

Report of the CfA Gender Equity Committee (CGEC)

February 2007

EXECUTIVE SUMMARY

This report summarizes the final findings and recommendations of the Center for Astrophysics (CfA) Gender Equity Committee (CGEC). The CGEC was appointed by former CfA Director Irwin Shapiro in 2002, to assess gender equity in all of the categories of CfA employment. Since 2004, CGEC activities have been supported by Director Charles Alcock. The CfA, based in Cambridge Massachusetts, is a combined institution composed of the Smithsonian Astrophysical Observatory (SAO), the Harvard College Observatory (HCO), and the Harvard Department of Astronomy. With an overall employee and associate base of about 950 individuals, the CfA is one of the largest astrophysical institutions in the world.

The findings of the CGEC are based on the committee's assessment of CfA employee demographics, solicited and unsolicited input from employees, and three independent studies: a web survey of the entire CfA employee population; confidential interviews of a randomly selected, statistically representative, sample of employees; and a statistical analysis of the institutional records of the SAO, which is the largest component of the CfA.

The CGEC finds that even though the CfA has a larger fraction of women postdocs (including those in prestigious named post-doctoral fellowships) than in nationwide statistics, overall the CfA lags behind the national statistics--which themselves need to improve--in the percentages of staff and faculty women scientists, both tenured and non-tenured. At SAO, for example, of the 22 Federal (tenured) scientists hired since 1991, there were 21 men and only one woman (hired in 2003). Women engineers are also nearly absent from the SAO Central Engineering Department. Women are virtually absent from the senior ranks of administrative positions, and hold only a minority of the senior IT positions.

The CGEC study revealed a consistent woman-adverse bias at the CfA. In all areas where a gender gap was detected (e.g., wages/salaries, space allocation, upward mobility), women were generally in a worse position than men. The survey of allotted workspace showed that on average women have smaller office spaces than men, a result echoing that found in gender equity surveys in other institutions. Similarly, a woman-adverse gap is found in rank/salaries. This gap--albeit small--would still result in significant differences in earnings over a career in favor of men. All the discrepancies found in the study, although small, tend to disfavor women.

The analysis of publication rates and citation indices for scientists revealed gender-related differences suggesting that women scientists, especially junior women, tend to collaborate less than their male colleagues. Interestingly, senior women scientists, while having a slightly smaller publication rate compared to the senior men, surpass senior male scientists in citations per paper. A larger percentage of women scientists

than men obtain external funding at SAO, but the few large contracts are male-dominated. This result may point to a higher level of entrepreneurship among women, but can also be explained by a sense of isolation. Since most SAO scientists work in mid to large size projects, if male scientists feel part of the team (and women do not), they are less motivated than women to apply for funding.

The web survey and interviews confirmed symptoms of gender imbalance in the perceptions of CfA employees. In particular, concerns were expressed about the lack of upward mobility for women, unwritten rules favoring male employees, lack of adequate mentoring, unfriendly culture and male cliques, lack of management training for SAO supervisors, the SAO performance evaluation process, and the need for more family-friendly procedures at the institution.

A detailed set of recommendations to move the CfA towards gender equality is given in Sections 1.2 through 1.5.

The CGEC feels strongly that a leadership and institutional commitment to gender equity in the CfA workplace is paramount. Without an explicit commitment to these goals by the Director, gender equity will languish. If we are serious about gender equity, we will need to re-think how we hire, reward, and promote CfA employees; and how we attract and further the career development of high-quality individuals.

We recommend that the CfA Director establish an independent mechanism to monitor equity. This could be achieved by creating a small standing committee chaired by a senior staff member of the CfA, which includes both science and non-science representatives. We also recommend that the Director, in conjunction with this independent equity committee, establish a system of incentives towards achieving equity.

Noting the difficulty in obtaining institutional data for the Gender Equity study, the CGEC recommends that *the CfA Director institute the means for pursuing an ongoing longitudinal monitoring of the entire CfA population*, to compare the career trajectories of different groups at the CfA and to investigate the issue of the disproportionately small number of women in high level positions; and that these statistics should be provided annually to the equity monitoring committee. We further recommend that the longitudinal record study be used to monitor other aspects of equity such as race, ethnic biases, and disabilities; and that for each new position, statistics should be provided annually to the equity monitoring committee on the gender of the applicants, and the gender fraction at each step of the hiring process. We recommend that full longitudinal studies (similar to those conducted by the CGEC), be performed at 3 year intervals to provide reports for the CfA Visiting Committee.

The CGEC recommends that *the CfA take steps to redress the gender biases uncovered in the present study*, and that as steps to accomplish this the Director ensure that women are members of all the CfA governing bodies and all committees, including promotion and hiring committees; the CfA address the issue of lack of

upward mobility for women employees; and the CfA develop formal mentoring programs.

In the course of our investigations, a broader range of issues than gender equity surfaced. The CGEC recommends that *the CfA improve communications and existing processes*. In particular, we recommend that the CfA set up effective information sources and communication paths for job-related issues that may affect gender equity; that SAO enforce training for supervisors; that the CfA revise the performance evaluation process; and that the CfA review its Ombudsperson and EEOC counselor programs.

In addition, the CGEC recommends that the *CfA improve its social and working environment*, by addressing and changing the present unfriendly culture for *all* women, and taking steps to facilitate family care processes for employees.

Focusing on scientists, the CGEC recommends that SAO and Harvard both strive to achieve gender equity among scientists and faculty; that future CfA Gender Equity studies include graduate students and post-doctoral fellows; and that Gender Balance be a consideration in the choice of speakers and chair-persons at CfA colloquia.

Focusing on the technical staff, the CGEC recommends that SAO address the paucity of women in Central Engineering, and the scarcity of women in IT positions at the higher grades.

Focusing on the administrative and support staff, the CGEC recommends that SAO address the scarcity of women in senior administrative positions, and that all scientists, men and women, be made aware of the necessity to engage in respectful behavior in their interactions with administrative and support staff.

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1. Recommendations

1.1 Background

The Harvard-Smithsonian Center for Astrophysics includes the Smithsonian Astrophysical Observatory and the Harvard College Observatory (under a single Director), and the Harvard Department of Astronomy (under a separate Department Chair). The CfA is one of the largest astrophysical observatories in the world. It is geographically distributed, with the greatest concentration of employees in Cambridge Massachusetts, where the facilities are spread over several buildings within the city. The CfA maintains observational facilities and staff in Arizona (the SAO Fred Lawrence Whipple Observatory, the MMT Observatory, and VERITAS) and in Hawaii (the SAO Submillimeter Array). The CfA is a partner in the Magellan 6.5 m telescopes in Chile (through the Harvard share), and in the 10 m South Pole Telescope in Antarctica. SAO operates, for NASA, the Chandra X-ray Observatory, and both SAO and HCO are involved in a number of space programs in astrophysics and solar physics. Research at the CfA covers most aspects of observational and theoretical astrophysics, and includes laboratory astrophysics.

Given its unique character as one of the world's finest astrophysical academic faculties, and government and private research laboratories; the CfA should set high standards for gender equity in the scientific community. As discussed in Section 3, the studies of the CGEC have revealed significant gender equity issues; including the small number of senior women scientists, the woman-adverse gap (albeit small) in salaries and office space, the significant lack of women among the engineers, and the glass ceiling in administrative management careers. The female population at the CfA also reports itself to be less content overall than the male population in such areas as career opportunities, climate at work and family support.

The gender equity situation at the CfA echoes the gender equity concerns emerging from studies of major scientific institutions in the US, starting with the path-breaking MIT report (<http://web.mit.edu/gep/res.html>), and including the gender equity study of the Space Telescope Science Institute (<http://www.aura-astronomy.org/nv/response.pdf>). A similar situation exists in leading scientific institutions in Europe, as described by the article in The Economist of Sept. 9th 2006: *Sex and Scientists' Salaries – Mind the Gap*, which reported on the general issue of lower salaries and fewer resources for women scientists when compared with their male counterparts. In this country, a recent report of the National Academy of Sciences committee on gender equity in science and engineering, chaired by Donna Shalala of the University of Miami, concludes: "Women are capable of contributing more to the nation's science and engineering research enterprise, but bias and outmoded practices governing academic success impede their progress almost every step of the way..... Fundamental changes in the culture and opportunities at America's research universities are urgently needed. The United States should enhance its talent pool by making the most of its entire population." <http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11741>

Other institutions have taken successful steps to monitor and address their gender equity issues (e.g., MIT), and so should the CfA. Insight into this process was offered by a recent talk at Harvard by Dr. Harriet Wallberg-Henriksson, president of the Swedish Karolinska Institutet. Her analysis recognized a gender bias in the perception of gender issues, which we also find at the CfA, and a self-confidence problem among women that makes them less aggressive than their male colleagues in pursuing advancement and applying for jobs. Consequently, the Karolinska Institutet has started a mentorship program and leadership classes for its junior staff, (which has benefited both women and men), and has been pro-active in creating jobs in areas where potentially successful female candidates are available. Similarly, the Women's Advisory Committee at NASA GSFC, a US government institution, has been effective in advancing equality issues, increasing the number of women supervisors and implementing child care and parenting spaces (see http://www.aas.org/~cswa/status/Status_Jan06.pdf). These types of actions, and others that we discuss below, would certainly benefit the CfA.

1.2 CfA-wide Recommendations

The completion of this study coincides with the roll-out of a new strategic scientific plan for the CfA. The CGEC feels strongly that a leadership and institutional commitment to gender equity in the CfA workplace must be integral to the fabric of the strategic plan. Without an explicit commitment to these goals by the Director, gender equity will languish. If we are serious about gender equity, we will need to re-think how we hire, reward, and promote CfA employees; and how we attract and further the career development of high-quality fellows.

Here we present the CGEC recommendations that apply to the entire CfA population: In Sections 1.3-1.5 we will present recommendations that apply to specific job categories.

1.2.1 Monitoring Equity at CfA

A. Our first recommendation is that there be a leadership and an institutional commitment at the CfA towards achieving equity. To this end we recommend that the Director establish an ongoing mechanism to monitor and implement equity. This could be achieved by creating a small standing committee chaired by a senior staff member of the CfA and including representatives of science and non-science staff. Note that a study by Harvard sociology professor Frank Dobbin (2006, private communication to the CGEC; Kalev, Dobbin & Kelly in *American Sociological Review*, 2006, vol 71, pp 589-617) has concluded that while diversity training in institutions does not guarantee equity, having a program responsible for diversity is effective. We recommend that the CfA Director both develop specific, attainable, goals for improving gender equity; and implement mechanisms that reflect adversely on the SAO managers who do not implement gender equity policies, either as part of the performance review process or as curtailed funding to the offending Divisions or Departments.

B. We recommend that the CfA Director institute the means for pursuing an ongoing longitudinal monitoring of the CfA-wide population; to compare the career trajectories of different groups at the CfA, and to investigate the issue of the disproportionately small number of women in high level positions. Three years from now, a body similar to the CGEC should be constituted to assemble these data into a longitudinal study of the sort the current CGEC envisioned doing, and to repeat the employee surveys. The results of these analyses should be presented to the Visiting Committee, to have an external assessment of equity at the CfA. To achieve this end the CfA will need to:

- Continue to digitize the relevant SAO institutional records and make all the data accessible for study in an easily searchable database, in order to provide samples for future longitudinal studies of the SAO employee population. The data must make it possible to track individuals year to year, and should also contain:
 - Information from exit interviews
 - For new hires, statistics on the qualified applicant pool at each stage of the selection process as appropriate, and how the position was advertised.
 - Information on the source of funding, to assess ‘hard’ versus ‘soft’ funding of different categories of employees.
 - Information on internal support (e.g., funding, postdocs, etc.).
- Provide access to the equivalent Harvard records for the HCO staff and Astronomy Faculty, to the extent consistent with faculty policies set by the Dean.
 - Establish a liaison with the Harvard Provost for Faculty Development and Diversity.
- Set up a centralized database of postdocs, including both Harvard and SAO stipend fellows, and include postdocs in future studies.
- Set-up procedures and protocols to safeguard the privacy and confidentiality of these institutional data.
- Conduct full longitudinal studies at 3 year intervals, to provide reports to the CfA Visiting Committee: Produce annual reports to monitor equity internally.
 - Appendix A gives a sample of data matrix that could be used for these studies.
 - By maintaining the data electronically in a searchable database, standard reports can be developed to easily assemble the data and display the results on the CfA intranet.

C. We recommend that the longitudinal record study be used to monitor other aspects of equity such as race, ethnic biases, and disabilities. Gender equity is only one aspect of equity in the workplace. The instruments that the CfA will set up for monitoring gender equity can be used to monitor the overall range of equity issues.

1.2.2 Redressing Uncovered Gender Biases

D. We recommend that the CfA take steps to redress the gender biases uncovered in our study. Such steps would include the following:

- **Ensure that women are visible at the highest levels of CfA management, by always appointing women among the Associate Directors.** Promoting an atmosphere where diversity flourishes along with a culture where differences are respected and appreciated requires strong support and encouragement from an organization's top management. As noted elsewhere in this report, it also requires that women play significant roles in the management and decision-making processes. When the CfA was formed in 1973 by joining the Harvard and SAO organizations under a single director, seven scientific divisions, and a number of technical and administrative departments were established, each with an associate director or a department head. Today there are six scientific divisions and science education, in addition to the technical and administrative departments. Much of the critical decision making at the CfA occurs in regular meetings of the Director and Associate Directors. However in the nearly 25 years since the CfA was established, only three women, representing two divisions, have served as Associate Directors, and there have been significant intervals when no women were Associate Directors.
- **Ensure that women are represented on all CfA committees.** The number of women has generally been small on CfA committees, including hiring (e.g. FSAC, CfA post-doc), professional review (e.g. PAEC, PRCE), and administrative reviews (e.g. ARC). To ensure that women play significant roles in both current management and determining the future direction of the CfA, we recommend that the representation of women on committees be increased from what is currently generally a single woman.
- Strive for a more equitable distribution of male and female employees in some job categories (scientists, faculty, engineers, and administrators).
- Strive for an equitable representation of female employees in senior positions.
- Abolish the lingering biases in pay discovered in the SAO HR data survey, which, although small, accumulate to a sizeable difference during employees' careers.
- Ensure that the workspace of female employees is as large as that of comparable male employees.

E. We recommend that the CfA address the issue of the lack of upward mobility raised by women employees. To this end, we recommend that the administration:

- Continue and advertise SAO and Harvard policies of funding job-related employee training, and promote job-related training to enhance opportunities for advancement.
- Ensure that all staff understand that some positions can have limited growth potential because of the overall structure or mission of a department or group, funding limitations, etc. that are not related to the employee's abilities or desired career path. Provide guidance to supervisors on how best to

communicate this, or general information sessions on the ‘institutional needs’ component of the job classification process.

- Ensure that all jobs are graded to allow the widest appropriate internal applicant pool.

F. We recommend that the CfA develop formal mentoring programs for the different categories of CfA employees, and task selected employees with the direction and monitoring of these programs as well as the facilitation of informal gatherings.

- The mentoring program should include training for mentors, and the automatic assignment of a mentor to new employees and to any current employee who requests one.
- Mentoring should be recognized as a legitimate and important element of a mentor’s position description and performance plan, and supervisors must allow employees who are serving as mentors reasonable time to engage in mentoring activities.
- The CfA should also organize and/or encourage semi-structured events where people can mingle and exchange professional information in an informal setting. Some events of this type are already taking place, but are not widespread in the CfA.

1.2.3 Improving Communications and Existing Processes

G. We recommend that the CfA set up effective information sources and communication paths for job-related issues that may affect gender equity.

Women especially raised the issue of unwritten rules, and/or the absence of a consistent system of distributing clear information about organizational policies and procedures, as crippling to their career advancement within the CfA. While the CGEC is aware that most, if not all, rules as regards personnel actions, funding opportunities, leave, etc. are documented and available on the web; the employees’ overwhelming perception is that this information is archived in a confusing and impenetrable way, difficult to find even if you know what to look for, and impossible if you don’t. The CGEC recommends the following:

- SAO should create a consolidated web page for employees that combines information--or links to information--that now appear on various department or other sites into a kind of ‘ready reference’ list. The HR web page in the SAO intranet contains a good amount of information, but it is not easy to find and to navigate, especially from the point of view of staff less knowledgeable of the various acronyms used. The SI PRISM site is too general for the casual uninformed user. Harvard has a very nice general employee information page, which can be used as a guide: <http://www.atwork.harvard.edu> . Besides talking to the HCO’s FAS HR officer, HCO employees can obtain confidential career advancement information via the Employee Assistance Program (<http://www.atwork.harvard.edu/worklife/counseling/>). Harvard publishes a monthly bulletin called Head’s Up, which contains information about courses, financial processes, and changes in rules and policies. While SI has a similar publication (The Blue Bulletin) the information it contains is

often not relevant to SAO, and although SAO departments have sometimes used the Weekly Calendar to distribute policy information, because of that publication's emphasis on the schedules of technical talks, other information is sometimes lost.

- Given that people tend to forget information until they need it, employees should be sent annual reminders on what information is available and where it is located.
- There should be a kick-off seminar for the entire staff once these web pages have been organized in a user-friendly way.
- All new supervisors should receive mandatory training on organizational policies and procedures, which includes instruction in how to obtain the most current information.
- Refresher training should be provided for all supervisors at 3 year intervals, and whenever a major new policy is implemented.
- Gender equity and co-worker respect should be a mandatory part of the orientation package for any new employee.

H. We recommend that SAO implement a program of formal training for supervisors. Many employees remarked that many supervisors have little management training or limited skills. While there is not necessarily any correlation between professional achievements and supervisory ability, nonetheless SAO staff are often promoted to supervisory positions based upon their technical or administrative accomplishments rather than their supervisory potential. While there was a policy of management training for new supervisors in the past, it has not always been enforced, especially in more recent years. Further, the training that has been offered to supervisors on an *ad hoc* basis (e.g. equal opportunity, sexual harassment), has not always been developed or presented in a way that was relevant to SAO staff, and because of this is often not taken seriously. While we recognize that this is not strictly a gender equity issue because men as well as women can be affected, the CGEC recommends the following actions:

- SAO should hire professional management training consultants, having specific experience with universities or research organizations similar to the CfA, to develop training programs.
- All training should be designed to include consideration of the composition of the audience. In particular, it is urged that training be tested on selected representative groups before being deployed at large.
- There should be a mandatory management training session for all current supervisors at SAO. There should also be a program established to provide mandatory management training for all newly assigned supervisors, and periodic refresher courses for all supervisors at appropriate TBD intervals.
- Gender equity should be a factor in all SAO personnel actions, including hiring, promotion, and reduction in force.

I. We recommend that the CfA revise the administration of the performance evaluation process, to ensure equitable treatment of all employees. Many concerns were raised about seeming inconsistencies in the performance evaluation process, particularly in the way some performance reviews were conducted. Some

employees reported delays in the performance process that would have repercussions on their overall compensation profile. There was also a prevalent feeling that a supervisor's personality--rather than an employee's achievements--plays a large role in personnel actions, resulting in an uneven playing field. On the SAO side, employees can take their grievances to their reviewing official but most people are afraid of (or feel awkward) taking this step since it means going 'over the head' of their own supervisor to his or her boss. The CGEC offers the following recommendations:

- Reviewing officials, who must sign the performance evaluations, should select a random sample to review in detail as a consistency check. This should include meeting with the employees.
- Use the CfA/SAO management structure for oversight and equity. Management should conduct both longitudinal and across the board studies at regular intervals to ensure that there are no egregious biases in different departments or divisions.
- Institute an annual review process for postdocs, including long-term visiting scientist, HCO, and named fellowships; similar to that which currently exists for Chandra, Spitzer, and Hubble fellows.
- Investigate the feasibility of establishing peer review boards similar to the PAEC or PRCE to monitor the promotion process for non-scientists, and to provide an independent appeal avenue for staff.

J. We recommend that the CfA review its Ombudsperson and EEOC counselor programs, paying particular attention to defining the purpose and goals of each program, and the process of choosing appointees and their terms of service.

- The availability of these programs should be publicized.
- Non-scientist ombudspersons should be appointed as well as scientist.
- The Director should consider defining the ombudsperson term of office and implementing a rotation of ombudspersons.

1.2.4 Improving the CfA Social and Working Environment

K. We recommend that the CfA address and change the present unfriendly culture. This issue was advanced both in relation to work group dynamics and more relaxed technical conversations. Issues included perceived exclusion from decision making, perceived unfriendly or rough conversations, verbal challenges, and being overlooked and/or ignored. Both male and female employees reported this type of behavior, but while men considered it a temporary problem for new employees that went away once people established themselves in the group, women found it an obstacle to becoming full-fledged group members. It was also noted that male and female colloquium speakers may receive different treatment in terms of introductions and questions. Women, as well as men, have been reported to be unfriendly to other employees. The CGEC recommends:

- The CfA community should be made aware of this problem. This can be achieved by a combination of a Director's memo, information session (mandatory), and reading of the CGEC interview report.
- Management training for the senior staff must address this problem.

- Co-worker respect should be included in an element for formal SAO performance review.
- Informal scientific interaction can be fostered in semi-formal settings that also encourage reports and questions from the junior (male and female) staff. Some of these events occur and are available to the scientific staff, but they are often confined to isolated pockets of the Observatory.
- The need for informal interactions is not restricted to the scientific staff. These interactions must also be fostered among administrative and technical staff, and especially between administrative and technical staff and scientists.

L. We recommend that the CfA take steps to facilitate family care processes for employees. Since child and elder care fall disproportionately on women, facilitating child rearing and elder care to the extent possible is a step toward gender equity. Telecommuting and flex-time can contribute significantly to a care giver's ability to perform effectively in the workplace. We recommend that the administration:

- Make CfA employees aware of available schedule flexibilities to balance career and parental/elder-care responsibilities, and ensure that these accommodations are made equally available to employees in all job categories.
- Explore what infrastructure and policies could be implemented to make parenting easier, e.g., ensuring that there are adequate and appropriate private spaces for breast feeding.

1.3 Recommendations with a Focus on Scientists

M. We recommend that SAO strive to achieve gender balance among scientists. The statistics of Section 3.1 indicate that the CfA is doing worse than comparable institutions nationwide, and these national statistics themselves do not represent an acceptable status quo. As we have noted elsewhere in this document (see fig. 1, Section 3.1.1.1), during the last 15 years only 1 woman was hired into SAO Federal ranks, compared to 21 men. A representative population of female senior scientists is essential to provide leadership and role models to the whole CfA community. We recommend that:

- All SAO Federal appointments should go through the Federal Scientist Appointment Committee (FSAC). The FSAC must include a larger representation of women scientists.
- SAO should take a proactive role in encouraging highly qualified women to apply to open job opportunities, especially Federal positions where the percentage of women is particularly small.
- SAO should institute non-targeted searches for Federal Positions. It is widely known that targeted searches favor male candidates, given the numerical disadvantage of women in the marketplace. By recruiting the next generation of scientific leaders at SAO based on general scientific excellence rather than highly specific scientific skills, the population of SAO federal scientists will float to that of the discipline overall.
- SAO should redress the disparities in the percentage of women (both Federal and Trust) in the scientific staff of different CfA Divisions.

N. We recommend that the Department of Astronomy strive to achieve gender balance among the tenured senior Harvard faculty. There is one senior faculty member out of 16 (including joint appointments in FAS and SAO), representing 6% female participation. Harvard is making progress on gender equity issues overall, but much more needs to be done. The Astronomy Department is making concerted efforts, as urged by the Department Visiting Committee, and now has one woman out of 4 current (2006) junior faculty members. Two searches are underway for which women are very strong candidates.

O. We recommend that the CfA create a better social and work environment for women scientists. The survey and interview portion of this study revealed that the social and intellectual environment for female scientists, especially junior scientists, is poor. It is difficult for women scientists starting their careers to get useful guidance and make the connections to establish a network of colleagues working on similar problems that is essential to any successful scientist's intellectual development and vitality. We recommend:

- Instituting a system of mentoring for junior scientists, to benefit both women and men.
- Encouraging scientist/graduate student mixers. The divisional structure and the sheer size of the CfA are often impediments to interaction among scientists across the broad CfA community. The mixers sponsored by the SAO Council have been a great success in bringing together thesis students with potential advisors. We recommend implementing themed science/social events to bring junior scientists together with more senior staff in a relatively unstructured format to permit one-to-one interaction.

P. We recommend that future gender equity studies include graduate students and post-doctoral fellows. Except for population statistics, demonstrating that the fraction of women in this category exceeds the national averages (Section 3.1.1.3), these important members of the CfA were not included in the present study because of the difficulty in data gathering. If the CfA implements the CGEC recommendations for building an easy to mine database, they will be included in future equity studies, and in the assessment of a 'leaky pipeline' at the CfA.

Q. We recommend that gender balance be a consideration in the choice of speakers and chairpersons. The SAO Council Gender Equity Study (http://cfa-www.harvard.edu/cfa_only/sao_council/gender.2002.11.22.html) of July 2002 noted that between 1995 and 2002 women were only invited to give 16.5% of the Thursday afternoon colloquia, with the percentage dropping as low as 8.9% in 1996-1997. While the choice of colloquium speakers is and should be driven for the most part by topicality and scientific importance, some attention should be paid to achieving a gender balance that is at least in line with female participation in astrophysics as a whole. Moreover, it is important to give women visibility by ensuring that they introduce speakers and serve as chairs of CfA events.

1.4 Recommendations with a Focus on the Technical Staff

R. We recommend that SAO address the paucity of women in Central Engineering (CE) positions (see Section 3.1.2.2, fig.2). In particular, we recommend that:

- SAO adopt a pro-active stance towards recruiting women engineers, and to diversifying CE even in the absence of the large scale hiring associated with major new hardware projects. Because women engineers tend not to have the specific technical experience required to work on CfA programs (as reflected in the applicant pools for CE positions), we recommend investigating possible sources of funding, including external support, to establish a fellowship program for newly graduated women engineers that would provide training specific to the development of observational research instruments.
- Since the ability of CE to hire (and retain) entry level engineers for Trust positions has been severely limited by the constraints of the Federal qualifications system, we recommend that the Director's Office pursue the offer extended by SI Undersecretary for Science, Dr. David Evans, in his meeting with the GEC of 12 September 2006, to investigate salary enhancements for entry level engineering positions.
- For future CE recruitments, SAO Human Resources should be provided with the resources it may require to investigate and employ non-traditional recruiting methods to target women, in order to expand and diversify the applicant pool for engineering positions.

S. We recommend that SAO address the scarcity of IT women in the higher grades (grades 11-14). SAO must investigate the reasons for this bias (see Section 3.1.2, fig.3) and increase hiring, promotion, and/or retention of women in senior IT positions.

1.5 Recommendations with a Focus on the Administrative and Support Staff

T. We recommend that SAO address the scarcity of women in Senior Administrative positions (see Section 3.1.4, fig. 4). While the administrative staff is overwhelming female, access to higher-paying and more responsible administrative positions is limited for women at the CfA, and this lack of career path is a significant source of job dissatisfaction. We recommend that the CfA administration:

- Be sensitive to Gender Equity in all personnel actions, in particular hiring and promotions.
- Encourage and facilitate in-job training, including outside courses and opportunities (e.g., conferences), to improve skills.
- Always include administrators and support staff in future longitudinal studies of the SAO database. In particular, include grade level and career advancement in these studies.

U. We recommend that all scientists, men and women, be made aware of the necessity to engage in respectful behavior in their interactions with administrative and support staff. The administrative staff have reported episodes of

blatant disrespect displayed towards them by scientists, both male and female, from graduate students to senior staff members. While this is not, in and of itself, a gender issue, we believe that it has implications for gender equity within the CfA. If the accepted cultural norm of the CfA is that non-science positions are inherently less valuable to the organization's mission than science positions, then the incumbents of those positions are treated less respectfully as a result. When the majority of the non-science staff are female this can lead to a tolerance for unequal treatment of female staff in all positions—from students to senior scientists—as well as administrative staff. We recommend that:

- Comprehensive training in CfA procedures be provided to all new-comers, including students, predocs, and postdocs. This training is separate from that provided to new hires by their Division/Department and should consist of:
 - An introduction to each area of the organization
 - An opportunity to meet key staff (payroll, fellowship, HR, etc.)
- CfA policies and procedures for all routine and annual tasks required of administrators should be documented, including individual staff roles and back-ups (in case of absence) in each Division/Department. This information should be part of the documentation and information provided in the CfA intranet; it should be searchable and user-friendly.
- The administration of CfA should develop a statement, based on the SAO (Smithsonian Directive 214 Prevention of Workplace Harassment Policy Statement, <http://prism.si.edu/pdf/WPHarassPolicy063005.pdf>) and Harvard University policies, which will define the standards for workplace behavior at the CfA. This policy should be applied to everyone at the CfA, including contractors and visitors, and should be administered much like the Computer Security policy; i.e., until an individual acknowledges that he/she has read the policy and agrees to accept its terms, as indicated by signing the statement, he/she would not be given a computer account at the CfA.

2. The CfA Gender Equity Committee

The CfA Gender Equity Committee (CGEC) was appointed by then CfA Director Irwin Shapiro in late 2002 to study all aspects of gender equity at the CfA, including SAO, HCO, and the Harvard Astronomy Department. The CfA Director and the Associate Directors decided to appoint this committee because of gender equity issues raised by a study of SAO scientists, and the suggestion of the CfA Visiting Committee.

The committee consists of a broad representation of CfA personnel, including scientists, administrators, and IT specialists. Fairly early in the activities of the CGEC, the Harvard Faculty representative (Alyssa Goodman) resigned because of her growing commitment towards the establishment of the Harvard Initiative for Innovative Computing and was replaced by Josh Grindlay.

2.1 CGEC membership

The present composition of the CGEC is given below. Short CVs of the committee members can be found in Appendix B.

Giuseppina Fabbiano(Chair)	SAO	Senior Astrophysicist	High Energy Astrophysics Division (HEA)
Andrew Szentgyorgyi	SAO	Astrophysicist	Optical & IR Division (OIR)
Nancy Adler	SAO	Manager	Travel and Special Events Department
Pat Brennan	SAO	Administrator	Central Engineering Department (CE)
Josh Grindlay	Harvard	Professor of Astronomy	HEA
Peg Herlihy	Harvard	Administrator	Department of Astronomy
Muriel Hodges	SAO	Administrative Specialist	Radio and Geoastronomy Division (RG)
Christine Jones	SAO	Senior Astrophysicist	HEA
Donna Thompson	SAO	Technical Information Specialist	HEA

The CGEC was assisted by two consultants: Dr. Gerhard Sonnert, a sociologist of science attached to Harvard's Physics Department, and Dr. Wendy Roth, then a graduate student in the Harvard Sociology Department. Their CVs are in Appendix C.

2.2 Charge to the CGEC

The CGEC was charged with deciding on its own chair, drafting its specific charge and schedule, and proposing a budget to the Director. The e-mail from Director Shapiro, appointing the committee, is in Appendix E.

2.3 Impetus for the Gender Equity Study

The initial impetus for a CfA gender equity study was primarily driven by the scientific community and focused on the CfA scientific staff. This approach, as originally envisioned for the gender equity study group, would have followed the template of most gender equity studies of institutions similar to the CfA. Former Director Irwin Shapiro chose to take an innovative approach to this process by charging the CGEC with the task of assessing gender equity over the entire CfA. While this wide charge has made the study a more challenging enterprise for the CGEC, the all-encompassing scope of the study makes it unique and provides new insight into the gender equity fault lines in a large educational/research institution. Being the first of its kind, it will be instructive to future committees on how to undertake synoptic gender equity studies. In this section we review the major motivating force that led to this study.

Two situations regarding the scientific staffing of the CfA made it apparent that some transparent self-examination of our hiring and promotion processes was needed. On the Harvard side, one of the most internationally prominent and recognized female astrophysicists was offered a prestigious named chair without prospect of tenure. On the SAO side, a failure to recruit women into the Federal civil service ranks and the very small cohort of women holding senior scientific positions (remarked on in Section 3.1 of this report) was seen as evidence of an institutional lack of commitment to gender equity. These two issues were seen as a blot on CfA's reputation in the scientific community at large. This perception may in fact have been a feedback mechanism making it hard to attract top female scientists, thus generating further gender inequity.

In empanelling the CGEC, former Director Shapiro was responding to several forces. The CfA visiting committee has on several occasions recommended the formation of a committee like the CGEC. In 2002, it recommended specifically that CfA follow MIT's example in conducting a review of gender equity. A CfA Women's Program Committee report to the Director and Associate Directors suggested the women scientists at CfA were on "softer" money than men, and recommended statistical data on gender equity be compiled and reviewed annually. In 2001, the Director empanelled the CfA Issues Committee (http://cfa-www.harvard.edu/cfa_issues/), primarily to study the process of joint Harvard-Smithsonian appointments. The Issues

Committee, as part of their study, did a brief assessment of gender equity among the scientific staff, which was contained in an unpublished Appendix to the Issues Committee Report. The SAO Council, formed in response to the Issues Committee Report, proposed that the Council itself might undertake a fuller assessment of gender equity among the scientific staff, expanding on the work of the Issues Committee. (The SAO Council report on gender equity can be found at http://cfa-www.harvard.edu/cfa_only/sao_council/gender.2002.11.22.html). Former Director Shapiro responded by forming the CGEC as it is currently constituted, except for personnel changes, and charged the committee with an equity study of the entire CfA. This report is a result of that sequence of events.

2.4 Approach to the Study

After a period of fact finding and discussions that included conversations and meetings with representatives of MIT women scientists, Jean Jackson and Lorna Gibson; senior astrophysicist Andrea Dupree of CfA, Chair of the STScI Gender Equity Committee; and SAO Human Resources (HR) Manager Laura Conway; the CGEC proposed a plan of investigation with the following elements:

- Study 1, Analysis of Institutional Data, including:
 - A Demographic Study – a statistical investigation of possible gender inequities as reflected in SAO and HCO Human Resources (HR) data, and other official records.
 - A Study Utilizing the ADS Database – a review of the number of publications of SAO and Harvard astronomy scientists and faculty and their citation indices, to investigate scientific productivity as a function of gender. These results are correlated with those of the Demographic Study to investigate the promotion patterns of men and women scientists at the CfA.
- Study 2, Anonymous Web-based Survey of CfA employees, utilizing
 - A targeted questionnaire, distributed CfA-wide, to identify possible equity issues, as reported by the employees themselves.
- Study 3, Staff Interview Project
 - Interviews with representative subsets of employees to supplement the findings of the questionnaire.

Study 1 was intended to precede the other two studies, to provide an unbiased baseline against which to consider the results of Studies 2 and 3, which by design address employee's perceptions. Because of the difficulty in obtaining the institutional records, Study 1 took place last. Studies 2 and 3 were completed by December 2004. Study 1 was completed in September 2006.

3. Findings

3.1 CfA Population Statistics

The CGEC studies look at two snapshots of the CfA population (SAO plus Harvard). The web survey and follow-up interviews were based on the entire CfA population as represented in the 2003 CfA Census database, which includes SAO, HCO, and the Harvard Astronomy Department, visitors, and contractors (i.e. anyone having office space at the CfA). The more recent institutional records analysis is based on the 2005 population of SAO employees, from SAO HR records. This database was augmented by the Harvard Astronomy faculty/scientists listed in the CfA 2005 census database for the study of publication and citation rates.

The 2003 Census database lists a total of 944 employees, 312 (33%) women and 632 (67%) men. In the 2003 Census there were 412 scientists (44%, of the total CfA population, including SAO, HCO, Harvard Astronomy, postdocs, and visitors) and 532 non-scientists (56%, Harvard and SAO). Scientists include astronomers, astrophysicists and physicists, all working in the broad area of Astrophysics (observational, theoretical, and laboratory). The scientist denomination in the Census is not restricted to PhDs; students and science support personnel are included. Non-scientists include engineers; Information Technology (IT) staff; technicians; publication and library personnel, including science educators; administrators; and support personnel. The 2005 Census lists 953 people affiliated with CfA, including 424 in the broad ‘scientist’ category.

In the SAO 2005 HR database, there are 601 employees: 198 (33%) women and 403 (67%) men. Table 1 gives the breakdown in job categories according to the 2005 SAO HR database. There are 210 employees with a doctorate and 212 listed as scientists (35%) (mostly the same people), and 389 non-scientists (65%).

Table 1. SAO population statistics from the 2005 HR database

Category	Women	Men	Total
Administrative, Support	90 (64%)	51 (36%)	141
Engineering	6 (7%)	77 (93%)	83
Publication, Library	16 (52%)	15 (48%)	31
Science	34 (16%)	178 (84%)	212
IT	52 (39%)	82 (61%)	134
Total	198 (33%)	403 (67%)	601

Percentages are relative to each category

We estimate the number of SAO visiting scientists and SAO postdocs from SAO 2005 fellowship information. These statistics are tabulated in Table 2. Note the relatively large fraction of women postdocs, compared with the fraction of women SAO staff scientists and visitors.

Table 2. SAO Visitors and Postdocs, 2005

	Women	Men
Visiting Scientists	6 (14%)	56 (86%)
Postdocs	18 (33%)	36 (67%)

In parentheses are the percentages for each category separately

The HCO population statistics are given in Table 3 (for 2005): 45% of the HCO employees are female. However, the Administrative and Support category is dominated by women (as is the case for SAO, see Table 1), while the IT category is dominated by men, even more so than in the SAO case.

Table 3. HCO population statistics from 2005 HR database

Category	Women	Men	Total
Administrative, Support	17 (85%)	3 (15%)	20
Engineering	0	1* (100%)	1
Publication, Library**	2 (33%)	4 (67%)	6
Science	5 (45%)	6 (55%)	11
IT and Technical	1 (6%)	16 (94%)	17
All together	25 (45%)	30 (55%)	55

*1 Harvard engineer who is not part of Central Engineering

**Including of the Science Education Department (SED)

Percentages are relative to each category

The Harvard Astronomy Department statistics are given in Table 4.

Table 4. Harvard Astronomy Department (2005)

Category	Women	Men	Total
Astronomy Faculty	2 (10%)	17 (90%)	19
Astronomy Staff	2 (100%)	0	2
Harvard Post Docs	9 (33%)	18 (67%)	27
Harvard Graduate Students	14 (30%)	32 (70%)	46
All together	27 (29%)	67 (71%)	94

Percentages are relative to each category

Lecturers (SAO scientists) are not included in this table (see Table 7)

Including graduate students, the Harvard population (2005), includes 146 people, accounting for 15% of the CfA 2005 census; the SAO employee population (Table 1) accounts for 63% of the CfA 2005 census; 12% of the census is made up by SAO visitors and postdocs (Table 2); the remaining 10% is likely to be made up by undergraduates, contractors, and people affiliated with Harvard departments other than Astronomy.

3.1.1 Scientists

From Tables 1-4, we derive a total science population (including visitors) at the CfA in 2005 of 433, of which 90 (21%) are women and 343 (79%) are men. Here we discuss in detail the demographics of this population. We include in this analysis the PhDs in the 2005 SAO HR database, the Harvard Astronomy faculty and graduate students, the SAO and Harvard postdocs, and the HCO scientists. We do not include employees with a science affiliation but not PhDs and visitors to the CfA.

3.1.1.1 SAO scientists (2005)

Among the SAO employees with doctorates in 2005, there are 32 women (15%) and 178 men. Among the employees classified as scientists in the HR records, there were 34 women (16%) and 178 men.

SAO employees can be either Federal or Trust employees. In general, Federal employees have more secure jobs than Trust employees, who are supported by grants, contracts, and overhead funds. For SAO scientists, a Federal job is equated to tenure in a University. Table 5 below gives the breakdown between Federal and Trust positions for *employees with doctorates* (we use this group of 210 employees as more representative of scientists, rather than the 212 employees with scientists in their job title, which include science support employees; in any case, given the considerable overlap of the two groups, our considerations are not dependent on the choice of one or the other group).

Table 5. SAO employees with doctorates, 2005 HR database

SAO Doctorates	Women			Men		
	Number	% All	% Group	Number	% All	% Group
Group: Federal	6	3	9	58	28	91
Group: Trust	26	12	18	120	57	82

% All: percentage relative to the entire SAO Doctorates population (Federal + Trust).

% Group: percentage relative to the group under consideration

Women are 9% of the group of doctorates with Federal positions, and 18% of the Trust employees with doctorates. Only 3% of the SAO employees with doctorates are women with Federal positions (to be compared with 28% for men with Federal positions). These women are also all senior employees whose jobs are comparable to a full professor in a major university. The time profile of Federal hires at SAO is shown in fig. 1. Note the gap in female Federal hires between 1991 and 2003. From 1992 to 2003, 21 Federal hires were made: all 21 were men; a woman was hired in a Federal position in 2003.

It is interesting to note that there are differences in these statistics within different groups in the Observatory. It is not meaningful to study individually all the science Divisions of the CfA, because of the small numbers of scientists in some of them. We have instead compared the SAO scientists in the High Energy Astrophysics (HEA) Division with those in the rest of SAO. HEA is the largest division, hosting 74 scientists, versus 136 in the rest of SAO. Table 6 summarizes this comparison for Federal and Trust SAO scientists.

Table 6 – Comparison of SAO HEA doctorate statistics with the rest of SAO, 2005 HR database.

	Federal			Trust		
	HEA	Other	Total	HEA	Other	Total
Women	2	4	6	13	13	26
Men	5	53	58	54	66	120
All	7	57	64	67	79	146

HEA: scientists in the High Energy Division

Other: scientists in the other Science Divisions of the CfA

Year of hire of federal employees with doctorates

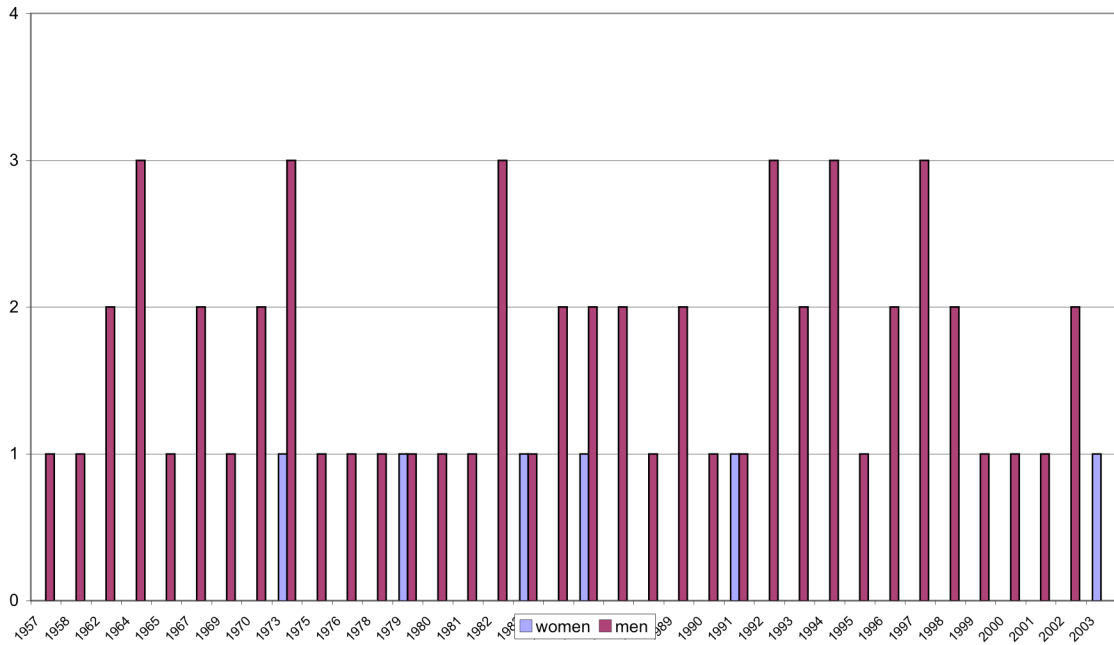


Figure 1 – Distribution of hires of SAO Federal employees with Doctorates, as function of the year of hire. Women are in blue, men in red.

Table 6 shows that women (both Federal and Trust) are 20% of the science population in HEA, versus 12.5% for the rest of the SAO science workforce. While women are 28.5% of the Federal scientists in HEA, this statistic is deceptive because we are dealing with only two women and five men Federal scientists: In the rest of SAO the percentage of women among Federal scientists is only 7%. Among Trust scientists, women are 19% in HEA and 16% in the rest of SAO. Excluding HEA, 24% of the women scientists are Federal, versus 44% of the men scientists: In HEA, the corresponding (and very uncertain) percentages are 13% of the women and 8% of the men, reflecting the fact that most of HEA scientists are Trust employees supported by NASA contracts and grants. In HEA, 5 women scientists and 8 men scientists are supported by very soft money (short-term grants). Future equity studies should assess the fraction of similarly supported employees CfA-wide, and explore if more women than men are in this category (see Recommendation B).

3.1.1.2 Harvard Faculty, Graduate Students, Postdocs and HCO Scientists (2005)

Harvard statistics from the Department of Astronomy are given in Table 7 (see also Table 3). Listed are senior faculty, junior faculty, lecturers, and graduate students. Note that of the 16 senior faculty, 5 (all men) hold joint SAO appointments (4 are Federal appointments; two are also Harvard tenured appointments). The support of senior faculty is divided between Harvard (11.5 FTE) and SAO (4.5 FTE). Only 1 of the senior faculty is a woman. Of the 3 junior faculty, (all Harvard supported), in 2005, 1 was a woman. Lecturers are typically SAO scientists who supervise a Harvard graduate student, and are chosen by students; a few of them may teach, but most do not. Of the 16 lecturers in 2005, 3 were women. Within the senior staff, women are 6% of the population; within the junior staff, the percentage is 33%. But in both cases we are dealing with small numbers of individuals. Overall, women are 10% of the Harvard Astronomy faculty.

Table 7. Harvard Astronomy Faculty and Graduate Students, 2005

Group	Women			Men		
	Number	% All	% Group	Number	% All	% Group
Senior Appointments	1	3	6	15	43	94
Junior Appointments	1	3	33*	2	6	67*
Lecturers	3	8	19	13	37	81
Graduate Students	14	-	30	32	-	70

% All: percentage relative to the entire Harvard Astronomy Faculty; this does not apply to graduate students

% Group: percentage relative to the group under consideration

* These percentages are highly uncertain, since are based on only 3 individuals

Although Harvard lags behind the national averages in the number of tenured female faculty, the University, not just the Department, is making the hiring of female faculty a top priority. Harvard postdocs are listed in Table 4. As is true for SAO (Table 2), in

HCO the percentage of women postdocs (33%) is larger than that of staff scientists and faculty: 30% of the graduate students are women. At least in these categories progress is being made in an effort to balance out the distribution of men to women. **It is important that this progress be extended to the faculty as a whole.**

3.1.1.3 Comparison with National Averages

Table 8 compares the CfA statistics with the national averages. The American Institute of Physics 2005 Report on Women in Physics and Astronomy (Ivie & Ray 2005, AIP Pub. No. R-430.02) gives the following national percentages of female astronomers at different stages of their career: PhDs – 26%, Junior Faculty – 23%, Tenured – 10%. The following table compares these national statistics with the statistics at the CfA (using the 2005 SAO HR database, the 2005 SAO postdoc statistics, and 2005 Harvard Astronomy statistics). For comparison, we use the national PhD statistics as a benchmark for the postdocs. The Harvard PhD statistics are based on the 2001-2006 period. The percentage of women Astronomy PhDs from Harvard was 25% in the years 1996-2000.

Note that the AIP statistics are based on a sample of Astronomy departments, they do not include joint Astronomy–Physics programs, nor Physics PhDs who move into Astronomy; therefore the PhD pool may be larger than in the AIP report (see <http://www.aas.org/~cswa/MEETINGS.html>). The Nelson Diversity Survey (<http://cheminfo.chem.ou.edu/faculty/djn/diversity/top50.html>) shows the percentage of women as full professors in the top 50 astronomy departments in the country (as ranked by NSF according to research expenditures) to be 9.3%, and of all faculty to be 11.7%.

Table 8. Comparison of National and CfA Percentages of Women from the databases described in the text.

	Women PhDs %	Women Postdoc %	Women Non-tenured %	Women Tenured %
National	26	(26)	23	10
CfA	-	33	18	9
SAO	-	33	18	9
Harvard Astronomy	26	33	33*	6

* This percentage is highly uncertain, since is based on only 3 individuals

This comparison shows that overall the CfA is doing well in terms of hiring women postdocs. Both Harvard Astronomy and SAO are above the national average of postdocs. SAO is below the average of non-tenured women, and while the non-tenured Harvard statistics may look good, it is important to remember that we are considering a very small number of individuals (3). In the case of tenured women, SAO is near the national average, while Harvard lags behind. Note that the overall CfA statistics are dominated by SAO, given the relatively small Harvard Faculty. **The**

CfA as a whole shows a worse trend than the national averages in the diminishing fraction of women in more senior positions. There has been considerable debate on the diminishing profile of women in more senior positions in Astronomy (the so-called leaking pipeline). It has been suggested in the AIP report that this effect can be explained by the historical profile of female versus male Astronomy PhDs; however other studies suggest bias against women (see http://www.aas.org/cswa/status/STATUS_Jun04sm.pdf, by F. Bagenal). In any case, **the CfA statistics strongly point to the need to increase the number of women scientists, especially in senior positions.**

As discussed in 3.1.1.1 above, looking at the percentages of women scientists in different parts of the CfA we find that the percentage of women is particularly low if we exclude the HEA Division: HEA accounts for about 1/3 of the science population of the CfA, and has 20% women scientists, compared to 12.5% for the rest of CfA. Although we do not try here to explain the reasons for these differences, **it is important that in the future the CfA address these gender imbalances in different divisions.**

3.1.2 Engineering Staff (SAO, 2005)

3.1.2.1. Central Engineering (CE) Population

Of all the categories of SAO employees, Engineering is the one with the greatest imbalance in the numbers of women (6) and men (77) employees (in the 2005 HR records, see Table 1). Several technical disciplines are represented in the CE Department of SAO, including: General Engineer (Occupational Series 0801), Engineering Technician (0802), Mechanical Engineer (0830), Electronics Engineer (0850), Computer Engineer (0854), Electrical Engineer (0855), Electronics Technician (0856), and Quality Assurance Specialist (1910). The gender distribution of employees in these disciplines is shown in fig. 2.

3.1.2.2. Comparison with the Federal Civilian Employment Population

We have chosen to compare SAO CE only with other government agencies to control for the variables introduced by differing standards for titling positions in industry. At SAO, hiring for Trust positions in CE is subject to the qualifications standards established for the Federal system, which requires highly specific educational credentials to qualify for engineering positions. However in industry, employees with many differing combinations of education and/or experience can be titled “engineer”, even when those employees would not qualify for an engineering position at SAO.

Unfortunately, the most recent available government-wide survey is from 1999. We have compared the 1999 SAO statistics with data extracted from USOPM Table W-E Full-Time Civilian White Collar Employment by Occupation, Gender, and Selected Agency, All Areas, September 30, 1999. We note that the contraction of CE since 1999 has made the SAO CE gender bias more acute. We have no way to estimate the change in other government agencies during this time period. The result is that overall

SAO CE is not worse than all the government agencies taken together. Since of all the civilian agencies the nature of the work at NASA most closely compares to the work conducted at SAO, we also compared the SAO 1999 and NASA data. We found that the percentage of women in software engineering positions in CE is consistent with that in NASA, and better than the government as a whole. However, **given the number of women graduating from engineering schools nowadays, we are concerned with the under representation of women in engineering positions in CE.**

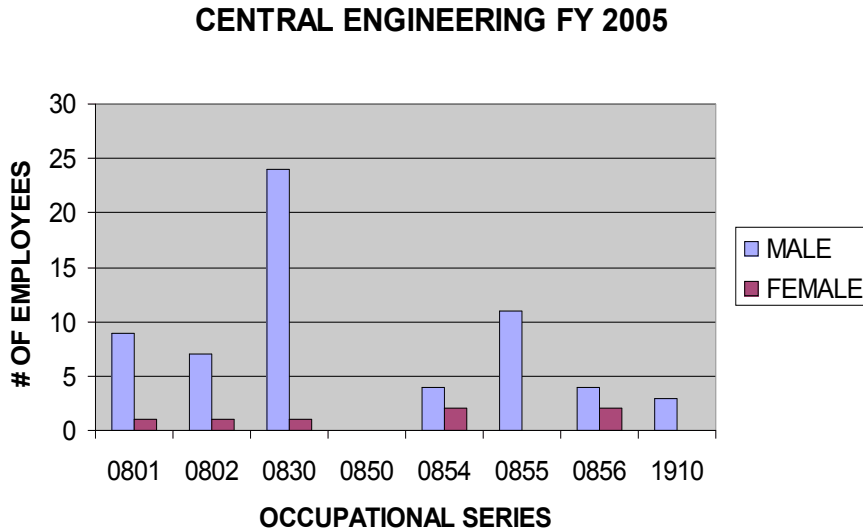


Figure 2. Distribution of types of engineers at SAO

3.1.3 IT Staff (SAO, 2005)

There are 134 IT employees in the SAO 2005 HR database, 52 women and 82 men. IT employees include software engineers/programmers, the groups in charge of computer systems and hardware, and operation support personnel (e.g. the people that support data processing, archives, and satellite operations in the Chandra X-ray Center). The demographics of SAO IT employees are shown in fig. 3 as a function of grade in the US Federal pay scale, which is used at SAO for both Trust and Federal employees. Note that there are a number of contractors providing IT services at SAO. They are not included in these statistics.

This snapshot shows a noticeable bias favoring male IT employees in the more senior positions. At grades 9 and below the two distributions track, and there is a larger overall percentage of women. However, starting with grade 11, the percentage of male employees grows, while that of female employees tapers down. The pile-up of employees (male) at the higher grades suggests that these are long-term employees that have reached the top grade allowed for their type of job. These trends suggest that IT women are either not hired or not promoted to more senior position at the same rate as men; another possibility is that IT women may have shorter stays at SAO than men. The different jobs in the IT area, and the different availability of women in

the different job markets may also play a role. **A longitudinal study is needed to investigate the IT population, and statistics of job applicants should be kept, to monitor the available pool.**

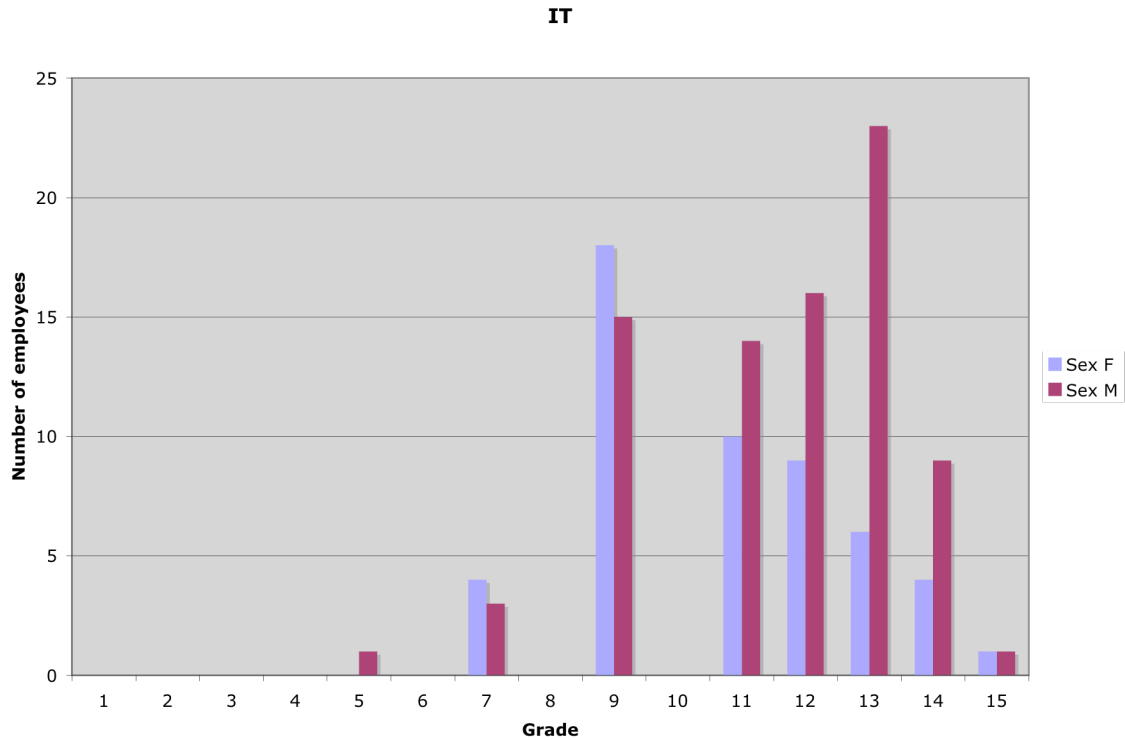


Figure 3. Distributions of the male (red) and female (blue) IT SAO employees as a function of grade, in 2005.

3.1.4 Administrative and Support Staff

The 2005 SAO database shows 141 employees working in Administrative and Support positions, 90 (64%) women and 51 (36%) men. These include administrators regardless of grade, and other administrative support positions. Figure 4 gives the distribution of these employees with grade. Analysis of these data shows that 59% of women administrators and support staff are working at grades 10 and below, compared to 43% of men. Above grade 10, women administrators are concentrated at grades 11 and 12 (26 total), while the number of women at grades 13 and 14 drops to 10. There is no woman administrator at the grade 15 level.

By contrast, men administrators and support staff are evenly distributed across grades 11 and 12 (9 total) and grades 13 and 14 (8 total), but the number of men in grade 15 increases dramatically to 12.

Despite the fact that, overall, women administrators outnumber men administrators by nearly two to one, there are only 5 women in senior administrative positions (grades 14, 15 and 16) vs. 15 men at these levels.

These data clearly highlight inequities between the status of men and women administrators and should be further explored to determine the source of these disparities, including for example, whether men are hired at higher grade levels and/or different titles than women, and whether opportunities exist for job growth and promotion for current women employees, among other issues.

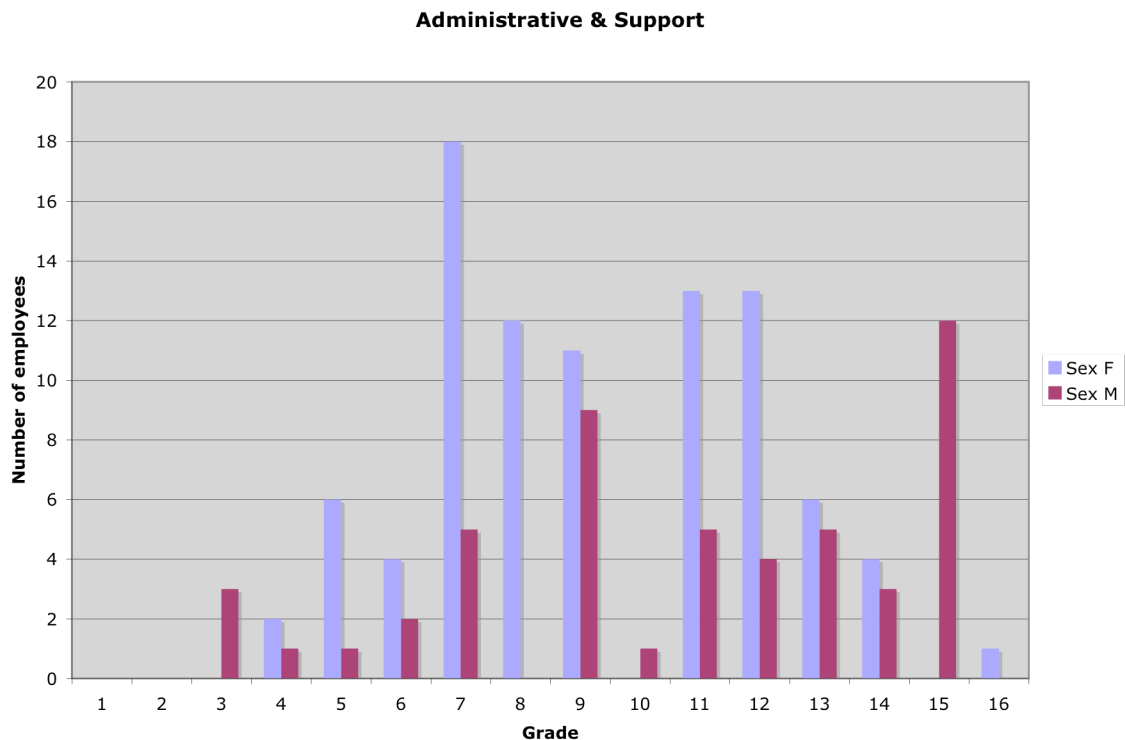


Figure 4. Distributions of the male (red) and female (blue) Administrative and Support SAO employees as a function of grade, in 2005.

3.2 Summary of the results of Study 1, Analysis of Institutional Data

The original aim of the CGEC was to obtain institutional records, from SAO, HCO, and Harvard Astronomy; to explore if any gender-based inequity transpired in the way these institutions treated their employees as regards salary, promotions, incentives, and office and lab space. Moreover, the study intended to investigate possible gender differences in scientists' performance as measured by the grants and contracts awarded to individuals, and their publication and citation records. The purpose of the study was to obtain these records for a 5-year period, so as to perform a limited longitudinal investigation of the CfA population.

3.2.1 Data Mining Issues

The CGEC presented to then Director Irwin Shapiro a data request, detailing the information requested for the study, in 2003. A first detailed memo was generated and addressed to the SAO HR manager and to the CfA personnel in charge of the institutional database (see Appendix F). After negotiations (but no data access), a new request was generated (Appendix G) and addressed to the new CfA Director (Charles Alcock), in 2005.

The difficulty in obtaining institutional records arose for several reasons:

1. The CGEQ was requesting data that SAO HR had not been called upon to provide in the past, so it represented a new form of database query.
2. The HR department had to change their information management system contemporaneously with the Gender Equity Study, making it hard to merge data from new and old, obsolete, systems.
3. Longitudinal (i.e. multi-year) databases are not maintained in a format that renders it amenable to analysis.
4. The SAO HR manager had serious concerns about providing confidential personnel records.
5. Harvard University is a private institution that does not share personnel information with external agencies.

In 2006, the CGEC was able to obtain only a snapshot of the requested data, relating to the year 2005, and including: SAO HR information, SAO Contract and Grants information, and CfA space allocation. To overcome the concern of the SAO HR manager about the confidentiality of the HR data, the HR data was directly transferred to the CGEC consultant (Dr. Sonnert) for analysis, who also set up a confidentiality protocol.

The scientist publication and citation data was obtained by the CGEC from the NASA ADS database (<http://ads.cfa.harvard.edu>), which is publicly available, with the assistance of the ADS group, located at CfA. This data is relevant for the entire science population of CfA in the 2006 census database (SAO, HCO, and Harvard Astronomy).

Besides the 5-year data needed for the longitudinal study, data not available included information as to the supervisory status of an SAO employee, number of employees supervised, and rank of employees in the supervisory chain; and amount of internal Smithsonian Institution/SAO funding. The lack of central coordination at the CfA also prevented the collection of data regarding percent of employment by external institutions, history of nominations (by gender) by the science prize committee, and data on postdocs.

3.2.2 Analysis and results

Dr. Sonnert analyzed these data and reported the results to the CfA in September 2006. Given the limitations of the data set, this study is only relevant for the SAO population, with the exception of the work space and of the publication study for scientists, which include Harvard scientists and faculty. Also the study, based on snapshot (cross-sectional) data, cannot provide unequivocal conclusions about longitudinal processes (e.g., how employees move through the ranks); because time and cohort effect are potentially confounded.

Dr. Sonnert's report covers: (1) employment and rank, (2) extra compensation, (3) work space, (4) publication productivity for scientists, and (5) external funding, also for scientists. In summary:

- Employment and rank (SAO only)
 - Men have attained a higher average grade than women
 - Highly significant at BA and lower educational level
 - Not significant at PhD level (but present)
- Extra compensation (SAO only)
 - No difference in cash awards (taking into account salary)
 - Time off awards were mostly awarded to women and administrators.
 - Although this was not included in Study 1, the CGEC points out that 5 senior SAO scientists, all male, receive extra compensation in the form of joint Harvard appointments.
- Work space (CfA)
 - Controlling for other factors (division, occupation, grade, professional age) the average work space of women is 13.2 sq ft smaller than that of men
- Publication productivity (scientists, CfA)
 - Overall, men did publish slightly more papers per year than women (5.6 versus 4.9 papers per year on average; 1.9 versus 1.4 if normalized to take into account multiple authorship)
 - Men also had more citations than women (130 versus 112 average citation per year), with the exception of the cohort of more senior employees (senior grades), where women outdid the men in citations (202 vs 177 citation per year), even if their publication rate is smaller (4.2 versus 5.0 papers per year).
 - A trend was apparent, suggesting that the publication and citation rates of men are in part due to more collaborative works
 - Women are first author of 35.5% of their publications (particularly in grade 13, the lowest considered)
 - Men are first authors of 28.4% of their publications
- External funding (SAO)
 - Considering the whole body of SAO scientists, more women than men obtained external funding
 - 69% of all PhD women had external funding
 - 58% of PhD men had external funding

- The median amount of the grant or contract is larger for women, considering the entire SAO scientist population
 - Total per individual \$42K (women) versus \$31K (men)
- But the average total funds is much larger for men, because of a few very large grants (the median above is not affected by these)
 - \$534K (men) versus \$92K (women)
- Including all the employees with doctorates (178 men and 32 women), the average number of grants received was 1.1 for the men and 1.5 for the women. Considering only the grant recipients, the average number of grants received were 1.9 for the men and 2.2 for the women.

The paper by Dr. Sonnert and associated charts, reporting the results of this study, can be found in Appendices H1 and H2, respectively.

3.3 Summary of the results of Study 2: Web Survey

The CGEC conducted an anonymous electronic survey of CfA employees in early 2004. The questionnaire was based on a survey prepared by the Women in Science and Engineering Leadership Institute (WISELI), a research center at the University of Wisconsin, Madison, to study the problem of the lack of diversity in the sciences and engineering. WISELI is a program funded by a 5 year Institutional Transformation Award from the National Science Foundation ADVANCE program. The questionnaire was modified by the CGEC to reflect the reality of the CfA. It was also pilot-tested internally before deployment. The questionnaire covered the following areas:

- The hiring process
- The promotion process
- Compensation
- Professional activities
- Satisfaction with the Center for Astrophysics
- Center for Astrophysics programs and resources
- Perceived gender biases
- Balancing personal and professional life
- Spouse/Partner's career
- Gender issues at the Center for Astrophysics
- Personal demographics

To ensure complete confidentiality, the resulting data were given directly to Dr. Sonnert for analysis. This procedure avoided the possibility that the pattern of replies could lead to the identification of specific employees by CGEC members.

We received 308 responses out of 944 employees (in the Census database at the time of the survey, 2003), giving a response rate of 32.6%. Of the respondents, 10 did not reveal their gender. Of the remaining 298 employees who responded to the survey, 121 (40.6%) were women, and 177 (59.4%) were men. Overall, the breakdown of the responding sample is a good representation of the entire CfA employee population.

The main result of the web survey is that the CfA community is satisfied with their institution and their work environment. The strongest contrast in the pattern of replies was between scientists and non-scientists, considerably overshadowing gender differences.

However, significant gender differences appeared in the areas of ‘perceived gender biases’:

- Women, especially women scientists and women who had been at the CfA for some time, did not feel that they were treated without regard to gender over the course of their careers here.
- The questions related to leadership and promotion opportunities also revealed less satisfaction on the women’s side, although the overall sense of the replies was positive in all cases.
- Women, more than men, raised the issue of unwritten rules and communication problems at the CfA.
- Responses to open-ended questions on job satisfaction identified the following positive factors
 - Enthusiasm for the scientific activities of the CfA
 - Appreciation of specific aspects of one’s job or career
 - Happiness with the general atmosphere at the CfA
- Negative factors cited
 - Burdensome and inefficient bureaucratic processes
 - Low levels of compensation
 - Specific aspects of one’s job or career
 - Belief that the CfA paid too little attention to gender and family issues

A copy of the questionnaire and the spreadsheet containing the results can be found in Appendix I1. The paper by Dr. Sonnert, reporting the results of the analysis of the Web Survey data, and the attached spreadsheet, can be found in Appendices I2 and I3.

3.4 Summary of Study 3: Employee Interviews

The purpose of these interviews was to follow up on the issues raised by the results of Study 2.

At the suggestion of Dr. Sonnert, who supervised the statistical evaluation study, the CGEC hired Ms. Wendy Roth, then a Harvard Sociology graduate student, who had extensive experience in designing and conducting interviews.

To ensure absolute confidentiality and proper protocols, Ms. Roth submitted the study to the Harvard Committee on the Use of Human Subjects for approval. The interviews were conducted during the summer of 2004, and the results were presented at the CfA in December 2004.

Sixty employees, selected at random from the CfA census database, and evenly distributed among women scientists, women non-scientists, men scientists and men non-scientists, were interviewed. No effort was made to differentiate between SAO and Harvard staff. The interviews lasted approximately one hour and covered the areas of gender equity at the CfA, career advancement and the promotion process, work climate, the organizational structure of the CfA, and balancing work and family.

In brief, the findings of this qualitative study are:

- Most female scientists believed that women are not treated equitably to their male colleagues at CfA. Almost all the female scientists with 5 years or more of service at CfA reported negative experiences dealing with colleagues and supervisors.
- Female scientists who had been at CfA less than 5 years had more varied experiences; some repeated the discomfort noted by their more senior peers, others did not report any feeling of gender bias.
- The work-related experiences of female non-scientists were also diverse. Some, however, reported antagonistic or condescending treatment from their superiors.
- Overt discrimination, sexual harassment, or inappropriate comments by male colleagues were rare.
- Women (scientists and non-scientists), instead frequently reported subtle discrimination and disrespectful treatment.
- Some women believed that their gender biased the evaluation of their performance, that supervisors did not put them forward and favored their male colleagues. Some reported instances of disrespectful or condescending behavior by the supervisor in the presence of their peers.
- Male scientists and non-scientists had a higher level of satisfaction than women. Some reported disrespectful behavior, but felt that this was part of the 'initiation' process at CfA. No major differences were found between male scientists who had been at CfA more than 5 years and more junior scientists.
- Most male non-scientists did not perceive any gender bias against women.
- Some male scientists were aware of gender bias against women at CfA.
- The subtle disadvantages perceived by women were related to various organizational and structural aspects of CfA, including
 - Isolation of divisions and departments
 - Lack of systematic CfA-wide policies
 - Culture of unwritten rules
 - Lack of mentoring and useful networks for women
 - Poor managerial skill of some supervisors
- Finally, there was no general consensus on family issues: Some employees were very happy with their supervisor's support, others with small children complained about the lack of daycare facilities.

The description of the project, the employee consent form, and the report on the results of the study by Ms. Roth are attached in Appendices J1-J3.

3.5 Solicited and unsolicited input from colleagues

The CGEC invited any member of the CfA community to send anonymous confidential comments, or to meet confidentially with either the entire CGEC or any of its members, to discuss individual experiences at the CfA. The additional information and suggestions resulting from these inputs are folded into the CGEC recommendations.

3.6 CGEC Comments on the Studies

3.6.1 Analysis of Institutional Data

The results of the Institutional Data investigation do not reveal major hidden gender biases at the CfA. **However there are some worrisome results, including the finding that women lag behind men in rank.** This discrepancy is particularly evident in the non-PhD population, and it could be due to different career tracks. However the concern about dead-end careers expressed by women non-scientists in the other two CGEC studies suggests a problem.

The rank discrepancy is small, but still present, in the PhD population. While this result may be considered not statistically significant, as noted by Dr. Sonnert, it is what it is; because strictly speaking statistical variance analysis does not apply to population analysis (which is what we have here) but to the analysis of samples, representative of a parent population. Even a small difference in rank will translate into a sizeable difference in earnings over an entire career. **A smaller office space allotment was also found for SAO women scientists, when compared to their male counterparts.** These results go in the direction found by other gender bias studies, such as the MIT study, the study at the Karolinska Institute in Sweden, and the recent report of the National Academy of Sciences, which found that women scientists are at a disadvantage compared to their male peers regarding compensation, career and available facilities (<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11741>).

Gender-related differences are also found in the analysis of publication rates and citation indices for scientists, suggesting that women scientists, especially junior ones, tend to collaborate less than their male colleagues. This suggests an isolation of female scientists that has an adverse effect on their publication rates. More women scientists than men obtain external funding at SAO (but the few very large grants are male-dominated). This is an interesting result that may point to a higher level of entrepreneurship among women, but can also be explained by a sense of isolation. Since most SAO scientists work in mid to large size projects, if male scientists feel part of the team (and women do not), they are less motivated than women to apply for individual funding.

As already noted, **Study 1 (as executed) is not a longitudinal study, and does not include the Harvard side of the CfA. As such it does not provide a full picture of the gender-dependence of the career histories of the CfA employees. Moreover, even for the SAO side, some data originally requested by the CGEC was not provided, so the results of Study 1 cannot address the full range of questions asked by the CGEC.**

3.6.2 Web Survey and Interviews

The Web survey and employee interviews give a more negative view of the gender equity situation at the CfA than suggested by the analysis of the institutional SAO records. Given the subjective nature of the data collected by these two CGEC investigations, these findings are, for the most part, reflective of employees' **perceptions** of gender equity at the CfA: While we recognize that perceptions alone are not necessarily direct evidence of gender discrimination, nonetheless, a systematic or pervasive perception of gender inequity within an organization is symptomatic of a dysfunctional work environment that must be taken seriously by both management and the community at large.

The main result of the web survey is that the CfA community is satisfied with their institution and their work environment. The strongest contrast in the pattern of replies was between scientists and non-scientists, considerably overshadowing gender differences. However, significant gender differences appeared in the areas of 'perceived gender biases'. Women, especially women scientists and women who had been at the CfA for some time, do not feel that they were treated without regard to gender over the course of their careers here. The questions related to leadership and promotion opportunities also revealed less satisfaction on the women's side, although the overall sense of the replies was positive in all cases. Women, more than men, also raised the issue of unwritten rules and communication problems at the CfA.

Symptoms of gender imbalance suggested by the Web Survey were more evident in the Interview Project and in the personal communications of employees with the CGEC. While both women and men (scientists and non-scientists), raised these issues, in general women felt that these problems affected them seriously, both in terms of career advancement and job satisfaction. We list these issues below:

1) Small number of women in federal jobs and in high-level positions

It was noted in the interviews that having relatively few women in visible senior positions within the CfA sends a negative message to junior women and to the CfA community as a whole. This is a concern mostly--but not only--for scientists. Only six women scientists have senior federal positions at SAO, positions that are comparable to tenured full-professorships at major universities. There is one woman full professor and one woman assistant professor on the Harvard side. Women are also underrepresented in technical positions in Central Engineering.

2) Problems with upward mobility

There is a perception by some employees of a lack of opportunity or training that would allow upward career mobility. This perception is widespread, but women raised it more forcefully.

3) Lack of information and/or unwritten rules (SAO)

Women especially raised the issue of unwritten rules, and/or the absence of a consistent system of distributing clear information about organizational policies and procedures, as crippling to their career advancement within the CfA. While the CGEC is aware that most, if not all, rules as regards personnel actions, funding opportunities, leave, etc. are documented and available on the web, the overwhelming employees' perception is that this information is archived in a confusing and impenetrable way, difficult to find even if you know what to look for, and impossible if you don't.

4) Lack of adequate mentoring

The lack of mentoring, and of access to the informal political information and other advantages that mentoring provides, was found to have a particularly negative impact on women, especially younger women. In addition, some male respondents to the CGEC survey commented that they felt reluctant to mentor female colleagues informally out of fear that their attentions could be misinterpreted as some form of sexual harassment. [Harvard has recently instituted an enhanced mentoring program for junior faculty. There is now an individual mentor for each junior faculty member in the Astronomy Department, along with a standing Mentor Oversight Committee.]

5) Unfriendly culture, male cliques

This issue was advanced both in relation with work group dynamics and more relaxed scientific conversations. Issues included perceived exclusion from decision making, perceived unfriendly or rough conversations, verbal challenges and being overlooked and/or ignored. Both male and female employees reported this type of behavior, but while men considered it a temporary problem for new employees that went away once people established themselves in the group, women found it an obstacle to becoming full fledged group members. It was also noted that male and female colloquium speakers may receive different treatment in terms of introductions and questions.

6) Lack of management training for supervisors (SAO)

A recurring theme in the interviews was that many supervisors have little management training or skills. The point was made that while there is not necessarily any correlation between professional accomplishments and supervisory skills, nonetheless, SAO staff are often promoted to supervisory positions based upon their technical or administrative achievements rather than their supervisory potential. While there was a policy of management training for new supervisors in the past, it has not always been enforced, especially in more recent years. Further, the training that has been offered to supervisors on an *ad hoc* basis (e.g. equal opportunity, sexual harassment), has not always been developed or presented in a way that was relevant to SAO staff, and because of this is often not taken seriously. This is not strictly a gender equity issue because men as well as women can be affected.

7) The Performance Evaluation Process (SAO)

Many concerns were raised about seeming inconsistencies in the performance evaluation process, particularly in the way some performance reviews were conducted. Some employees reported delays in the performance process that would have repercussions on their overall compensation profile. There was also a prevalent feeling that a supervisor's personality--rather than an employee's achievements--plays a large role in personnel actions, resulting in an uneven playing field. On the SAO side, technically employees can take their grievances to their reviewing official but most people are afraid of (or feel awkward) taking this step since it means going 'over the head' of their own supervisor to his or her boss.

8) Family support

While in general employees were happy with the family-friendly atmosphere at the CfA, recent parents or parents-to-be raised strong concern on family leave and child care support at SAO, which fall short of what is available at some universities, including Harvard and MIT, and even that there are differences between SAO Federal and Trust employees, for example in the availability of flexible spending accounts for dependent care. Another area of concern is the lack of appropriate on site facilities that can be used by expectant or breast-feeding mothers. While child rearing is an issue for all parents, it has been raised as an area of particular concern for young women scientists, given the conflicting demands of family and the critical early stage of their careers. Elder care support has also been raised as an issue that particularly affects female employees.

3.7 Preliminary Report of the CGEC

A preliminary report was prepared following the completion of the web survey and interview projects. This report was released via the CfA internal web page in April 2005. The preliminary report is attached in Appendix K.

Acknowledgments

This study could not have happened without the leadership of the former CfA Director Irwin Shapiro and CfA Director Charles Alcock. We acknowledge the continuing support of the Deputy Director for Administration Pat Kennedy Graham. We thank the SAO HR Manager Laura Conway, for her assistance in the data mining effort; Julie Shaw and Michael Chesleigh, for giving us input to the CfA Census database and setting up the web interface for the employee survey; Julie Shaw and Mary Juliano, for setting up and managing the CGEC web pages in the internal CfA web; Nayla Rathle, for administrative assistance; Christine Crowley, for providing the SAO fellowship statistics; Saku Vrtilek, for providing national science statistics; and Alberto Accomazzi, for providing scientific publication and citation data. We are grateful to our colleagues Andrea Dupree, Margaret Geller, Kate Kirby, Nancy Brickhouse, and Antonella Fruscione for constructive criticism and input on the issues facing female scientists at CfA. We thank, while preserving their anonymity, all our CfA colleagues who participated in the studies, and those that sent us comments or talked to us on gender equity issues. We thank Jean Jackson of MIT for early advice to our study and Lorna Gibson of MIT, who gave the CGEC a presentation on the MIT women's gender equity activities. We thank Bernice Durand, Vice Provost for Diversity and Climate and Professor of Physics, University of Wisconsin - Madison, for advice and guidance in the earliest phases of this study. Our web-based survey was modeled on a similar survey conducted by the Women in Science & Engineering Leadership Institute (WISELI) at the University of Wisconsin - Madison. We thank Frank Dobbin of Harvard University, for discussing with us his study on programs for redressing inequities in the workplace. We are deeply indebted to our consultants, Gerhard Sonnert and Wendy Roth, for their expert advice in setting up our studies, and for their work in analyzing the data and summarizing their findings.

APPENDIX A – Data Matrix for Institutional Data Mining

Datum	Comment
Name or number	Must be consistent year to year
Gender	
Age	
Organization Affiliation	HEAD, SED, SSPP,
Classification	Administrator, Scientist, Engineering
Nature of Position	(Fed/Trust/WAE/Stipend/Indefinite/&c.)
Pool of Applicants	For new hires, statistics on the qualified applicants to the position, at different steps of the selection process if appropriate, and information on how/where the job was advertised
Years of Service at CfA	
Source of Support	Contract, Grant or Federal
Separation Information	Institution's reason; Employee's comments
Highest Degree	
Years Past Degree/Date of Degree	
Step/Grade or Rank	
Annual Performance Rating	This will change this year to four levels.
Years Since Last Evaluation	
Years Since Step Increase	
Years Since Two Step Increase	
Years Since Promotion	
Cash Award This Year?	Amount
Time Off Awards?	Amount
Retention Bonus?	Amount
Signing Bonus?	Amount
Supplemental Funding?	Assigned federal travel funds, etc.
Number of Employees Supervised	
Grade and Step of Employees Supervised	
Supervisor Grade and Step	
Number of Internally Supported Research Assistants and Postdocs	
Number of Externally Supported Research Assistants and Postdocs	
Office Space Square Footage	
Office Location	60, 160, CDP, ...
Duty Station	Cambridge, Arizona, Hawaii,
Source of SAO Salary	Fed, Contracts & Grants, Overhead, Harvard, Other
Amount of Internal Support	IR&D, RE, Proposal Prep funds, etc.
Amount of External Support Received	From successful Grant or Contracts
Percentage Employment at Other Institution	
Amount of External Salary	
Prize Nominations	
Committee Membership	
Publication and citation records	From ADS, most relevant for scientists

APPENDIX B - Short CVs of CGEC Members

Giuseppina Fabbiano. Physics Doctorate, University of Palermo, Italy (1973). Senior Astrophysicist, joined SAO in 1975. Scientific interests include the study of normal galaxies, their evolution, and the galaxy-nuclear activity connection, by means of X-ray observations. Fabbiano has published a number of highly cited research and review papers in this subject. She has been involved in observational X-ray astronomy and space data management throughout her career, and is presently the Head of the Data Systems Division of the Chandra X-ray Center. She is the CfA lead for the Virtual Observatory, a project aimed at making astronomical data archives inter-operable and accessible to the wider public and the member of a team investigating future high resolution X-ray telescopes. She has long been an advocate of high resolution, large collecting area X-ray telescopes and is investigating future space missions in this area.

Andrew Szentgyorgyi. Physics Doctorate. University of Wisconsin - Madison (1986). Assistant Professor, Columbia University Physics Department (1986-1990), Astrophysicist, SAO (1989-Present). Current scientific interests are open star clusters, star formation and exoplanets, as well as astronomical instrumentation, especially high-dispersion optical spectroscopy. Szentgyorgyi has recently led efforts to build large instruments for the MMT in Arizona, the Magellan telescope in Chile, the Herschel telescope on La Palma as well as a number of instruments for smaller SAO facilities.

Nancy Adler, BA in English, University of Pennsylvania; MBA, Boston University. Manager, Travel and Special Events Department. She has been employed by SAO for over 30 years, served on a number of Observatory wide administrative search committees, and was Women's Program Coordinator for the CFA in the early 1980s.

Pat Brennan, BA, University of New Hampshire. Administrator, Central Engineering. She has been administrator of the Central Engineering Cost Center since its formation in 1982, and served several terms on the Women's Program Committee.

Peg Herlihy, B.A. in English, Art, and Theater from Amherst College. Division Administrator in the Department of Astronomy since 1999. She held several positions in the HCO Business Office from 1983 through 1999, served on various CfA committees including the CfA Women's Program Committee, and is currently a member of both the Steering Committee for the Harvard Administrator's Forum and the Transportation Committee.

Muriel Hodges joined the Radio and Geoastronomy Division as a Staff Assistant in 1999 and is past coordinator of the Women's Program Committee.

Christine Jones is a Senior Astrophysicist at SAO, where she has worked since 1978. She received her AB (1971), AM (1972), and PhD (1974) degrees from Harvard University. Before joining SAO, she was a CfA Post-doctoral Fellow (1974-1975) and a Harvard Junior Fellow (1975-1978). Jones has published nearly 200 papers on a wide range of science topics from early work on X-ray binaries to her current research on the evolution

of galaxies and clusters, large scale structures, and accretion onto and feedback from supermassive black holes in galaxies. She works with scientific colleagues at the CfA and around the world. Since 1990, Jones has led the CXC work to calibrate the Chandra science instruments and telescope. For the past 15 years, she has been the PI of the NSF supported program to bring summer interns to the CfA. Jones has served on the AAS Council, on the HEAD Executive Committee, on advisory and review panels for NASA and the Space Telescope Institute and on the organizing committees for international conferences. She also works to improve science education in elementary and high schools.

Jonathan Grindlay is the Paine Professor of Astronomy at Harvard, where he has been on the faculty since 1976. He received his Ph.D. in astrophysics from Harvard in 1971, was then a Harvard Junior Fellow (1971-74) and then a SAO research scientist (1974-76). He served as Department of Astronomy chair from 1985-1990 and 2000-2002. His major scientific interests are in studies of compact accreting objects (white dwarfs, neutron stars and black holes) as well as large scale surveys and instrumentation. He leads several current large survey projects and associated instrumentation development for temporal-spatial studies of compact objects.

Donna Thompson, MS, Library Sciences, Simmons. Technical Information Specialist with the NASA Astrophysics Data System. She has had several different positions in various departments and Divisions since coming to SAO in 1985, and has been active in the Women's Program Committee.

APPENDIX C – CVs of CGEC Consultants

GERHARD SONNERT

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VITA

EDUCATION

- 1988 *Master in Public Administration*, Harvard University
1986 *Doctor of Philosophy* in sociology, University of Erlangen-Nürnberg, Germany
1982 *Master of Arts* (Magister Artium) in sociology, modern history and human geography, University of Erlangen-Nürnberg, Germany
1980-81 Exchange student in economic history and sociology, University of Manchester, England

FELLOWSHIPS AND AWARDS

- 1995 *Choice* magazine's "Outstanding Academic Book of 1995" selection for *Gender Differences in Science Careers*
1986-88 McCloy Scholarship at Harvard University
1984-86 Doctoral Fellowship of the German National Scholarship Foundation
1976-82 Bavarian State Scholarship and German National Scholarship Foundation Fellowship

RESEARCH POSITIONS

- 1988- *Research Associate*, Department of Physics, Harvard University
1985 *Postgraduate Worker*, Department of Sociology, University of Edinburgh, Scotland
1982-84 *Research Associate*, Research Project on Regionalism in Western Europe, Departments of Sociology and Political Science, University of Erlangen-Nürnberg, Germany

TEACHING POSITIONS

- 1999- *Senior Lecturer*, Program in Human Services and Social Science in the Women's College, Lesley University, Cambridge, MA
1998-2001 *Lecturer*, Department of Social and Behavioral Sciences, Rivier College, Nashua, NH

NUMEROUS SCHOLARLY PUBLICATIONS, INCLUDING THE FOLLOWING BOOKS

- G. Sonnert and G. Holton. *What Happened to the Children Who Fled Nazi Persecution*. New York: Palgrave Macmillan (scheduled for December 2006).
G. Sonnert. *Einstein and Culture*. Amherst, NY: Prometheus Books, 2005.
G. Sonnert, with the assistance of G. Holton. *Ivory Bridges: Connecting Science and Society*. Cambridge, MA: MIT Press, 2002.

- G. Sonnert, with the assistance of G. Holton. *Gender Differences in Science Careers: The Project Access Study*.
ASA Rose Book Series. New Brunswick, NJ: Rutgers University Press, 1995.
- G. Sonnert, with the assistance of G. Holton. *Who Succeeds in Science? The Gender Dimension*. New
Brunswick, NJ: Rutgers University Press, 1995.
- G. Sonnert. *Nationalismus und Krise der Moderne. Theoretische Argumentation und empirische Analyse am
Beispiel des neueren schottischen Nationalismus*. Frankfurt: Athenaeum,
1987.
- R. Kreckel, F. von Krosigk, G. Ritzer, R. Schütz, G. Sonnert. *Regionalistische
Bewegungen in Westeuropa.
Zum Struktur-und Wertwandel in fortgeschrittenen Industriegesellschaften*.
Opladen: Leske, 1986.

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EDUCATION

- 2005 (expected) **Harvard University**, Cambridge, MA
Ph.D. in Sociology and Social Policy
Passed Oral Exam with Distinction, May 2002
A.M. received June 2002
- *Dissertation*: “Racial Identity at Home and Abroad: Its Impact on Puerto Ricans’ and Dominicans’ Social Networks and Economic Mobility.” *Committee*: Mary C. Waters (advisor), Katherine S. Newman, Peggy Levitt, Prudence L. Carter
- 1997 **Oxford University**, Nuffield College, Oxford, UK
M.Phil. in Sociology, with Distinction
- *M.Phil. Thesis*: “Homelessness and Social Networks: Comparing Informal Support in Britain and the United States.” *Committee*: John Goldthorpe (advisor), Duncan Gallie, Michael Noble
- 1995 **Yale University**, New Haven, CT
B.A. in Sociology, Magna Cum Laude
- *Senior Thesis*: “The Ties that Provide: The Use of Social Networks by Homeless Families.” *Committee*: Robert Jenkins (advisor), Josh Gamson

SOCIAL RESEARCH WORK EXPERIENCE

- 2003-2004 **Research Assistant to Prof. Susan Eckstein**, Professor of Sociology, Boston University. Conducted demographic and statistical analysis of Cuban-American population using the 2000 Census for forthcoming book, *Ties That Bind and Transnational Transformations: Cuban Migration, Miami, and the Remaking of Cuba*.
- 2001-2002 **Interviewer, The New York Second-Generation Project**, New York, NY. Interviewed Puerto Rican second-generation immigrants and an American control sample for a qualitative follow-up study of assimilation and transitions to adulthood, led by Prof. Mary C. Waters (Harvard University), Prof. Philip Kasnitz and Prof. John Mollenkopf (CUNY Graduate Center).

- 2001-2002 **Researcher, National Academy of Sciences, Committee on Case Studies on School Violence**, Jonesboro, AR. Conducted a case study of the school shooting in Jonesboro, AR for a government research project on school violence, mandated by Congressional Act. Led qualitative interviews, ethnographic fieldwork, and archival research. Analyzed and reported findings in a volume emphasizing policy implications.
- 1999-2000 **Research Assistant to Prof. Katherine Newman**, Malcolm Wiener Professor of Urban Studies, Harvard University, Cambridge, MA. Carried out research on projects relating to low-wage work and job-seeking. Created a coding scheme and data entry program for job application data, managed two student employees, sorted and coded qualitative interview data, reported findings for grant proposal.
- 2000 **Research Assistant to Visiting Prof. Victor Nee**, Cornell University Goldwin Smith Professor of Sociology and Sociology Department Chair, Cambridge, MA. Analyzed statistical data on indicators of ethnic assimilation for Prof. Nee, a visiting professor from Cornell University. Analysis contributed to the book *Remaking the American Mainstream: Assimilation and Contemporary Immigration* by Victor Nee and Richard Alba, professor at SUNY Albany.
- 1997-1999 **Quantitative Researcher, National Centre for Social Research** (formerly Social and Community Planning Research), London, UK. Designed and managed quantitative survey research projects for UK government sponsors. Responsible for all aspects of research, including proposal writing, survey design and management, CAPI questionnaire development in Blaise III, briefing of interviewers, data editing and coding, preparation of data, analysis and reporting.
- Projects included:
- New Deal for Lone Parents (August 1997 - June 1999; Directed fieldwork from October 1998 - June 1999) Evaluation of the pilot phase of a Department of Social Security welfare-to-work program. The evaluation involved CAPI survey research with 4,000 single parents, site visits to program areas, qualitative interviews, and analysis of administrative data from benefits records.
 - Youth Lifestyles Survey (March 1998 - June 1999) Home Office survey of 12-30 year olds in England and Wales on drug and alcohol use, self-reported offending, school bullying, attitudes to crime and the police, and many other aspects of young people's lives. 5,000 interviews were conducted both face-to-face and in self-completion. Survey design included both random and focused enumeration samples, and a split-sample experiment between paper and computerized modes of interview.
- 1993-1994 **Student Fellow, National Science Foundation Research Experience for Undergraduates Program**, SUNY Stony Brook, Stony Brook, NY. Participated in a quantitative study of homelessness in the Institute for Social Analysis. Conducted quantitative and qualitative interviews, wrote computer analysis programs, coordinated data management, and conducted an independent research project.

PUBLICATIONS

Peer-Reviewed Journal Articles:

2002 Roth, Wendy D. and Jal D. Mehta. "The *Rashomon* Effect: Combining Positivist and Interpretive Approaches in the Analysis of Contested Events." *Sociological Methods and Research*, 31(2): pp.131-173.

Books:

2004 Newman, Katherine S., Cybelle Fox, David Harding, Jal Mehta, and Wendy Roth. *Rampage: The Social Roots of School Shootings*. New York: Basic Books.

Chapters in Edited Volumes:

2002 Fox, Cybelle, Wendy D. Roth, and Katherine S. Newman. "A Deadly Partnership: Lethal Violence in an Arkansas Middle School." Pp. 91-116 in *Deadly Lessons: Understanding Lethal School Violence*, Case Studies of School Violence Committee, edited by Mark H. Moore, Carol V. Petrie, Anthony A. Braga, and Brenda L. McLaughlin. Division of Behavioral and Social Sciences and Education. Washington, D.C.: National Academy Press.

Other Publications:

2000 Hales, Jon, Wendy Roth, Matt Barnes, Jane Millar, Carli Lessof, Mandy Gloyer and Andrew Shaw. *Evaluation of the New Deal for Lone Parents: Early Lessons from the Phase One Prototype--Findings of Surveys*. Department of Social Security (UK), Research Report No. 109.

2000 Hales, Jon, Carli Lessof, Wendy Roth, Mandy Gloyer, Andrew Shaw, Jane Millar, Matt Barnes, Peter Elias, Chris Hasluck, Abigail McKnight, and Anne Green. *Evaluation of the New Deal for Lone Parents: Early Lessons from the Phase One Prototype--Synthesis Report*. Department of Social Security (UK), Research Report No. 108.

1999 Finch, Helen and William O'Connor with Jane Millar, Jon Hales, Andrew Shaw, and Wendy Roth. *The New Deal for Lone Parents: Learning from the Prototype Areas*. Department of Social Security (UK), Research Report No. 92.

1998 Hales, Jon, Andrew Shaw and Wendy Roth. 1998. *Evaluation of the New Deal for Lone Parents: A Preliminary Assessment of the Counterfactual*. Department of Social Security (UK), In-house Report 42.

- 1995 Roth, Wendy D. "The Strength of Social Ties Among the Homeless: A Concentration on Network Content over Size." *Journal of Undergraduate Research* 1: 1-12.

WORKS IN PROGRESS

- Roth, Wendy D. "The End of the One-Drop Rule? Labeling of Multiracial Children in Black Intermarriages." Revise and Resubmit at *Sociological Forum*.
- Kingdom Roth, Wendy D. "The British Are Still Coming: Contemporary United Immigration to the United States." Chapter in preparation for *The New Americans*, edited by Mary C. Waters and Reed Ueda. Cambridge, MA: Harvard University Press.

SELECTED AWARDS, GRANTS & FELLOWSHIPS

- 2002 National Science Foundation Doctoral Dissertation Research Improvement Grant, and Grant Supplement for International Academic Collaboration (\$12,500)
- 2002 Frederick Sheldon Traveling Fellowship, Harvard University (\$18,000)
- 2001 Weatherhead Center Pre-dissertation Fellowship, Harvard University (\$3,000)
- 2001 Graduate Society Summer Fellowship, Harvard University (\$2,500)
- 2001 David Rockefeller Center for Latin American Studies Summer Field Research Travel Grant, Harvard University (declined)
- 2000-present Doctoral Fellow, Multidisciplinary Program in Inequality and Social Policy, Kennedy School of Government, Harvard University (\$21,000)
- 2000 Sociology Department Conference Travel Grant, Harvard University
- 1995-1997 Economic & Social Research Council Overseas Research Scheme Award, United Kingdom
- 1995-1997 Nuffield College Funded Studentship, Oxford University (2 years of full tuition, room & board, + stipend)
- 1995 Charles P. Howland Fellowship for Post-Graduate Research
- 1995 Phi Beta Kappa Honor Society
- 1995 Mildred Priest Frank Memorial Prize in Sociology, Yale University
- 1995 Honors in Sociology, Yale University

- 1994 Richter Fellowship for Summer Research, Yale University
- 1991 Robert L. Byrd Honors Scholarship
- 1991 Governor's Committee on Scholastic Achievement Award

Selected Presentations

- 2004 “The End of the One-Drop Rule? Labeling of Multiracial Children in Black Intermarriages,” paper presented at Harvard-Oxford-Stockholm Graduate Student Conference, March 17-18, Oxford, UK
- 2003 “Creating Racial Options: Labeling of Multiracial Children in Black Intermarriages,” paper presented at The Harvard Color Lines Conference, The Civil Rights Project, Harvard University, August 30 – September 1, Cambridge, MA
- 2002 “Racial Options in Socialization: Parents’ Racial Designation of Multiracial Children with Black Heritage,” paper presented at the annual meeting of the American Sociological Association, Regular Session, August 16-19, Chicago, IL
- 2001 “The Racial Identification of Mixed-Race Children,” paper presented at Harvard-Oxford-Stockholm Graduate Student Conference, March 16-17, Oxford, UK
- 2000 “Homelessness and Social Networks: Comparing Informal Support in Britain and the United States,” paper presented at the annual meeting of the American Sociological Association, Student Roundtable Session, August 12-16, Washington, DC
- 1998 “The New Deal for Lone Parents: Preliminary Assessment of the Impact,” report presented at the Department of Social Security (UK) policy briefing, July, London, UK
- 1996 “The Ties that Provide: The Use of Social Networks by Homeless Families,” paper presented at the Harvard-Oxford-Stockholm Graduate Student Conference, October 9-11, Stockholm, Sweden
- 1994 “The Strength of Social Ties Among the Homeless: A Concentration on Network Content over Size,” paper presented at the annual meeting of the Eastern Sociological Society, Regular Session, March 17-20, Baltimore, MD
- 1992 “Television Use by the Institutionalized Elderly and its Effect on Their Conceptions of Reality,” poster presented at the annual meeting of the Connecticut Psychological Association, April 30-May 1, Stamford, CT

TEACHING EXPERIENCE

- 2004 *Teaching Fellow, **Race, Class, and Poverty in Urban America***, Social Analysis Division of Core Curriculum Program, Harvard University. Prof. William Julius Wilson.
Taught a discussion section of an undergraduate lecture course.
- 2003, 2001 *Guest Presenter, **Qualitative Social Analysis*** (required graduate seminar), Sociology Department, Harvard University (with co-presenters Cybelle Fox, David Harding, and Jal Mehta). Prof. Mary Waters (2003) and Profs. Katherine Newman and Prudence Carter (2001). Gave invited presentations on conducting ethnographic fieldwork on highly sensitive topics, using the experience of research on school shootings.
- 2001 *Teaching Fellow, **American Society and Public Policy***, Social Analysis Division of Core Curriculum Program, Harvard University. Profs. Theda Skocpol and Mary Waters. Taught two discussion sections of an undergraduate lecture course.
- 2000 *Independent Study Advisor, **Black Ethnicities and Affirmative Action***, Afro-American Studies Department, Harvard University. Advised and evaluated an undergraduate independent study on the ethnic origins of Black undergraduates at Harvard University, and the implications of these demographics for university Affirmative Action policies.
- 1997 *Guest Lecturer, **Homelessness***, Department of Applied Social Science & Social Research, Oxford University. Prof. Michael Noble. Gave an invited lecture on homelessness in international perspective for this graduate seminar in the Applied Social Science M.Sc. program.
- 1996 *Teaching Assistant, **Statistical Modeling***, Oxford University. Dr. Garrett Fitzmaurice. Assisted students and graded papers in this graduate course offered jointly by the Sociology and Comparative Social Research M.Phil. and D.Phil. programs.
- 1996 *Teacher, **English as a Foreign Language***, Oxford Intensive School of English, Oxford, UK. Taught European students in one-on-one tutorials, emphasizing written, oral, and grammatical skills.

PROFESSIONAL TRAINING

- 2001 “Atlas.ti,” Harvard University, Cambridge, MA, and CUNY Graduate Center, New York, NY. Two separate training courses on the qualitative data analysis package.
- 2000 “Sociology Teaching Practicum,” Harvard University. Term-long course for teaching preparation.

- 1999 & 2001 “Teaching Workshop,” Derek Bok Center, Harvard University.
- 1998 “Constructing and Using Survey Weights,” Centre for Applied Social Surveys, University of Southampton, UK.
- 1998 “Survey Data Analysis,” Social & Community Planning Research, London, UK.
- 1998 “Quantitative Survey Design and Data Collection,” Social & Community Planning Research, London, UK.
- 1997 “Survey Sampling,” Social and Community Planning Research, London, UK.
- 1997 “Report Writing and Presentation of Results,” Social Research Association, London, UK.
- 1997 “Advanced SPSS,” Oxford University Computer Services, Oxford, UK.

PROFESSIONAL SERVICE & AFFILIATIONS

- 2003 *Visiting Researcher*, Facultad Latinoamericana de Ciencias Sociales (FLACSO), Santo Domingo, Dominican Republic
- 2003 *Visiting Researcher*, Institute for Caribbean Studies, University of Puerto Rico, Rio Piedras
- 2002 *Conference Co-organizer*, “Doing Ethnic Studies: Current Research and Prospects for the Future,” Interdisciplinary Student Conference, February 28, Harvard University
- 2001-2002 *President*, Graduate Student Organization, Sociology Department, Harvard University
- 2000-2001 *Social Science Representative*, Graduate Student Council, Graduate School of Arts and Sciences, Harvard University
- 2000-2001 *Graduate Representative*, Conference Grant Review Committee, Graduate School of Arts and Sciences, Harvard University
- 1996-1997 *Social Secretary*, Nuffield College Junior Common Room, Oxford University
- 1993-1995 *Student Representative*, Faculty of Arts and Sciences Committee on the Protection of Human Subjects, Yale University
- 1993-1995 *Student Representative*, Sociology Undergraduate Affairs Committee, Yale University

APPENDIX E – e-mail of Director Irwin Shapiro, Appointing the CGEC

TO: Pepi Fabbiano
FROM: Irwin Shapiro
DATE: 30 October 2002
SUBJECT: Study of Gender Equity at the CFA

The Associate Directors and I would greatly appreciate your agreeing to serve on a committee to study all aspects of gender equity at the CfA. The desirability of such a study was internally generated and strongly supported by the CfA Visiting Committee.

The study committee will consist of eight members, three SAO scientists, two HCO scientists, and three members from the rest of the CfA community. The committee, once formed, will decide on its own chair, draft its charge (including a schedule), and propose a (preliminary) budget, the latter two to be iterated with us. Considerable statistical data were gathered by the CfA Issues Committee, mostly in 2000, and can be used as a starting point for the data collection phase.

Please respond to me with your decision by 4 November, if feasible, and please do not hesitate to call or write if you have any questions that you would like addressed before you reach a decision.

JJ/IS p:\Jordan\Oct02\PF27050.doc

APPENDIX F - First Data Mining Request

Email to Laura Conway, Julie Shaw and Kathleen Entler from Andrew Szentgyorgyi and Patricia Brennan (for the CGEC), 6 June 2003

Dear Laura, Julie & Kathleen:

Thank you for agreeing to help the CfA Gender Equity Committee. We recognize that this is a particularly stressful time for Human Resources, and we hope to make our requests as painless as possible.

The committee would like to develop a database that is sufficiently detailed so that we may make an unbiased assessment of the status of gender equity at the CfA. This study divides somewhat naturally into three parts: Harvard, SAO technical/administrative and SAO science. The present discussion concerns only the latter two categories. Only peripheral Harvard data is available through the SAO administrative units and information for the Harvard portion of the study will be acquired through separate requests to other agencies. While gender equity issues are universal, it is useful to recognize that two distinct populations of employees exist within SAO, data regarding them will be somewhat different and require different treatment (e.g. number of publications not a meaningful measure of productivity for non-scientists, with very few exceptions.) Nonetheless, recognizing that some data does not exist for certain categories of SAO employees, it seems most efficient to collect our SAO data in one sweep.

The committee is also keenly aware of the privacy/confidentiality issues that attend a study of this sort. We also recognize that some level of trust is required to proceed successfully; even in a fully anonymous study of the sort we propose, there is risk of abuse or invasion of privacy. All data that the Gender Equity Committee releases will be sufficiently aggregated so that privacy of all individuals will be guaranteed. We welcome any advice you have to offer on this matter.

One of us (PB) has compiled a list of important databases we would like access to:

I. Data available from HR through NFC payroll records:

-
- Date of Birth
- Gender
- Series/Grade/Step
- Previous grade/step
- Time since last two step
- Time since last promotion
- Nature of position (Fed/Trust/Indefinite/Fixed Term/Intermittent etc.)
- Duty hours per pay period
- Highest degree
- Date of degree

- Years at SAO (Service Comp. Date)
- Duty station or stations
- Cash awards and all other forms of monetary compensation from SAO
- Grade/step of individuals supervised
- Grade and step of supervisor

II. Data available through the Staff Database (obtained through the CF):

-
- Source of SAO salary (Fed, Contracts & Grants, Overhead, ...)
 - Classification (Scientist, Engineer, Administrator, Science Educator, etc.)
 - Divisional/organizational affiliation (HEAD, SED, CE, OIR, ...)
 - Name and title of individuals supervised

III. Data available from FMD

-
- Office location/area (size)

IV. Data available from CGPM

-
- Amount of grant money brought in over five year period

V. Other Data

-
- Percent employment by other institutions e.g. Harvard, Tufts, etc.
 - Years at other agencies/other SAO affiliates, e.g. Harvard
 - Amount of external salary
 - Number and rank of individuals supervised as second line or reviewing official.
 - Amount of internal grant/IRD/etc. money received in previous five years.

This database should not include WAE (Intermittent) positions.

We envision the data gathering as proceeding in two phases: a preliminary canvass of "open" databases where names of individuals would be included in the database, and a second phase where confidential information is inserted into the database and "anonymized". We recognize plan has some imperfections and look forward to strategizing with you to improve it.

We also stress that our understanding of these data are incomplete at best. We may be requesting some information that is unavailable or non-existent. On the other hand, we may also be unaware of data that are extremely important to a full understanding of gender equity. If we fail to request an important datum, it does not mean we don't care about it. It just means we don't know it exists. We look to you, the custodians of these data, for assistance in developing the best database possible.

We would like data at two, or three times, say the end of FY02, FY97 and FY92. It would be extremely useful to be able to track individuals between these epochs with a numerical or other anonymous identifier.

Some residual questions that we might discuss Wednesday are:

Is it possible to get information about the distribution of other kinds of "career enhancement" compensation such as: training funds, tuition reimbursement, funds for travel to conferences/seminars etc.?

How is the promotion gradient measured for staff with interruptions in SAO service?

Does the composition of the promotion peer review committees (PAEC, PRCE) perpetuate gender bias?

Is it possible to obtain information on Performance Appraisal Ratings?

Thanks again for agreeing to participate in this study. Thanks also, a little belatedly, to Laura for an extremely useful briefing in February.

Pat Brennan and Andrew Szentgyorgyi
for The Gender Equity Committee

Pat Brennan
Pepi Fabbiano
Allyssa Goodman
Peg Herlihy
Muriel Hodges
Christine Jones
Donna Thompson
Andrew Szentgyorgyi

APPENDIX G – Revised Data Mining Request to Director Charles Alcock

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX H1 – Study of Institutional Data Paper (by G. Sonnert)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX H2 – Study of Institutional Data Charts (by G. Sonnert)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX I1 – Web Survey Questionnaire

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX I2 – Web Survey Results Paper (by G. Sonnert)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX I3 – Web Survey Results Spreadsheet (by G. Sonnert)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX J1 – Description of Interview Project (by W. Roth)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX J2 – Consent Form for Interview (by W. Roth)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX J3 – Interview Results Summary (by W. Roth)

See http://cfa-www.harvard.edu/cfa_only/geneq/

APPENDIX K – Preliminary Report of the CGEC

See http://cfa-www.harvard.edu/cfa_only/geneq/