in the elevator. You can’t even move away.
- Male faculty members and/or male graduate students have often stared at me in class throughout the entire session.
- During technical meetings, a sexist comment is made and all eyes turn to me for reaction.
- I am always being stared at in elevators, meetings, and classes.
- Often, when I am sitting at my terminal, which happens to be near the door of my office, male faculty and students will walk by numerous times staring at me.

Feelings and comments:

- I always feel as if I am being pursued. I also feel like I’m in a spotlight. All of my actions are under close scrutiny constantly and I feel extremely self-conscious.
- Approaches from a professor make me feel uncomfortable with him. In situations where I should have been able to go to him with questions I avoided him. I still feel uncomfortable around him and have yet to say more than “hello” several years later.

3 Inappropriate Interpretation of Female Students’ Behavior

Specific examples:

- A male student who had lunch with me a number of times when we were T.A.’s for the same course regarded me as his “territory”. I overheard him say to another male graduate student, in reference to a third, “blank is muscling in on my “territory.””

- In an interview with a faculty member about research the following gestures made by me were interpreted as come-ons: 1) looking him directly in the eyes, 2) smiling while talking to him, 3) leaning back in my chair.

- Following a technical discussion over lunch with a faculty member, I was asked to a dinner date.

- A faculty member told other students that one of his male students wasn’t getting his work done because I had started going out with him and he was spending too much time with me. I wasn’t going out with him. His lack of progress was due to completely different reasons.

- At one point my officemates told me that several people had come to them to ask what was “going on” between me and a male student I’d been seen talking to. The only thing going on was that we were TA’s for the same course.

General examples:

- People assume that I’m going out with any male I talk to.
- I can't even say "Hi" to some people. Any friendly overture is interpreted as romantic interest.

- Some women are uncomfortable about asking certain male graduate students for help (about the system, projects, etc) for fear that it might be viewed as "coming on" to them. The answer to a question may be followed by an invitation to go out.

- Having lunch with male graduate students seems to signify that I'm going out with them. The same is implied by technical discussions.

Feelings and comments:

- I feel like I can never have any friends here, like I can never fit in. I've never felt so isolated in my life.

- I find I have a sense of anxiety all the time here. Because I never know who's going to decide I'm "available," I'm not comfortable away from my desk and I find it difficult to talk to male graduate students. This is particularly noticeable because I am comfortable talking to the female students and the majority of the faculty.

- These situations have made me stop talking to faculty and fellow graduate students. Any approach made to me by faculty or graduate students I view with great suspicion.

- Being a part of the "community" is very important for professional growth, but this is very difficult for a woman here.

4 Stereotype Comments

Specific examples:

- I was told by a male faculty member that women would not/do not make good engineers because of early childhood experiences (e.g., little boys build things, little girls play with dolls, boys develop a strong competitive instinct, while women nurture...).

- I was once told that the reason women don't finish here is that they are trained by society not to be aggressive.

- "<Female grad student> flirts to get whatever she wants."

- "I don't like to take on female graduate students. For instance, I can't stand it when they start to cry if you criticize their work. In general, I have trouble relating to them."

- A female grad student who eventually completed her Ph.D. was told by a male grad student (who ultimately left without finishing), "You'll never make it through MIT. You are too feminine. You're just not aggressive and pushy enough."

- "You remind me of the girl next door."

- "You remind me of my kid sister."
- "You're a woman--how do I get rid of this stain on my shirt?"
- "Mrs. Attila the Hun."
- "You're so aggressive."
- "Women aren't concerned about technical details."
- "I'll bet she doesn't take any shit."
- "Women always ask for help. They aren't able to do work on their own."
- "<Female grad student> only came here to get married."
- A cartoon was placed on my door about "my little sex kitten."
- I received an anonymous mail message saying "Looks like there is a 'hot item' in the department."
- "<Female grad student> now has competition."
- "<Female grad student> is just a JAP."
- "<Female grad student> is a flirt."
- "Just let Daddy pay for it."
- "You sure are bitchy today; must be your period."

General examples:
- I've heard several male TAs come to the conclusion that women always ask for help. The implication is that since more women than men will ask for help, they can't figure things out on their own.
- We all received letters addressed to Mr. <our name> from an EE department laboratory. The man who wrote this should have stopped to think that some of the recipients (all EE&CS grad students) might be women.

Feelings and comments:
- "Stereotyped comments are so irritating."
- Stereotypes make it harder for me to work here because they reinforce the idea that I can't be a good engineer. This attitude is pervasive. It affects other people's behavior to me as well as my own self-image.
5 Comments About Appearance

Some of these sound like simple compliments and in some contexts are, but there are many situations, such as technical discussions, in which they are always inappropriate. Other statements should NEVER be said.

Specific examples:

- "Oh, the one with no chest!"

- "The problem with this place is that there aren't enough attractive, available female graduate students."

- When I first met the professor in charge of a course for which I was TA, he said "Boy, the TA's have gotten a lot better looking around here."

- "The women around here are so ugly." I never hear female students tell male students how ugly they are.

- During a grades meeting, a professor decided to give a borderline student the higher grade because she was "cute". When I suggested that that was not a relevant basis for grading, another staff member chimed in. "Yeah, she's not THAT cute."

- Male students ask me if I'm jealous of other attractive women graduate students (i.e. that I'm not the only one anymore).

- "You look so punk sexy!"

- A graduate student said, "You should be a Playboy-centerfold."

- A graduate student said, "Men are tired of only seeing men. They want to see women in dresses, not women who look like men."

- "Gee, I've never seen you in a dress before. I didn't know you had legs."

- I was told by a secretary planning a summer, technical meeting at Endicott House that the host of the meeting would prefer that female attendees wear two piece bathing suits for swimming.

- "Button your shirt."

General examples:

- When people comment about my appearance in a meeting, it directs everyone's attention away from what I'm saying.

- "Cute" does not describe a professional.

- There is a difference between compliments between friends and inappropriate comments. Comments about appearance are inappropriate 1) when discussing technical matters, 2) in front of people with whom professional bearing is important (e.g., outside consultants, government representatives, visiting scholars, etc.), 3) among people with whom you have neither a business nor a personal relationship.
Feelings and comments:

- When someone makes comments about my appearance in a technical setting, I know he’s not seeing me as a colleague. I feel undervalued.

- Comments about my appearance are upsetting. They make me feel insulted, embarrassed, offended, hurt, and concerned for my stature as a professional.
Sorry I'm so late in sending you my memo on Barriers to Equality. Please note that it is still a draft. The Department's Committee on Graduate Students is planning to discuss this memo in draft form. Then I will write up my final version (even though I do not anticipate many changes since it has been circulated to the EE women for comments). I thought that this agenda item would have been scheduled early in the term, but it wasn't. Hence the delay.
Memorandum to: Professor A. C. Smith, Chairman
   Committee on Graduate Students
From: Marilyn Pierce, Administrator
Subject: BARRIERS TO EQUALITY IN ACADEMIA

As you requested, I met with the women graduate students* in Electrical Engineering (Areas I, III, IV, V and VII) to discuss BARRIERS TO EQUALITY IN ACADEMIA prepared by the women graduate students in Computer Science (Area II). My aim was two-fold: to seek out reactions to the document, and to identify similar problems in the other areas.

It was very clear in meeting with the women students that all agreed the report was a courageous endeavor resulting in a very professional, very impressive document. Most of the women were appalled at the extent of discrimination in both professional and social identity in Area II as presented in the report.

Some problems do exist in Electrical Engineering, but the impression is that they are not nearly as severe or prevalent as Area II. The over-all environment in Electrical Engineering was felt to be a healthy one for women. Consequently, most women in

*35 out of a total of 49.
EE would not want the Computer Science report to be interpreted as being representative of the entire Department.

Following is a summary of the meetings I had with the women in the individual areas: Most of the discussions centered around Section 2 (Professional and Social Identity) which contains the bulk of the report.

PROFESSIONAL IDENTITY

Most women in EE believe they are treated with respect as aspiring professionals. The attitudes of faculty in EE are not consistent with the discriminatory attitudes ascribed to some of the men in Computer Science.

a) **Invisibility** and its consequences did not appear to exist.* Whenever this problem was mentioned, it was in a positive way - that faculty were supportive and helpful in including women in discussions and research activities with the result that women were accepted by others in the group and good interaction with colleagues was possible.

b) **Patronizing Behavior** A few instances of this behavior were mentioned; some male graduate students just won't leave the women students alone when they are working on hardware, for example. Although some other situations were mentioned that could be construed as patronizing, some of the women

* With the exception of one woman who is working in a lab outside the Department.
involved perceived it to be an advantage, not a handicap; i.e., when TAs were helpful to them in the lab and not to male students who were having similar problems.

c) Qualifications This subject was discussed by several groups with the over-all conclusion that the women are generally as qualified as the men (even though, as one woman mentioned, the Department might have different admission standards). They reported no one had ever openly questioned their qualifications. However, one woman said that she had heard of an EE faculty member who believed that women should not be in engineering.

d) Acceptable Behavior for Women Discussions on this topic were not out of line with Area II findings that some women felt forced to use a non-traditional style of behavior to survive at M.I.T. A few women realized that they had unconsciously created a persona and/or adopted a masculine style to fit into the male environment.

e) Preferred Address In one situation a faculty member introduced his two TAs to his new class as "the girls". The women approached him later and when they explained they wanted to be called "women" he apologized and the matter was easily resolved. So there are things that go on with the best of intentions!
f) Support Staff  A few working relationship problems between support staff and women graduate students were discussed. Some women students feel uncomfortable asking secretaries to do typing for courses or research projects. Women graduate students, on the other hand, are unhappy about being the ones asked to answer phones when secretaries aren't around.

g) Comments Made: One group noted that the report mentioned that women are always under surveillance, but did not consider the situation in which there is a sole woman representative. They felt that when you are the only woman in your research group, everyone is watching you and judging your whole sex by your performance. If you do really well, everyone knows it and everyone's estimation of a woman's ability goes up a notch. And if you don't do well, everyone's estimation of a woman's ability goes down several notches.

SOCIAL IDENTITY

Informal interaction with male colleagues, staff and faculty was not a significant problem. As indicated in the discussion on Professional Identity, the importance of supportive faculty and research associates in establishing an environment for good interaction was a key factor.

a) Unwanted Attention  On the other hand, there were several instances in which women mentioned that male TAs had asked them for dates while the women were taking their subject. The women declined; but in one situation the TA continued to harass the woman who refused the date.
Only one instance was mentioned involving faculty. It was a situation in which a thesis advisor insisted that the student go to dinner with him, even though she had tried several times to say "no". It was bothersome for her at the time, she reported, but not worth making a fuss.

In another instance of what appears to have been an ongoing situation, a male support staff member made a practice of staring and commenting in an inappropriate fashion on the appearance of the women whose duties took them into contact with him. This involved both women students and other women support staff. This situation was brought to the attention of the Department and was dealt with immediately.

b) Observations Made: In the course of discussions, several observations were made about the situation in Area II. Based on the descriptions of the actions of male students in Computer Science, the women felt that the men appeared "socially inept". The problem may be aggravated, in some way, by uncertainty about appropriate social behavior. The authors never made it clear whether dates between graduate students and/or faculty are appropriate or not. It was felt that the Area II women want you to decide that male faculty members and graduate students should never ask out women graduate students. But the women in Area II are not willing to say that they do not want this to happen. It was also pointed out that the competitive work environment may have left little time for "outside" dating by the men and thus added to these pressures for dates within the area.
REACTIONS

All of the women were extremely impressed with the time and effort spent to produce such an excellent document. The contents of the report, especially the conduct described in the report of some of the men in Computer Science, were upsetting to many of them. They felt that it was indeed unfortunate that some men were creating such a bad environment for everyone.

All of the women strongly agreed with the recommendation made by the women in Computer Science that the Department must make commitments to increase the number of women faculty, staff and students. They felt that not until we increase the visibility of women in these areas will the problems gradually decrease thus making the Department a healthier environment for women.

Several women expressed annoyance that part of the report was published in the IEEE SPECTRUM last month. It gave the impression that these problems exist throughout the Department. Some women thought that if we are to encourage more women to come, it seems counterproductive to send this report outside the Institute.

Practically all of the women agreed that there was no need for any Departmental action or policy changes for faculty outside of Computer Science. They felt it would be an insult to many professors and staff who are already comfortable with women students.
Most of the women were pleased with the opportunity to express their opinions and probably more at ease talking with a small number of other women in an informal setting. They seemed to appreciate the interest the Department was taking in them and many felt that these meetings should continue to be held on an on-going basis.
Women in Computer Science at MIT: A Case Study

Prepared by the female graduate students and research staff in the Laboratory for Computer Science and Artificial Intelligence Laboratory at MIT, September 1982.
The original list on which this report is based was prepared by the following graduate students and research staff:

In addition, Ronni Rosenberg, a former MIT Computer Science graduate student, participated in the writing and editing of the final report.

The following people contributed sections to the final report:

- Peter Elias
- Marilyn Pierce
- David Reed
- Mary Rowe
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Table 2-2: EECS Department, Graduate student statistics for the seven Areas, Fall 1981 (provided by Marilyn Pierce, EECS).
1. Introduction

This report is a case study that describes the professional and educational environment encountered by the female graduate students and technical staff in Computer Science at MIT.

The case study has several purposes. The first is to make people aware of how their actions affect the women with whom they work. At the root of many of the problems identified in this report is a lack of awareness or acknowledgement that social and institutional patterns exist that interfere with women's academic and professional development. This document should provide a foundation for continued discussion among the present and future members of the Computer Science community at MIT, as well as other communities where similar conditions prevail.

A second purpose of this report is to help women in other professional communities recognize and voice their problems as women. The authors of this report are certain that the conditions described herein are not unique to the Computer Science community or to MIT; in fact, if anything is unique, it is the support and encouragement that the authors received from members of the community in writing this document.

Finally, the actions of the students, staff, faculty, and administrators described in this report, can serve as an example to other communities of one approach to addressing, resolving, and alleviating these problems.

Most of this report does not address problems of overt discrimination, but rather more subtle behavior that makes the environment inequitable for women. Such behavior is often not recognized as discriminatory for two reasons. One is that the actions are often not intended to be discriminatory, but their effect is to undermine the professional image of women held by the women's colleagues and/or by the women themselves. A second reason is that an individual event or behavior might appear to be trivial, and therefore not requiring special attention, if viewed by itself. But, when women experience such events daily, the overall effect is much greater than just the sum of its parts; the behavior patterns are not personal, but social, and the problems are not trivial, but overbearing.

The report is organized as follows. Chapter 2 provides background information which is helpful in understanding the issues described in the remainder of the report. Chapter 3, which contains the major part of our discussion of particular issues and problems, is divided into two categories: those issues that are primarily concerned with women's professional lives and identities, and those which women encounter in their social lives within the work environment. Chapter 4 describes the attempts made by the women subjects

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1 We have addressed the problems of women in particular throughout this report; our purpose being to help women gain access to truly equal educations and professional lives. However, we stress that many of these issues are problems encountered by all minorities.
given the opportunity to prove themselves. In addition to restricting the opportunities available to women students, this questioning of qualifications by others may lead women to believe it themselves, resulting in a general lack of self-confidence. There is a vicious circle because this lack of self-confidence makes women reluctant to take on challenging projects, in order to prove that they are really capable.

Of course, it becomes more difficult to accept the goals of women in a technical field if it is believed that women are basically incapable of such an endeavor:

- I was told by a male faculty member that women do not make good engineers because of early childhood experiences...little boys build things, little girls play with dolls, boys develop a strong competitive instinct, while women nurture...

While most people would agree that men and women receive a different type of socialization during childhood development, these differences should not be allowed to form a permanent barrier to a woman's training in a technical field. Instead, these insights should be used to construct academic programs for students that quickly bring them up to speed in their areas of weakness, should such weaknesses exist. In fact, most women applying to engineering school have spent a great deal of effort overcoming the "deficiencies" in their previous training, (both educational and social) and by the time they enter graduate school they are as well prepared as the male students to undertake research in computer science.

The last comment is also an example of attributing a general trait to women as a class, which may not be appropriate to all women, and thereby putting identity as a women first before identity as a professional. Such generalizations also underlie the following examples:

- "Women aren't concerned with technical details" - a male colleague.

- I've heard several TAs come to the conclusion that women always ask for help more than men, with an implication that women can't figure things out on their own.

- I've heard men chuckle when a women's technical opinion is mentioned, and say, 'Oh, <woman's name>', in a tone of voice that dismisses and ridicules her opinion.

These broad generalizations that women do not examine problems to a sufficient level of detail, do not exhibit independent thought, or cannot make thoughtful contributions to a technical discussion, sometimes lead to a reluctance on the part of the research supervisor to accept women on their projects or to give them critical tasks, thus restricting the opportunities available to women in the department.

3 The two particular areas of gender-specific socialization referred to here are: engineering aptitude developed by playing with traditionally male toys such as tinker toys, model airplanes, and ham radios; and aggressive, competitive behavior encouraged by other traditionally male activities such as athletics.
These attitudes also have a secondary effect. When a woman is constantly reminded that her colleagues do not think she can succeed, she may begin to believe it herself:

- Stereotypes make it harder for me to work here because they reinforce the idea that I can't be a good engineer. This attitude is pervasive. It affects other people's behavior towards me as well as my own self-image.

The generalizations are not limited to technical areas:

- 'I don't like to supervise female graduate students. For instance I can't stand it when they start to cry if you criticize their work. In general, I have trouble relating to them.' - a male faculty member.

While it is understandable that male faculty members may feel more comfortable with "typical" male reactions, they should take responsibility for learning to deal with both men and women in these situations. Such differences have no bearing on technical ability and yet, such generalizations are used to deny women the opportunities available to men.

3.2.5 "Acceptable" Behavior for Women: A Double Bind

'Some argue that women students would be best to adopt a "masculine" style in order to achieve classroom credibility. Others point out that a woman who does so may be perceived as "aggressive" rather than assertive because her way of talking and acting does not conform to "feminine" expectations: what a woman student says in a "masculine" style may be rejected out-of-hand on that basis. Indeed, the same behaviors seen as "forceful" in a man may be viewed negatively- perhaps even as "hostile"- when used by a woman.4

The experiences of women in this department also reflect the double bind in which women are caught:

- I was once told that the reason women don't finish here is that they are trained by society not to be aggressive.

- 'You'll never make it through MIT. You are too feminine. You're just not aggressive and pushy enough.'

And on the other hand:

- 'You're so aggressive.'

- 'Mrs. Attila the Hun.'

- 'I'll bet she doesn't take any shit.'

- 'You sure are bitchy today; must be your period.'
In other words, if a woman appears quiet and feminine, then her success may be hindered because she is not competitive. And if she is not quiet or feminine in the eyes of her colleagues, then she is socially ostracized for that reason instead. This double bind leaves women feeling that there is no way for them to be accepted by their colleagues.

3.2.6 The Consequences for Women

Many of the otherwise distinct experiences presented in the previous section lead to the same consequences; in this section we identify several categories of consequences and the experiences that contribute to their occurrence.

Most directly, women suffer from the actual limitations placed on their professional development by the refusal of faculty members to supervise them, to provide financial support for them, or to allow them to work on interesting and important problems. For any graduate student, there is often only one professor at a given institution whose interests coincide with the student’s, and for whom the student can work. For a woman who must work with a professor who does not provide a supportive environment for women, there is often no choice; she cannot continue her education unless she changes to another field or to another school. Because the attitudes of the professor often affect the research group’s attitudes, valuable support can also be absent from peers. When a woman leaves, her departure is often blamed on her lack of ability, rather than attributing any responsibility to the faculty member.

Other consequences for women are less apparent and more difficult to measure. A woman who is subjected to constant sexual harassment (verbal or physical) may decide that the work environment is so uncomfortable that she must leave. Even if she decides to stay, the negative atmosphere may significantly affect her ability to work. Certainly she will not have the benefit of the positive, professional and social interaction with colleagues that is available to men.

Frequently women internalize the opinions they hear so often. When people whose ability they respect, such as their advisors, continually undervalue their contributions and convey the attitude that they are incapable of succeeding, the women will start to believe that appraisal. The acceptance of the opinion of others is not unique to women; men are also sensitive to their advisors’ opinions of their work, and suffer the same consequences as women, if their work is consistently undervalued. This situation leads to a vicious circle, in that once a woman feels incompetent, she is less likely to be able to accomplish as much.

The above consequences often lead to women failing to meet their goals, or at least not doing as well as they would have, had they received the quantity and quality of encouragement given to their male colleagues. If women realize the existence of these attitudes and correctly attribute their experiences to those attitudes,
they will not lose their self-confidence and ability to work. However, even when these attitudes are correctly identified, dealing with them takes both time and energy. As a result, the women have less of each to devote to their research.

Finally, the struggle takes its toll personally as well. One survival tactic that women adopt in such an atmosphere is withdrawal. They isolate themselves from their research group, possibly selecting a research topic that requires little interaction with others. These women may thus be deprived of the benefits of working together with others and learning from them, which is an integral part of graduate education.

Alternatively, women may choose to hide their femininity. They may intentionally dress unattractively, act more masculine, or adopt a louder, and more aggressive manner than they would have under more comfortable circumstances. Such behavior has the dual benefit of stopping sexual overtures and comments, and at the same time creating an image that is more in keeping with their colleagues' view of an engineer or scientist, thus making them more acceptable. Unfortunately, this alternative may backfire also, since men may be unwilling to accept a woman who completely denies traditional women's roles [1].

For many women, dealing with the problem in any of these ways is an unacceptable burden. They may leave MIT rather than remain frustrated with professional and personal compromises they find unavoidable. As a result, some very capable women, who had the ability to make strong contributions to their field of research, have left without completing their studies. This is a loss to MIT as an institution as well as to the women involved.

3.2.7 A Positive Note

Not all of the experiences described in the previous sections have affected all of the women in the computer science area. There are some research groups that provide a very supportive environment for women, as well as men. Women are respected as essential members of the group, capable of making significant contributions to the success of the group. Other members of the group refer to them for technical opinions, care about their work, and treat them as equals. Many of these women work closely and successfully with their supervisors. Senior women in some groups are given the opportunity to help in the supervision of junior graduate students and run technical seminars. When a faculty member treats women in his or her group with such respect and demonstrates this respect by encouraging women to take on significant responsibility within the group, then other male and female colleagues will assume this respect as well. Senior women in a research group may also serve as role models for new women, which often leads to the perpetuation of women in the group and continuation of a supportive environment for women. The following comments provide a glimpse of the supportive atmosphere in some research groups. These are examples of experiences that should be part of every graduate student's training.
- At technical seminars, when questions arise in my area, my supervisor always refers the questions to me, even though he is certainly capable of answering them himself.

- When visiting scientists come to see my supervisor, and are interested in work in my area, he always includes me in the discussions.

- I have had several discussions with my advisor, in which he spent considerable time with me, discussing possible paths that I might follow. He discussed how I could best prepare myself for each option. These talks made me feel that my advisor respected my goals and was concerned about ensuring that I would be prepared to meet them.

- One semester, I was put in charge of organizing a weekly informal seminar dealing with my research area. My responsibility was to select a paper weekly and lead the discussion. This experience was valuable to me in many ways; not only for the professional skills I acquired, but also for the confidence I gained. In particular, the interest and commitment of the other participants was especially gratifying.

- A professor invited me to present a guest lecture on the work of my group in his undergraduate course. The respect from this professor that this gesture demonstrated, and the subsequent respect that I received from his students, meant a great deal to me and helped to build my self-confidence.

- If my supervisor is unable to attend a conference in which he was asked to speak about our work, he always suggests that I take his place.

- When I first started, some senior graduate students and research staff had just begun implementing a large project in my area of interest. They invited me to participate in this project, and we found some small problems I could work on. The project was a valuable experience for me since I had had no research experience in that area. I received an excellent introduction to my area of interest by being able to participate in and contribute to an ongoing effort. It was especially important to me that the students and staff took the initiative to include me and help me get started.

- I once took a course in an area that was somewhat removed from my area of research, but which I found very interesting. I took an active part in the class, regularly asking and answering questions. Toward the end of the semester, the professor encouraged me on a couple of occasions (and before the entire class), to attend the regular seminars of his group, if I was more interested in their research. This type of encouragement can really go a long way in developing a woman's self-image.

- Whenever my supervisor finishes a new paper, he gives it to me to read, not because he just needs a proofreader, but because he is genuinely interested in my technical opinion of the work.

- When I started as a graduate student, I literally had no background in the particular area that I chose to pursue in my research. My supervisor was not concerned about this. It was apparent to him that I had a good general technical background and that I showed enthusiasm for the subject. He gave me a small project right away, encouraged me to read the literature, and was confident that things would work out. Fortunately for us both, they did.

With the same positive stimulation, encouragement and respect that men receive, women will be equally
successful as men at pursuing a professional career in computer science. MIT and other academic institutions have the potential and the responsibility to provide equitable training to female computer scientists by promoting the kind of positive educational experience that is reflected in these last comments.

3.3 Social Aspects of Professional Development

There is a social side to professional relationships, especially intimate working relationships, that provides a valuable means for the intellectual exchange of ideas and the development of personal understanding and respect. Understanding and respect are critical components of professional as well as non-professional relationships. Women often feel that they cannot develop these social aspects of the working relationship because they run the risk of attracting romantic attention that erodes the relationship. Thus, women often find the development of professional and social relationships in the research environment more difficult than their male counterparts do.

Confusion and conflict resulting from women and men working together is a global issue that is yet to be resolved in most professional environments. But in the disciplines of engineering and computer science where men form a large majority, the inequity in numbers often causes female graduate students to receive an inordinate amount of unwanted attention from male staff, students, and faculty. In addition, the standards of social behavior reflect the predominance of men. Women are continually reminded of being different, being female, by such things as posters, cards, comic strips that are demeaning, sexist jokes, language that excludes females, and inappropriate attention in the form of staring and following. As a result, women can become isolated and can feel that they are not a part of the community.

3.3.1 The Social Side of Professional Relationships

In addition to the formal professional training that students obtain through meetings, seminars, and classes, a large component of graduate education comes from informal interaction with colleagues. Informal settings, such as luncheons and technical bull sessions, provide relaxed atmospheres in which students can receive feedback on their progress from peers and supervisors, as well as valuable technical knowledge. Many students may find that they gain respect from others by being able to participate in informal activities, which also benefit their self-confidence and improve their abilities to work effectively in groups. Women students are more likely to miss important opportunities for feedback and exchange of technical ideas because they are not as well or as easily accepted as colleagues in informal settings. Instead, they are often viewed as potential dates.

Because a woman is viewed as a potential date, her behavior is often inappropriately interpreted. A female graduate student who is friendly with a male colleague runs the risk of having the male colleague think that
she is romantically interested in him, even if he does not. There is also the added problem that others may think that she is romantically interested in him, whether he does or not. A lunch appointment, albeit perhaps made to discuss a technical matter, may be viewed by the male and/or by members of the community as a social date only. Thus, it becomes very difficult to keep professional relationships from appearing as purely romantic ones. The following examples illustrate the problem of misinterpreted behavior.

- In an interview with a faculty member about research the following gestures made by me were interpreted as come-ons: 1) looking him directly in the eyes, 2) smiling while talking to him, 3) leaning back in my chair.

- All I did was say 'Hi,' to a male graduate student, and the next time I saw him, he asked me out.

- A male student who had lunch with me a number of times when we were T.A.'s for the same course regarded me as his 'territory'. I overheard him say to another male graduate student, in reference to a third, '<Blank>' is muscling in on my territory.'

- Having lunch with male graduate students seems to signify that I'm going out with them. The same is implied by technical discussions. In short, people seem to assume that I'm going out with any male I talk to.

- Prof. X and I were working late on a project, and we decided to grab something to eat. I thought we'd go for a sandwich. Imagine how I felt when we drove up to a fancy, candle-lit restaurant. I didn't want to go in because it seemed too much like a date situation, but he insisted and also wouldn't let me pay for my dinner. I felt as if I had been forced into going on a date with him, and after that I always felt nervous about being alone with him.

- A male faculty member and I played <sport> together a few times until I realized that he was viewing our games as dates.

- Following a technical discussion over lunch with a faculty member, I was asked for a dinner date.

Although the following example illustrates the fact that talking to a male graduate student is often equated to going out with him, it also illustrates another problem. Women are viewed by some as disruptions to the work environment; they are not considered to be part of the research atmosphere and are treated as distractions and nuisances.

- A faculty member told other students that one of his male students wasn't getting his work done because I had started going out with him and he was spending too much time with me. I wasn't going out with him. His lack of progress was due to completely different reasons.

The following are comments from women graduate students about how experiences such as those presented have affected them.

- Approaches from a professor made me feel uncomfortable with him. In situations where I should have been able to go to him with questions, I avoided him. I still feel uncomfortable around him and have yet to say more than 'hello' several years later.
Faculty members should understand that personal attentions from a faculty member threaten my professional image. I don't want to fight the 'She got through because of Prof. X' syndrome.1

I am uncomfortable about asking certain male graduate students for help (about the system, projects, etc) because it might be viewed as 'coming on' to them. More times than not, the answer to a question is followed by an invitation to go out.

I find that I have a sense of anxiety all the time here. Because I never know who's going to decide that I'm 'available,' I'm not comfortable away from my desk, and I find it difficult to talk to male graduate students. This is particularly noticeable because I am comfortable talking to female students and the majority of the faculty.

These situations have made me stop talking to male faculty members and fellow graduate students. Any approach made to me by male faculty members or graduate students I view with great suspicion.

Because men always think that I'm coming on to them, I don't feel comfortable joining technical bull sessions. I feel as if I'm missing a valuable part of my graduate education.

3.3.2 The Social Environment

Both women and men are attempting to find a social life within their professional environment; a social life that does not necessarily include romantic relationships. Women, like men, want to have friends among the people with whom they work. But development of friendships is inhibited by a common attitude among male graduate students, faculty and staff members that a woman who is not involved with someone is "available" and looking for a romantic relationship. Many men are not able to view a woman as a friend, but only as a potential date.

One of the male research associates started taking an interest in me. He went out of his way to find opportunities to talk with me. However, once he found out that I was engaged to be married, he completely ignored me. Subsequently, he began to bother my female officemate. He wouldn't leave her alone even though she said 'no' to several dinner invitations. I resent the fact that I was treated as a potential date instead of as a colleague.

Male graduate students will often walk into my office just to 'talk' or 'chat'. Many times when I want to work and I ignore them, they stay. Even when I explicitly ask them to leave, they continue to dawdle in my office.

Many women are as interested in romantic relationships as are the men, but the women are inundated with unwanted attention. Unfortunately, a woman cannot say 'no' in many situations and have that be it; she often is bothered again and again by the same man or by others. This situation is largely a result of the unnaturally high ratio of men to women: there are ten men to every one woman.

I received continuous dinner invitations from a male graduate student after I'd been turning them down at least twice a week for two months.
Some men seem unable to view a woman as an individual unless she is associated with a man. One result is that a woman’s interactions with her male colleagues are often misconstrued by others as being romantic, as discussed in the section above. Another result is that at times women find it extremely difficult to be a participant in certain group activities.

- I went on a ski trip with a number of men in the department. At the conclusion of the day, there was an explicit discussion among the men about whom my ‘partner’ for the night was going to be.

Women graduate students also find that they are continually stared at in classes, group meetings, or their offices and are often followed by male colleagues. This "fishbowl syndrome" causes women to feel as if they are constantly under surveillance, and consequently, they feel uncomfortable and out of place.

- A male graduate student sitting next to me leered at me all through a seminar. This happened often enough so that in subsequent seminars I made sure that my friends sat around me to ‘shield’ me from this particular graduate student.

- As a first year student I was followed around intermittently by a professor who was teaching one of my courses. He never said anything and kept his distance, but he was watching. It was unnerving.

- A faculty member started paying a lot of attention to me—going out of his way to ‘run into’ me, talking to me a lot, and flirting. When I asked another woman student what she thought was going on, she told me he had made advances to a couple of other students. She was surprised that I had not been warned about him.

- Wherever I am, be it in my office or the elevator, or at a lecture, seminar, or meeting, male graduate students, faculty, and staff are always staring at me as if I were some sort of freak.

- A male graduate student said, ‘What do you expect? You are a very attractive and interesting women so you are going to attract alot of attention.’

Many of the experiences described thus far are common occurrences for women in the department. In addition, a smaller number of men are much bolder in their attentions to women. They use physical contact in demeaning and taunting ways or as an excuse to be deliberately personal. Although physical contact often can be comforting and reassuring between friends, depending on the individual, the following examples illustrate inappropriate instances of physical contact.

- I have been grabbed and tickled by a male graduate student in my research group with whom I have no personal involvement.

- When I was sitting at my terminal typing, a male faculty member came up behind me and started rubbing my neck and shoulders. I felt like throwing up.

- While talking with a male colleague in my office, he suddenly placed his hand on my breast and expressed his interest in me. Our discussion did not warrant such an action. I had never dated him, and never intended to.
Many times men fail to understand why women do not appreciate constant attention. They believe that their comments and actions are "flattering" or "cute". They do not realize that women find these comments and actions bothersome and that the number of men in the department causes the number of offenses to be unacceptably large.

An aside is that men often seem to hold the female graduate students responsible for the low percentage of women in the department. This lack of women is used as an excuse for unacceptable behavior; the argument is that since there are not many women in the department, men do not know how to act.

- A male graduate student said, "The problem with this place is that there aren't enough attractive, available female graduate students." Enough for what? I'm not here to be attractive and available.

- A graduate student said, 'Men are tired of only seeing men. They want to see women in dresses, not women who look like men.'

- This is MIT!

Another manifestation of "men not knowing how to act" is the pervasiveness of humor that often takes the form of sexist and demeaning quips about women or men's relationships with women. This humor tends to keep women from becoming integrated into the community as colleagues and adds to the "locker room atmosphere".

- I have had obscene mail sent over the system by male graduate students.

- There is a picture of a nude woman on our system which is printed out and displayed. It is also used occasionally to demonstrate the graphic capabilities of the system.

- "That's where you belong: on your knees." I was kneeling in the library in front of the card catalog. He walked up and planted himself right next to me such that if I turned to face him, my face would have been just below waist level.

- There was an obscene decoration on display in a professor's office. When I objected by pointing out that it might offend some women, my objection was laughed off.

The following comments were made by women graduate students about how the social environment has affected them.

- Trying to have a social life here is very difficult. I have to be constantly on guard for 'wanton' men. I don't have the time and energy to be constantly having to 'defend' myself while I am trying to get work done on my thesis.

- We don't want it to seem like we're saying all attention is bad. We want the men here to treat us as well-rounded people which includes desire for human relationships. The problem with the attentions we receive now is that our freedom of choice is ignored.
- I always feel as if I am being pursued. I also feel like I'm in a spotlight. All of my actions are under close scrutiny constantly and I feel extremely self-conscious.

- I feel like I can never have any friends here, like I can never fit in. I've never felt so isolated in my life.

3.3.3 The Consequences for Women

As a consequence of examples such as those given in this section, women in the department can find themselves in a double bind. If they opt against involvement in the social and personal sides of professional relationships, they can alienate themselves from particular individuals and from the community. This alienation detracts from career growth because women do not get the valuable feedback and technical interaction that informal settings provide. On the other hand, friendships with male colleagues are usually viewed as romantic not only by the male colleague, but also by the community at large. Thus, a woman's professional image is often hurt if she opts to include a social side to a professional relationship. For women graduate students to become successful computer scientists, they need to feel as if they are, and indeed be treated as colleagues. Constantly being reminded that they are "different" simply because they are female undermines their professional images and makes the development of professional and non-professional relationships quite difficult.
4. The Aftermath

### During a meeting the women in the group had with Mary Rowe, she suggested that they write down the comments and incidents that had upset them and concerned them. As a result of her suggestion, after several more meetings, the women created two lists, a list of incidents that they felt could be made public, and a second "private" list. The private list contained incidents that identified particular members of the community, either the women reporting the incidents or others involved in them.

A representative group took these lists to Peter Elias, Associate Head of the department. The purpose was to show him the lists and discuss with him what to do next. The women agreed to address the faculty first by distributing copies of the list along with a letter from Peter Elias stating that the concerns would be the topic of discussion of the next weekly Computer Science faculty lunch. The faculty were approached first for two reasons. First, they have the single largest amount of power over what occurs within their research groups. Second, whether they choose it or not, they are viewed by many students as role models and as such should be careful of the examples they set.

Peter Elias received the women's requests with support and understanding and contributed invaluable advice. The women decided that no single one of them should be present at that first faculty meeting because, even if they could all have attended, individuals might be labeled if they were to address concerns of the faculty. In addition to the Computer Science faculty, various members of the department headquarters including Marilyn Pierce, by special invitation, attended the lunch in early April. The faculty lunch was successful in providing a forum for the faculty to express their thoughts and concerns about the issues the women had raised. They decided to spend another lunch discussing the problems, inviting Mary Rowe to attend this second lunch in late April.

When the list was first distributed to the faculty, it included a small number of rather insensitive comments relating to secretaries. Mostly because of these comments, there were some negative reactions from a number of the secretaries. The nature and cause of these reactions will be addressed later in the discussion of people's reactions. The result of the secretaries' reactions was introspection and discussion among the women, resulting in deletion of those items from the list.

In early May, all the women met with Peter Elias and the directors of both labs, Michael Dertouzos and Patrick Winston. The two courses of action that resulted from that meeting were the decision to provide a forum for all members of the community to discuss the problems and creation of this report which would relate the women's experiences to other members of MIT and the academic community, as well as future members of the laboratories. Requests for copies had already come from outside the labs, and in fact copies
had appeared on other parts of the campus. The women also wanted something that could be presented to new members of their community.

In addition to the deletion the items found upsetting to the secretaries, at the suggestion of others who had seen the list, modifications were made to clarify points. The list was then distributed to all members of both labs. There also was an announcement of a lunch (including food provided by the department and the Laboratory for Computer Science) to discuss the women's concerns. A couple hundred people participated in that meeting. The women had spent several hours with the help of two concerned men carefully planning the orchestration of that meeting in an attempt to keep that many people under control and focused on the subject to be discussed. A number of women had particular questions and examples to raise for discussion when the time seemed appropriate and on signal from the moderator. The meeting went well. People felt free enough to express some of the frustration and concern over the issues and the aftermath of raising those issues, while still allowing others to speak as well. Many concerns were raised and clarified. This last meeting occurred as school was ending for the summer. The hope is that the discussion will continue as people return in September.

One of the first concrete results of the preceding set of events was the formation of a men's discussion group to address the women's problems. This small group is clarifying for themselves what they think the women's problems are and how they can best address them. They welcome anyone who would like to join them.

4.1 Men's reactions

The reactions of the men to the list was positive in general. Most conversations whether in groups or privately began with an affirmation that the women had raised legitimate issues and that most men supported their concerns that the issues be addressed. Beyond that, reactions varied widely. Prof. David Reed addressed a letter to the women expressing his sensitivity to and concern about their problems. A small group of men began meeting weekly to discuss how the situation could have arisen and how they could address it. They continue to meet. Many people appear to be more sensitive to the feelings of others around them, although lack of harassment is difficult to measure.

There also were negative reactions often following a protestation of sympathy. Some people seem to think that once they have said that they agree in principle, their words and actions do not need to bear that out. As a result there are cases in which harassment has increased, although these are small in number. A far greater number of men expressed anger and frustration. The anger seems to have been at "publicly airing dirty linen" or behaving like spies. The frustration seems to have taken a number of forms. For example, some
men could not understand how people they considered reasonable, rational people could reach conclusions so
different from their own. Others were frustrated by the women's lack of sensitivity to their problem of the
lack of women. Still others were frustrated that the women (who make up less than 10% of the graduate
student population in Area II) had not sought them out individually to hear their concerns. The following is a
partial list of frequently heard comments.

- "Can't you take a joke?" This has a double problem. If a woman evokes this response, she does
  not think the incident in question was funny. If she lets the episode slip by, she is giving tacit
  approval to something that upsets her.

- "It wasn't meant that way." This comment highlights the difference between intention and
  perception. The speaker intended one meaning, while the listener perceived something else. The
  speaker may need to be more sensitive to how his comments may be perceived.

- "Tell me whenever I am doing something you don't like." In this case the speaker is putting the
  full responsibility on the woman for pointing out problems, relieving himself of the responsibility
  of thinking of others. He is asking for the impossible. With women in such comparatively small
  numbers, they cannot be expected to be everyone's conscience. What is at least as important is
  that they cannot always speak out. Often, it would be even more damaging for a woman to say
  something (for example to her thesis advisor or in the middle of a technical meeting). In other
  cases, no woman may be present when an offensive remark is made.

- "I agree with the important points, but you should get rid of the trivia." The most interesting
  aspect of this common comment is that each speaker chooses a different set of items she or he
  considers trivial. More importantly, one of the significant aspects of the women's lives at MIT is
  the continual bombardment of minor offhand comments and almost unnoticeable suggestive
  actions.

4.2 Women's Reactions

The women fell into three categories. The first was the support staff, a vocal subset of whom had negative
reactions. The second was the group of female technical staff who accidentally were not included in the group
working on the list. The third was the women who had assembled the list and signed it. Each group will be
considered separately below.

When the list first went to the faculty, their secretaries who are responsible for the mail also read it. There
were about half a dozen comments mentioning secretaries. Each was there for one of two reasons. One
reason was that the authors wanted to exemplify the fact that women also discriminate against women; the
discrimination is not practiced only by men. Women have problems with other women besides secretaries,
but because secretaries form the largest group of women in this community, they provided more of the
examples. The other reason was that many secretaries are treated poorly, with unreasonable demands put on
them and unreasonable expectations imposed on them. Unfortunately, the authors must be responsible for
their lack of sensitivity to the secretaries plight and how those items might be interpreted. To some of the
secretaries, the women seemed to be saying that they wanted to be able to make the secretaries lives as miserable as the men had historically done. It became apparent to the women very quickly that they had made a mistake. They concluded that at that time they were unable to express what they had wanted without hurting another group of people. Their reaction was to remove all the offending items from the list before distributing copies to the other members of the laboratories.

The women also made another mistake, again highlighting their unwitting participation in the insensitivity that they were asking others to examine and correct. Because they thought they were capable of addressing the problems of the graduate students and technical staff, but felt much less sure about the problems of the support staff, and because they thought it important to keep their discussion group to a manageable size, they decided to limit themselves to female graduate students and technical staff. Unfortunately as a result of the fragmentation and isolation of the fragments, they did not find and include all the technical staff. The department keeps lists of female graduate students; no one keeps lists of female staff members. Those women who were omitted felt hurt and frustrated. They could not understand why they had been left out. They also felt that, although they might agree with what had been said, it was unfair that they be asked to defend something in which they had not participated. Some secretaries also expressed this concern that they were expected to defend a position to which they had not contributed. The women involved in this report felt again that they had been insensitive by not searching harder for the other female technical staff members in the laboratories. Although exclusion of some staff members was not intentional, the women who did participate felt responsible for not having sought out the others.

The women’s own reactions were very complicated. As mentioned, one reaction was disappointment with themselves for not being more sensitive to others in the way they were asking the men to be sensitive to them. But, there was much more than that. They found themselves more in the limelight than ever before; everything was scrutinized and questioned, where previously it had just been watched. They found that even after all the energy they had expended in creating the list, they were misunderstood. Some of them became frustrated at having to say things and explain themselves so many times. Others became depressed about the need for so much additional explanation. Most of them were angry that people could express sympathy for them and continue or increase their misbehavior. All of them were exhausted and torn between the pull to straighten it all out and make everyone understand what they were trying to say and the pull to get back to their various chosen fields of work and research. Few, if any, had realized how much energy and emotional strength the process could take and continues to take. But there were positive reactions also. The open and honest effort of some of the men to understand and correct the situation they addressed was elating. That and a closeness among the women that had not existed before, brought many of them to the realization that the efforts were valuable. The women all learned more about themselves and each other.
4.3 Contributions by Other Members of the Community
4.3.1 Peter Elias -- The department

When I saw the report written by the women graduate students and technical staff I was surprised and dismayed at the extent of the problems they had found in our environment, but felt that other members of the community would share my surprise and concern, and that the report could make a great contribution to producing a more satisfactory environment for women in computer science at MIT. I invited my colleagues to read the report and discuss it at a lunch meeting of computer science faculty and research staff on April 1, 1982. In the memo announcing the lunch I wrote:

It is tempting to shrug off some of these problems as merely showing oversensitivity on the part of the women involved. I don’t think we can afford to do that, however, for three reasons.

First, many of our women graduate students heard before they came that MIT was a difficult place for women. Others, who did not apply or did not come, may have been frightened off by such reports. The percentage of women in graduate work is roughly the same in Area II as in the rest of EECS, although we have almost twice the percentage of undergraduates.

Second, the women note in their letter that many women graduate students feel uncomfortable enough here to avoid their research group or laboratory. They thereby lose a principal component of graduate education.

Third, a larger number of complaints of this general character arise from Area II than from the rest of EECS. This may be due in part to our distinctive geography and workstyle. Whatever the cause, it gives us a greater incentive to take the problem seriously.

The lunch was very well attended, discussion was intense and largely sympathetic and interest was sufficiently great that we agreed to have a second meeting with Mary Rowe present, to give us a better MIT context within which to place the situation here. That meeting, on April 29, 1982, also drew a large and very vocal audience, including some of the women faculty and research staff. The women’s group then held what I believe was the first meeting for all of the members of the two laboratories, The Laboratory for Computer Science and the Artificial Intelligence Laboratory, including students, research staff, support staff and faculty, on May 20, 1982. Again discussion was intense and revealing.

Certainly the net result of all this activity will not make the problems faced by women in computer science at MIT all disappear. However I do believe that there was a significant increase in the sensitivity of many of us among the students, faculty and staff to many of those problems, and that the report and the following activities were a useful and important first step.

Peter Elias
4.3.2 Marilyn Pierce -- The first faculty meeting

On April 1, 1982, Professor Peter Elias held a luncheon meeting for the faculty and research associates in Area II to discuss the document of specific concerns to women prepared by the women graduate students in Computer Science. The meeting was an attempt to examine the problems encountered by these women students.

After reading the report, several faculty were concerned that these problems (i.e., problems of isolation to stereotype comments) seemed to exist in Area II and not in the rest of the Department. In discussing why these problems seem to exist only in Area II it was suggested that although there were no clear answers there were contributing factors to the situation; i.e., the geographical location of Technology Square and the workstyle of students and faculty.

The faculty appeared to exhibit a relatively positive attitude about addressing these concerns. Everyone had done their homework and read the document. Several admitted that they were probably guilty themselves in contributing to some of the problems.

Some concrete action resulted from the meeting. The Area II faculty and research associates agreed as a group to meet with Mary Rowe, Special Assistant to the President, to discuss these concerns. (Ms. Rowe has counselled many women and groups on matters of specific concern to women.) It was also decided to distribute the document written by the women graduate students to the entire Area II graduate student population. In this way students, as well as faculty, will be aware of the problems that exist in Area II.

All in all I was rather pleased at the outcome of the meeting. There was good faculty attendance, the problems recognized, and action taken to help alleviate their grievances. There is still a long way to go. But this meeting was certainly a step in the right direction to help make the Area II environment a more desirable place for women.

Marilyn Pierce
4.3.3 Mary Rowe -- The second faculty meeting
4.3.4 David Reed -- one man's reaction to the report

When I read an early version of this report, and encountered the reactions it engendered among the faculty, staff, and students in the area, I wrote the following paragraphs to the reports' authors. I think they bear repeating, as one man's reaction to the report. I would only like to add that I am proud of the effort put in by both men and women here in discussing these problems openly and honestly. There are complicated and deeply held feelings at the root of these issues. The old rules of "correct" behavior between man and woman are based on assumptions of inequality. As we destroy these old assumptions, the rules change for all of us, and we must examine even our most fundamental instincts.

I am very glad that you put in the effort you did. It is always hard to speak up when you feel oppressed, harassed, or beaten down--you wonder whether it is all your fault (especially when there are those who will imply that it is), or whether it is worth exposing yourself to more of the same, or whether it will do any good.

Certainly the reaction has been mixed, and with the extended distribution you will continue to get reactions. However predictable such reactions seem to be, and however defensive, denying, misunderstanding, insensitive, or uncaring, it is clear that you have had a significant effect. I have attended both faculty lunches where these issues have been discussed, and it is clear that most men there have learned a lot, as I have, about how individual women may perceive their actions--e.g., that discomfort at being an object of undesired attention is not just a "minor" problem to be solved when the women "adjust" to the norms of M.I.T.

Personally, I feel that your list has broken the ice between women and men who work here. These problems will not be solved quickly, and some men will say in a defensive reaction "these women don't deserve to work here if they have such thin skins." That they are so defensive is a good sign of sorts--they used to feel it unnecessary to defend such behavior.

As for me, I learned a lot. I am not a woman, so I have not always been sensitive in the way I have behaved (I remember one time in anger sending a system message containing graphic language it embarrasses me now to recall, and I am sure that I have said things that could be heard as imputing that women could not be as successful as men[though I don't believe that]). I know now about some situations that have occurred that I might be able to help prevent in the future by expressing my disapproval as a faculty member and group leader. I will never be able to neuter myself (nor should any man) at work, but I hope that I can learn from you to listen with some understanding of how it feels to you.

I have heard a rumor that several of the women involved in preparing the report are planning now to leave after their S.M. because of their feelings about the things in the list. I feel sad that some of you find that
necessary after making a strong contribution towards improving life here. One of the reasons I am writing this is to let you know that there are those who care that you stay. M.I.T. need not be inhuman to be excellent.

Thank you all.

David P. Reed
4.3.5 The men’s group -- another perspective on discrimination in Area II

This section of the report has been written by a group of men in the labs who have been meeting regularly to discuss many of the problems and issues that are presented in the main body of this report. We formed in response to the initial report that the women’s group issued, and started meeting shortly after the large lunch meeting. Male students, faculty, and staff members have attended our meetings, and several women from the labs have also come and shared their perspectives with us. We meet weekly, and welcome new members.

We all feel that the issues raised here deserve careful attention. While some individuals have treated the report as either a target for jokes or as a personal attack, our experience is that most of the lab members we have spoken with have begun to think more seriously about the problems of discrimination here. Solutions are not the responsibility of the women alone. While it is clearly inappropriate and paternal for us as men to try to solve women’s problems for them, it is equally inappropriate for us to expect the women to provide all of the criticism and all of the answers. It is important for all of us to address the issues as individuals as well as considering how we can use our positions as staff, students, faculty, group leaders, or administrators to effect positive changes.

We have discussed what advantages we obtain by virtue of being men here. The privileges that we enjoy correlate (not surprisingly) very closely with the problems that women have identified. We take advantage of these privileges constantly, and almost always without thinking consciously about it. We have become aware of a pattern of discrimination under which women have difficulty getting involved in research. Male graduate students are more likely to get RA’s and command a greater share of their supervisors’ time. There is no lack of Ph.D. level role models for men in the lab. Men tend to get those tasks which are on the critical path of group efforts. We benefit from the assumption that men are more technically competent than women. We are also aware of another pattern under which women live in a social "goldfish bowl" because they are so outnumbered. Men are rarely chased after for sex, leaned upon for companionship, nor are they "rated" on the basis of their ability or willingness to conform to socially defined standards of appearance, dress, and behavior. There is no drain on our time and energy from such expectations. It is clear to us that these patterns reflect the cultural biases of our society; women are being discriminated against and men are benefiting from it.

Discrimination is a real and severe problem everywhere, and the field of computer science is no exception. It is easy to try to dismiss the problem as one that occurs elsewhere, anywhere else, but not here. The problems that surface within the labs are not limited to gender differences. Racial, economic, cultural, and educational difference all lead to various forms of discrimination. Lines between students, faculty, and clerical staff are rarely crossed. While this report deals primarily with discrimination based on gender, perhaps its presence will stimulate people to consider what other groups here deserve equal treatment.
Our ultimate goal is to move towards an environment that we consider healthier for all of its members. This means identifying ways in which individuals and groups are hurt, and attempting to eliminate destructive competition, sexual harassment, and all of the other ways in which we oppress each other. Equally important to us is the goal of fostering a more supportive environment. Cooperation and community are important aspects of our experience here that tend to remain underdeveloped. The presence of many strong egos often leads to a lack of respect for one another. Traditionally, we learn that women are more sensitive to human needs, while men are more rational and capable of scientific thought. These roles are harmful; as men we need to learn to be fuller human beings by allowing our emotional selves more credence. We need to stop stereotyping women as available for support only in sexual and emotional ways, and not intellectual.

What can be done? Taking responsibility for our own actions is a crucial first step towards solving these deeply rooted problems. One aspect of our group is often referred to as 'consciousness raising' - that is, identifying the problems, and relating these problems to our own actions as well as our perception of interactions going on around us. We attempt to identify concrete changes that might be made to help correct harmful situations. It is our hope that we can provide a forum for discussion among those who agree with our analysis as well as those who are questioning and those who disagree. The whole issue of discrimination is deeply rooted, and needs to be kept visible, for it is far too easy to dismiss it after superficial consideration. We hope to sponsor one or more public discussion sessions open to the whole lab, and we continue to meet regularly to maintain and develop our awareness of the problems and in the hope of discovering new ways of addressing them.

We invite any interested lab members to join us. We generally meet Thursdays from 1:00 to 2:00. Check with any of us for information about meeting times and places, and for notice of discussion topics.

Steve Berlin

Dan Carnese

Oded Feingold

Walter

Sinil
5. Recommendations

In this section, we present some formal recommendations to the faculty, students and staff in the Computer Science area of the EECS department. There are two types of recommendations that can be made; the first addresses the educational and administrative policies of the department, while the second addresses the personal efforts of individuals to improve the day-to-day environment for women in the department. The focus of this section will be the formal policy-oriented type of recommendation. The latter, more personal recommendations have been addressed indirectly in section ?? of this report. It is hoped that efforts in this area are continued through open discussion between men and women in the department.

Before presenting the formal recommendations, two general points should be made. First, many of the suggestions are aimed at improving the overall environment for men and women students, faculty and staff. The ideas were generated through discussions among men and women graduate students, and are often motivated by problems that both groups have encountered. One reason for discussing these recommendations here is that policies aimed at improving the general environment often have particular benefit for women in the department. Their realization will require careful consideration by a group of individuals, representing the many facets of the department.

The formal recommendations:

1. Establish a committee of people to oversee the implementation of these proposals, and improvement of the environment for women in the department.

2. Appoint a member of the faculty and/or administration of the department, who could provide advice to men and women on the issues that have been discussed in this report, and who could take an active role in the solution of a problem that requires outside assistance. A formal grievance procedure should be established.

3. Make a formal policy statement from the Computer Science administration, articulating a commitment to provide a positive educational environment for women, stressing faculty responsibility in this area.

4. Encourage a department commitment to increase the number of women faculty, staff and students. (The EECS department could also lobby for Institute-wide support of this commitment.) This commitment requires the active recruitment of women, which could be accomplished in at least two ways:

   a. Send department representatives to other campuses to recruit both men and women for the graduate program.

   b. Distribute literature to universities across the country, and to potential applicants to the graduate program, which discusses: (1) the importance of trained Ph.D.’s in the field of Computer Science, (2) the specific program of study offered at MIT, (3) the desired preparation for graduate education in Computer Science, with an explicit discussion of the
type of background not derived from course work (such as independent study, research, familiarity with the literature, etc.) and (4) the formal commitment of the department to providing a rich environment for women graduate students.

5. Encourage the visibility of women members of the research group at conferences, and promote contacts with researchers outside MIT. This exposure contributes to the placement of women in good positions in academics and industry.

6. Include student representation on department committees, such as the graduate admissions committee, and faculty search committees. In the area of graduate admissions, women graduate students could provide valuable input into the evaluation of women’s applications.

7. Promote good undergraduate preparation of women at MIT, by encouraging them to
   a. undertake UROP projects,
   b. undertake substantial B.S. theses,
   c. present their work in group seminars,
   d. talk to professors in their area of interest,
   e. read relevant literature
   f. talk to graduate students.

The following suggestions contribute to an increase in communication between undergraduate and graduate students:

   a. Establish a system whereby graduate students serve as co-advisors to undergraduate students.
   b. Establish a formal means of communication between women graduate and undergraduate students, such as luncheons.
   c. Organize a meeting of undergraduates interested in applying to graduate school, in which they have an opportunity to speak to graduate students in their area of interest.

8. Set up a formal library for literature on issues of women in professional careers, particularly relating to women in engineering. The library might also include (1) department reports, such as this, (2) institute reports and policies, (3) notes of meetings of groups addressing women’s issues, (4) department statistics. Relevant literature might also be distributed to the department.

9. Maintain department records on students that leave the department before fulfilling their original goals, in an attempt to assess whether changes in the educational or administrative policies of the department might help to decrease the loss of good students from Computer Science.

10. Setup workshops within the department for thesis advisors, teaching assistants, graduate students, staff, etc. which address the following:
a. Teaching effectiveness.

b. Sensitization of people to the differential treatment of men and women in the research and classroom environments.

c. "Assertiveness" or "self-confidence" training.

In this context, a means of self-evaluation for men and women in the department may be established, such as a questionnaire, which articulates particular behaviors which people may look for in their own experiences (for an example, see [Chilly]).

11. Establish a semester progress report, through which students may receive an objective evaluation of their progress, achievements, strengths and weaknesses, so that they may better focus their graduate development.

12. Encourage events that seek to break down the barriers that can exist between men and women in a research group, such as picnics, organized athletics, or trips. Inter-group events, both academic (such as inter-group seminars) and social, could contribute toward a break-down of the compartmentalization that exists within Computer Science. A formal list of suggestions for group leaders from the department, with possible financial incentive, could help to promote these events.

Finally, the most important recommendation that can be made is to promote open discussion between men and women, about problems that have been encountered in the department, and to take an active role in improving the environment for men and women together.
I. Bibliography

[1] Hall, R., Sandler, B.
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Project on the Status and Education of Women, Association of American Colleges

Saturn Rings.
*Sojourner*...
of this report to deal with the problems described. This chapter also includes a discussion of the reactions of various portions of the community to the women's efforts. Comments and descriptions of these events, written by people who were important to the process but who were not otherwise involved in the writing of this report, are included. The report concludes with recommendations, which we believe will help to further improve the MIT Computer Science environment, and might provide insight to other communities that are committed to improving their environment.
2. Background

2.1 The MIT, Computer Science Environment

In order to understand much of what follows, the reader should be aware of the physical and organizational environment with which we deal.

The graduate student women who participated in writing this report are all members of the Computer Science Area of the Electrical Engineering and Computer Science (EECS) Department\(^3\). In addition, as with most of the graduate students and faculty in Computer Science, each woman was associated with one of two research laboratories, the Laboratory for Computer Science (LCS) or the Artificial Intelligence Laboratory (AI). The research staff members who participated were also from the two laboratories.

All of the people who are associated with the two laboratories, including the faculty and graduate students, have office space in a building that is approximately a block from the edge of the main part of campus; it is shared with various companies. Most of the people or facilities with which one is likely to work can be found in this building including the library, seminar rooms, copying facilities, supply room, mail room, and computer facilities, but not classroom space. This environment is thus very different from most of MIT where the buildings are interconnected, interspersing central facilities, classroom space, and laboratory space.

The laboratories are further divided into research groups, usually consisting of a faculty member or senior researcher, some graduate students, support staff, and possibly some research staff and/or undergraduates. Some of these groups have several female graduate students or research staff; some have only male. Most groups have female support staff. In 1981, of the 149 graduate students in Computer Science only 13 were women. All thirteen women participated in the preparation of this document.

2.2 A History of Women in the Department

This section briefly describes the recent history of women in the Computer Science Department at MIT. As can be seen in the following list, it is a history full of efforts by many members of the department to integrate women into the academic and professional community on an equitable basis. Had the women who produced this report not been certain of the commitment and support of those members, they would not have felt it possible to publish a document of this nature.

The statistics presented in Table 2-0 and 2-1 give further indication of the continuing scarcity of women in

\(^3\) There are six areas in the EECS Department; Computer Science is referred to as Area II.
Computer Science at MIT. The ratio of men to women in the environment accounts for or contributes to many of the problems described later in the report.

Table 2-1: Department of EECS, Fall Registration (graduate students only), 1973-81 (provided by Marilyn Pierce, EECS).

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Total</th>
<th>WOMEN</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>565</td>
<td>61</td>
<td>10.8</td>
</tr>
<tr>
<td>1980</td>
<td>554</td>
<td>54</td>
<td>9.8</td>
</tr>
<tr>
<td>1979</td>
<td>529</td>
<td>50</td>
<td>9.5</td>
</tr>
<tr>
<td>1978</td>
<td>491</td>
<td>45</td>
<td>9.2</td>
</tr>
<tr>
<td>1977</td>
<td>475</td>
<td>29</td>
<td>6.1</td>
</tr>
<tr>
<td>1976</td>
<td>504</td>
<td>26</td>
<td>5.2</td>
</tr>
<tr>
<td>1975</td>
<td>469</td>
<td>19</td>
<td>4.1</td>
</tr>
<tr>
<td>1974</td>
<td>460</td>
<td>22</td>
<td>4.8</td>
</tr>
<tr>
<td>1973</td>
<td>427</td>
<td>12</td>
<td>2.8</td>
</tr>
</tbody>
</table>

Table 2-2: EECS Department, Graduate student statistics for the seven Areas, Fall 1981 (provided by Marilyn Pierce, EECS).

<table>
<thead>
<tr>
<th>AREA</th>
<th>TOTAL</th>
<th>WOMEN</th>
<th>PERCENTAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area I</td>
<td>97</td>
<td>9</td>
<td>9.3% (Systems, Communication, and Control)</td>
</tr>
<tr>
<td>Area II</td>
<td>149</td>
<td>13</td>
<td>8.7% (Computer Science)</td>
</tr>
<tr>
<td>Area III</td>
<td>120</td>
<td>12</td>
<td>10.0% (Electronics, Computers, and Systems)</td>
</tr>
<tr>
<td>Area IV</td>
<td>56</td>
<td>6</td>
<td>10.9% (Energy and Electromagnetic Systems)</td>
</tr>
<tr>
<td>Area V</td>
<td>70</td>
<td>8</td>
<td>11.4% (Materials and Devices)</td>
</tr>
<tr>
<td>Area VII</td>
<td>55</td>
<td>9</td>
<td>16.4% (Biomedical)</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>3</td>
<td>21.4% (Operations Research)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1</td>
<td>20.0% (Technology Policy Program)</td>
</tr>
</tbody>
</table>

Efforts to address the special problems of women in EECS can be traced to 1976, when Professor Arthur Smith, the Graduate Officer in EECS, called a meeting of the women students. It became evident at that
meeting that some of the women present felt they had encountered discriminatory attitudes in the department. As a result of that meeting, Marilyn Pierce, the administrator in charge of graduate students in the department, met with each of the women students to discuss those problems in a private and less threatening situation. She then wrote a report, published in 1979, describing the students' complaints and suggestions for improving the situation. 

Also in 1979, Candace Sidner received her PhD in Computer Science (only the third granted to a woman in the history of the computer science area at MIT) and, upon leaving the department, published a report describing the difficulties encountered by women at MIT and the prevailing attitudes that made it difficult for women to succeed. As a result of those reports, one of the first tangible policy efforts was made, namely, the realization and resolution of the apparent bias that gave proportionally more Teaching Assistantships (as opposed to research assistantships) to the female students. This bias had hampered the progress of female students' research efforts.

In the spring of 1981, the MIT Committee on Sexual Harassment, chaired by Professor Peter Elias, published its report. This policy statement helped to bring attention to and legitimize the special problems of women students. It also made the Computer Science women aware of Professor Elias' support and concern; that awareness was important in the women's decision to approach him about the issues that resulted in the production of this report.

Later that year, the women faculty published the results of their study of the graduate student academic environment at MIT. This report included a section on the specific concerns of women, and among other things emphasized the importance of role models and support groups. In accordance with the recommendations of that report, Emily Weidman, then-Special Coordinator for Women's Affairs, and Marilyn Pierce, started holding monthly lunches for the women students in EECS. It was at these meetings that the severity of the problems facing the Computer Science women became apparent.

Because of the number of problems raised by the Computer Science women at these lunch meetings, the Computer Science graduate women decided to meet separately from the rest of the department women to investigate the issues further. A number of the female research staff from the Laboratory for Computer Science and the Artificial Intelligence Laboratory also joined. They found that they had many experiences in common, partly because of their unique environment in the off-campus Technology Square building that is shared by the two laboratories.

During a meeting with Mary Rowe, Special Assistant to the President of MIT for Women and Work, she suggested that the women write down examples of comments and incidents that had upset and concerned
them and that they felt contributed to an inhospitable environment for women. As a result of her suggestion, after several more meetings, the women created two lists, a list of incidents that they felt could be made public, and a second "private" list. The items on the public list, hereafter referred to as "the list", all represented actual occurrences but were altered so that they would not be identified with particular individuals or groups (see Appendix 3). The women agreed that the problems concerned the community as a whole; they neither wanted to point fingers at particular "offenders" nor give any member of the laboratories, male or female, the impression that he or she was not responsible or involved. The private list contained incidents that identified particular members of the community, either the women reporting the incidents or others involved in them.

A representative group took these lists to Peter Elias, Associate Head of the department. The purpose was to show him the lists and discuss with him what to do next. The women agreed to address the faculty first by distributing copies of the list along with a letter from Peter Elias stating that the concerns would be the topic of discussion of the next weekly Computer Science faculty lunch. The faculty were approached first for two reasons. First, they have the single largest amount of power over what occurs within their research groups. Second, whether they choose it or not, they are viewed by many students as role models and as such should be careful of the examples they set. A second version of the list, described in section 4, was later distributed to the staff and graduate students.

The following section describes the problems that women have in this environment, and should serve as a foundation upon which change and resolution might be built. All of the examples used in the section come from the list distributed to the faculty and graduate students in the spring of 1982.
3. The list

3.1 Introduction

The following two sections are an annotated version of the original list that was circulated among our colleagues in the department. Unlike the original list which had many sections, we have broken this presentation down into two sections that represent what we feel are the two major aspects of our graduate careers: Professional Identity and Social Aspects of Professional Development.

3.2 Professional Identity

Graduate education and research have been more difficult for many women in computer science at MIT than for their male colleagues. Frequently, this disparity is due to beliefs held by male supervisors and peers that women's career ambitions are not as important as those of their male colleagues and that women are incapable of becoming expert in a technical field. It is not possible to succeed as a researcher if one's research judgment and technical expertise are not respected by others in the field, and it is very difficult to achieve that level of expertise if as a student one's peers and advisors have low expectations for one's success. Often people who convey these biased attitudes toward women are well-intentioned and think that they are acting fairly and objectively. Nevertheless, their biases harm female colleagues in the professional environment.

There are some attitudes that we feel are particularly important to identify in this section. The first attitude questions the seriousness of women's academic or professional goals. In the extreme, this attitude takes the form of "She only came to MIT to get a husband." Like their male colleagues, women have come to MIT to receive a technical education and begin careers. In general the attitude is manifested by a concentration on a woman's personal identity, rather than her professional status, even in purely professional situations.

A second, more extreme attitude is to consider women as being inherently incapable of gaining technical expertise in computer science, or of addressing substantial problems in research and development. This attitude ranges from the stance that women's thought processes are inferior and incapable of the same level of analytical reasoning, to the assumption that women have been socialized so differently that they cannot learn the "correct" way to do engineering. At best, women face the attitude that they are less qualified to pursue research in computer science than their male colleagues are.

A third problem is simply that many of the men and women in the laboratories, as elsewhere, are unaccustomed to working with members of the opposite sex in technical and professional contexts. At MIT it is the women who are both the newcomers and the minority. While this problem does not reflect biased attitudes, it does give rise to differential treatment of the women and can make it more difficult for them to
work effectively. The added amount of time and energy needed to deal with problems that arise from the differential treatment can be burdensome.

All of these attitudes are manifest in various actions in the work environment. They may be conveyed directly, for example, through explicit verbal comments that embody the attitude, or indirectly, through the differential treatment of men and women. Subtle or inadvertent behavior often can do more damage to women than overt discrimination, because it may not be recognized as discriminatory by the men or women responsible. Constant negative comments that appear unbiased have the effect of diminishing a woman's self-esteem and gradually leading her to believe that she is incapable of succeeding. If the actions are not recognized as discriminatory, the woman will not know the proper framework in which to deal with them. Even when a woman is faced with overt discrimination, she may not know how to "properly" handle it without offending her male and female colleagues or being labelled as "hard," "too sensitive," or "radical."

In the next few sections, we discuss particular experiences of women in computer science at MIT that reflect these pervasive attitudes about women. The situations described include: a lack of acceptance of women's contributions to technical discussions and group work, patronizing behavior from colleagues, assignment of less challenging problems to women, and sometimes a complete unwillingness by faculty to work with female graduate students and technical staff. We understand that some of the specific comments may at first appear insignificant, with consequences that are difficult to understand. However, when these situations arise daily to more than a few women in the department, they create an atmosphere in which it is difficult for women to work effectively.

These problems are not universal in the computer science area of the department; there are some research groups that have provided very rewarding experiences for women. At the end of this section, we present some examples of positive experiences of women in this area in order to provide a broader context in which to view the negative events and to identify the kinds of experiences that we would like to encourage.

3.2.1 First a Woman, then a Professional

The day-to-day experiences of women in computer science are characterized by situations in which their identity as professionals is overshadowed by their identity as women. These experiences convey an attitude that women are not treated seriously as professionals. One example of this type of experience is reference to sexual or personal issues, either directly to a woman, or in reference to a woman, in professional situations. Such references can take the form of specific comments about a woman's appearance, her personal relationships, or stereotyped comments about women's abilities and personal traits. Inappropriate times for these comments include during technical discussions (for example, a class, a technical seminar, a group
meeting, or a meeting with a supervisor), or in the presence of people with whom professional bearing is important (for example, outside consultants, government representatives, visiting scholars). Whether intentional or not, focusing on personal issues in professional situations creates the impression that the woman is there for personal, rather than for professional reasons. The following examples provide illustration of situations in which reference is made to personal matters during professional interactions. All of the examples in this report are actual experiences of women in Computer Science at MIT.

- Following a technical discussion over lunch with a faculty member, I was asked for a dinner date. This kind of experience leaves a woman wondering whether the faculty member went to lunch for the intended technical discussion or for personal reasons.

- During a technical discussion with a faculty member, he made an obscene remark about my clothing when another man entered the room.

- While I was teaching a recitation section, a male graduate student burst in and asked for my telephone number. Men often interrupt women during technical discussions to ask personal questions or make inappropriate remarks about non-professional matters. This generalization from the experiences of the women in this department is supported in a study by the ***Project on the Status of Education for Women.

- Faculty members have referred to personal details concerning women students in class lectures.

- When I was a TA, one of my students missed the lecture and saw me later. He said, 'Will you come sit on my lap sometime and tell me what I missed?' This illustrates a lack of respect for the instructor, as well as an attempt to undermine her authority by focusing on the fact that the TA is a woman. Respect from her students can be as important for developing a woman's self-confidence as respect from a peer or supervisor.

- If during a technical meeting, a sexist comment is made, all eyes turn to me for my reaction. This situation reflects the fact that not only are women constantly in the limelight, but that many men think it is all right to make sexist comments even if when a woman is in the room.

- A male graduate student said, 'Gee, I don't think it's fair that the only two girls in the group are in the same office. We should share.'

- I was told by a secretary planning a summer, technical meeting at Endicott House that the host of the meeting would prefer that female attendees wear two piece bathing suits for swimming.

- During a grades meeting, a professor decided to give a borderline student the higher grade because she was 'cute.' When I suggested that this was not a relevant basis for grading, another staff member chimed in, 'Yeah, she's not THAT cute.'

These kinds of experiences undermine women's professional identities, by drawing attention away from their roles as professionals, and focusing it on the personal differences between men and women. They convey the attitude that men think of women first as women, and second (if at all) as professional colleagues. In the course of a technical discussion, these experiences detract from the import of the woman's technical
contribution and can damage her credibility. Inappropriate comments by professors in the presence of graduate students, or comments by graduate students that go undiscouraged by senior colleagues, legitimize these attitudes and perpetuate the lack of respect displayed for female members of a research group.

The following comments and incidents are also examples focusing on the personal rather than professional images of women. The examples may seem less problematic than those in the previous section because some were evidently intended as compliments, and in other contexts, would be. However, whatever the intent, they have the effect of detracting from a woman's professional image in the context of a work situation.

- 'What do you expect? You are a very attractive and interesting woman so you are going to attract a lot of attention.'

- When I first met the professor in charge of a course for which I was a TA, he said, 'Boy, the TA's have gotten a lot better looking around here.'

- A male student used the following phrase to identify a particular female colleague, 'oh, the one with no chest!'

- A graduate student said, 'Men are tired of only seeing men. They want to see women in dresses, not women who look like men.'

- I received an anonymous mail message saying, 'Looks like there is a hot item in the department.'

As one woman summarized: "Comments about my appearance are upsetting. They make me feel insulted, embarrassed, offended, hurt, and concerned for my stature as a professional."

A different set of attitudes are reflected in stereotypic assumptions about women's roles and values. Women enter a technical field for the same reasons that motivate men to enter the field, and with the same career goals. Male colleagues, however, sometimes do not accept these similar roles for men and women, and instead assume more traditional roles for women, as reflected in the following stereotyped comments:

- 'Why do you need a degree for marriage?' - a male colleague.

- '(Female graduate student) only came here to get married' - a male graduate student.

- 'What's an attractive girl like you doing in a place like this?' - a male colleague.

- '(Female graduate student) flirts to get whatever she wants.'

These comments further reflect the attitude that women are not treated seriously as professionals.

To summarize, a common thread throughout this section has been the placement of a woman's identity as a woman before her identity as a professional, reflecting an attitude of women as second-class professionals, not
to be taken as seriously as their male counterparts. Women, as a result of these experiences, feel undervalued, and suffer a loss of self-respect and self-confidence, which hinders their professional development.

3.2.2 Invisibility

Many women feel that they are not treated seriously as professionals because of their "invisibility" in technical situations. By "invisibility" we mean overlooking women in technical discussions, attributing their work to male colleagues, excluding women from group efforts, and not seeking their technical opinions on relevant subjects. A few specific comments underscore this "invisibility":

- I have had men ignore my questions about their work, but respond to a man who asks the same questions.

- It's very common not to be asked for my technical opinion on a relevant subject in my field of interest.

- I have been excluded from discussions. I even had two people with whom I was trying to have a meeting pull their chairs together and start talking to each other as if they'd forgotten I was in the room.

- In response to being asked about my work, a colleague took over, gave my analysis of the situation, and said how long it would take me to do a task.

- I have been ignored, constantly interrupted, and talked over in meetings as if I weren't there.

- I was the only woman in a group working on a machine. Only one person could use the machine at a time. Often, while I was working on a task, a male graduate student would physically push me away from the machine and interrupt my work so that he could get at the machine. This didn't happen to the men in the group.

- It is a common experience for women to receive professional correspondence addressed to "Mr. So-and-so". In fact, all of the graduate women received letters from an Electrical Engineering department laboratory addressed in this way. Women have also observed great surprise from male colleagues when they discover that a good article in the technical literature by, for example, J. Smith was written by a "Janet" rather than a "John". Men still form a large majority of researchers in the field of computer science, but women have also proved themselves capable of making valuable contributions to the field. When it is assumed that engineers in general, and authors of good work in particular, are men, there is an implication that women's contributions are being ignored.

These events reflect the attitude that women do not make equally valuable contributions to technical discussions or group work, and do not offer sound judgment on research problems. These experiences have the unfortunate consequence of promoting a negative self-image for women, by leading women to believe that they are not doing good work, and are, less competent. Also, such prejudices present a lower image of women generally and can inhibit their careers.
3.2.3 Patronizing Behavior

On the other end of the spectrum from invisibility is excessive, patronizing attention from colleagues, reflecting an attitude that women must be taken care of, led by the hand, or have their work done for them:

- 'We'll see how we can fix things for you so they're better' a male colleague.

- Often when I ask a male graduate student how to do some task, particularly something on the system, he will do it for me rather than explaining it to me so that I can do it for myself.

- I asked a male graduate student a technical question, and got an answer that seemed to be aimed at someone with little or no knowledge of computer science, as if it were being explained to a high school student rather than a colleague.

- It seems like all I have to do is ask one simple question and the people I work with try to take over my entire research problem and solve it for me. I think they're trying to be helpful, but it doesn't help me if I'm never allowed the chance to do my own project.

The final comment emphasizes the key problem: women, as well as men, need the opportunity to work on open-ended research projects on their own. They need this experience in order to learn the discipline necessary to focus a research problem, the creativity to formulate alternative paths to pursue, the technical judgment to evaluate different alternatives and to choose the most appropriate path to follow, and finally, the technical skill, self-reliance and perseverance to carry a problem to its completion. While some research supervisors are gifted with an ability to teach these qualities to their students explicitly, most students must learn such qualities through experience.

For a project to be a significant learning experience, it must be challenging. However, women, more often than their male counterparts, are relegated to straightforward menial tasks instead of substantial, challenging problems in their area of research because less is expected of them. Concerning the assignment of menial tasks, one woman comments:

- I resent being given what are considered menial tasks for two reasons: first, the dispenser of the tasks assumes that women should be doing more menial tasks, and second, the dispenser is making a statement about whomever does the tasks by defining them as menial.

In an early meeting with a potential research supervisor, a woman received the following suggestion:

- 'You want to do research? Let me see what I have that you can do...This paper needs proofreading.'

We recognize that a valuable way of introducing a student to research, and testing her research judgment, is to encourage her to read current literature, and use this literature as a basis for initial technical discussions and as a source of ideas for research projects. Insightful comments from the student, reflecting an in-depth
analysis of the work, could indicate to a professor that the student may be capable of tackling research problems in this area. However, in the above incident, the woman who received this comment felt that the professor thought her to be capable only of elementary proofreading. There was no encouragement to provide an in-depth analysis of the paper, or to use it as a stepping stone to further work with this professor.

Every graduate student has to prove himself or herself of having sound technical background, and being capable of pursuing open-ended research problems. Good or bad, many will argue that this tradition is a "feature" of the environment of MIT and many other academic institutions. Women ask only to be given the same opportunities to prove themselves that are available to their male colleagues and the same chances to pursue challenging research problems.

3.2.4 Qualifications

Many of the problems that women encounter may arise from a basic doubt that women are qualified to pursue a graduate career in computer science. In our department, no unqualified women are accepted, so that it should not be expected that women will be less capable of succeeding in course work and the pursuit of research. Nonetheless, the following sorts of comments are heard:

- 'You got into graduate school because the department needs more women.'
- 'You got into graduate school because Professor X is in love with you.'

Even undergraduates do not accept the ability of women graduate students:

- I heard an undergraduate say, 'What am I going to do? This is an important course and my TA is a girl.'

There is a feeling among women that they often need to be more qualified than men, to be considered as capable:

- A member of the graduate admissions committee told me, after the admissions decisions had been made, that there were no well-qualified women. When the women arrived it turned out that there were several. I find it frustrating that women have to be superstars to be considered mediocre at best by some of the faculty.
- I was told I had a poor background, although male graduate students from the same undergraduate program were never told that.
- I have often heard people say, 'I really don't think the women students around here are as good as the men.'

Women are often told that they lack qualifications for entering research projects, and are consequently not