AWM
ASSOCIATION FOR WOMEN IN MATHEMATICS

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PRESIDENT'S REPORT

A Celebration of Women in Mathematics

On the first weekend in March, a wonderful Celebration of Women in Mathematics took place at MIT. The event, organized by Susan Friedlander, consisted of nine lectures by prominent women mathematicians and a banquet. It was sponsored by NSF (as part of Susan's Visiting Professorship for Women at Brown University) and MIT.

The colloquium style lectures were given by Joan Birman (Barnard/Columbia), Ingrid Daubechies (Princeton), Dusa McDuff (SUNY at Stony Brook), Jill Mesirov (Thinking Machines, former AWM President), Cathleen Morawetz (Courant Institute, NYU), Jill Pipher (Brown), Jean Taylor (Rutgers), Chuu-Lian Terng (Northeastern, AWM President-Elect) and Karen Uhlenbeck (Texas at Austin).

MIT Provost Mark Wrighton introduced the gathering, which was well attended. It was splendid to expose the Cambridge scientific community to the rising numbers of first rate women mathematicians. This may lead to some understanding that there is a growing number of outstanding female scientists and mathematicians in this country, of which the excellent group of speakers are a good sample.

MIT has a poor record integrating women mathematicians into its faculty. While commenting that neither MIT nor Harvard have even one tenured woman math professor, the Boston Globe quoted an MIT math professor as saying "It's unfortunate, and something we are working to correct." One wonders what makes their work so slow and unyielding, while a growing number of women mathematicians gain recognition from their achievements.

It is hard to believe that the leading mathematicians in these departments need the imprimatur of other groups or of rival universities to recognize mathematical excellence. Thus there is every reason to expect that they will hasten to incorporate outstanding women colleagues into their ranks.

International Congress of Mathematicians

The ICM'94 will meet in Zurich from 3–11 August 1994. It will be an historical event for women since, for the first time in the history of

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MATHEMATICS

The Association was founded in 1971 in Boston, MA. The purpose of the association is to encourage women to study and to have active careers in the mathematical sciences. Equal opportunity and the equal treatment of women in the mathematical sciences are promoted.
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such meetings (the first ICM took place, also in Zurich, in 1874), there will be *two* women giving Plenary Addresses. In fact, Emmy Noether had been the only woman plenary speaker (in 1932) until Karen Uhlenbeck presented her lecture in Kyoto at the last Congress four years ago.

This year the honor will be shared by Ingrid Daubechies (Princeton) and Marina Ratner (Stanford). We congratulate them on this mark of recognition.

Our congratulations extend to the eight other women who will deliver Invited Addresses. They are Fan Chung (Bellcore) in Combinatorics, Deborah Hughes-Hallett (Arizona) in Teaching and Popularization of Mathematics, Frances Kirwan (Oxford, UK) in Geometry, Joyce McLaughlin (Rensselaer Polytechnic) in Applications of Mathematics in the Sciences, R. Parimala (Tata Institute, Bombay) in Algebra, Karen Parshall (Virginia) in History of Mathematics, Bernadette Perrin-Rioux (Université Pierre et Marie Curie, Paris) in Number Theory, Claire Voisin (CRNS, Orsay, France) in Algebraic Geometry, and Lai-Sang Young (UCLA) in ODE and Dynamical Systems.

While we rejoice in the increased number of women, I have to mention that these ten women are among 152 invited speakers. In nine of the sections (Logic, Topology, Lie Groups and Representations, Real and Complex Analysis, Operator Algebras and Functional Analysis, Mathematical Physics, Probability and Statistics, Partial Differential Equations, Mathematical Aspects of Computer Science, and Numerical Analysis and Scientific Computing) representing major fields of mathematics, the organizing committee found no woman to invite. And, in those sections to which women have been invited, there is just one woman per section!

"Still their numbers seemed large mostly because there had been none only a few years before." The quote is from a recent newspaper article on how difficult it is for black female top models to make the cover of fashion magazines.... And yes, it fits well.

Royal Society

Congratulations to Dusa McDuff (SUNY at Stony Brook), who becomes the second woman in history (the first was Dame Mary Cartwright) to be elected a Fellow of the Royal Society.

AAAS Meeting

We attended several meetings in the last few months. Of special interest was the annual meeting of the American Association for the Advancement of Science (AAAS), the umbrella organization of scientific societies that AWM joined last year. AWM representatives to the sections of Mathematics and Statistics are former Presidents Alice Schafer and Mary Gray, respectively. Alice is also a member of the AAAS Council, and Mary chairs its Advisory Committee on Human Rights.

There were several special sessions of interest to mathematicians, and also some on women in science. AWM hopes to

participate with a special session in the 1995 annual meeting in Atlanta.

AWM Attended Other Meetings

The National Science Foundation hosted a large conference in Washington, DC called "Building the system: Making science education work." More than a thousand educators and education administrators (from K to 12 to colleges and universities, and from all over the country) participated in two days of workshops and demonstrations. Some of the demonstrations, involving advanced technologies, were very impressive. Congressman George Brown, Chairman of the Committee on Science, Space and Technology of the U.S. House of Representatives, gave a major speech as the keynote address. It is good to provide teachers at all levels with the opportunity to meet with others and learn about their experiences. It is not clear, however, how much can be achieved that way.

On a smaller scale, the University of Maryland hosted an Equity Conference, under the title "Gender and Ethnicity at Universities." It was a one day event, attended also by participants from other colleges in the area.

Science Magazine Features Women in Science

For the third consecutive year *Science* magazine — the weekly journal of the AAAS — has an issue (vol. 263, pp. 1345–1532, 11 March 1994) devoted mostly to Women in Science. This year the main theme is "Comparisons across cultures."

The fact that the most influential American journal in science highlights the importance of incorporating women into science is certainly encouraging. *Science*, although widely popular among experimental scientists, is usually not read by mathematicians. Still most of you will have it readily available at any nearby library.

Personally I find some of the explanations advanced there for the disparity among women's places in the scientific establishments of different countries highly debatable. But although I hope to enter that debate, we will gain by discussing the material presented in *Science*.

Furthermore I recommend reading and discussing the article by Mildred Dresselhaus et al. on "Interventions to Increase the Participation of Women in Physics" (pp. 1392–1393). The program they describe, if fruitful, should have bearing on mathematics. I know that some of us have misgivings about the effectiveness of programs of that type — so I invite debate on what is to be done.

There is also an interesting review section "Women in Science: Some books of the year," featuring, among others, a volume in the series edited by Ann Hibner Koblitz, *A Matter of Choices*, the memoirs of the physicist Fay Ajzenberg-Selove. Both the book and Ann's foreword are recommended reading for all of us.

Some may remember that the treatment of women in mathematics in the 1992 *Science* women in science issue was not well received by a number of us. There is almost no mention of women mathematicians in the 1993 and 1994 issues. Why this is so may be a matter of speculation. But certainly the question interests us. Our collective experience is important, and to discuss it outside our usual circles may well serve both the interest of women and of mathematics. *Science* magazine may be a prime place for such a discussion.

Good Financial News

The Exxon Education Foundation renewed its grant to AWM. Last year, the Exxon grant made a great difference to us. We appreciate their support and plan to put the money to good use!

New Staff Member

The more we do, the more needs to be done. In order to fulfill our many duties, we have hired a new part-time employee. Her name is Angie Beach, she is simply wonderful, and you will meet her either by telephone if you happen to call the office, or in person if you visit Maryland.

Coming Workshops for Female Graduate Students and Postdocs

Three important events geared toward young people are coming.

In the second half of May, the Women's Program in Gauge Theory and Geometry, directed to both undergraduate and graduate students, will be held at the Institute for Advanced Study in Princeton. It is organized by Karen Uhlenbeck (Texas at Austin and Research Director of PCIAS) and Chuu-Lian Terng (Northeastern and AWM President-Elect) in preparation for the Park City/IAS Summer Institute.

MEMBERSHIP AND NEWSLETTER INFORMATION

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Affiliate: $250
Corporate: $150

Subscriptions and back orders

All members except family members receive a subscription to the newsletter as a privilege of membership. Libraries, women's studies centers, non-mathematics departments, etc., may purchase a subscription for $40/year ($48 foreign). Back orders are $6/issue plus shipping/handling ($5 minimum per order).

Payment

Payment is by check (drawn on a check with a U.S. branch), U.S. money order, or international postal order. Cash payment will be accepted if necessary, but only in U.S. currency.

Ad information

AWM will accept advertisements for the *Newsletter* for positions available, programs in any of the mathematical sciences, professional activities and opportunities of interest to the AWM membership and other appropriate subjects. The Executive Director, in consultation with the President and the Newsletter Editor when necessary, will determine whether a proposed ad is acceptable under these guidelines. *All institutions and programs advertising in the newsletter must be Affirmative Action/Equal Opportunity designated.* Institutional members receive two free basic ads as a privilege of membership. For non-members, the rate is $60 for a basic ad (eight lines of type). Additional lines are $6 each.

Deadlines

Editorial: 24th of January, March, May, July, September, November
Ad: 1st of February, April, June, August, October, December

Addresses

Send all **Newsletter** material **except ads and book review material** to Anne Leggett, Department of Mathematical Sciences, Loyola University, 6525 N. Sheridan Road, Chicago, IL 60626; phone: (312) 508-3554; email: leggett@math.luc.edu; FAX: (312) 508-3514. Send all material regarding **book reviews** to Cathy Kessel, 2520 Etna, Berkeley, CA 94704; email: kessel@soe.berkeley.edu. Send everything else, **including ads and address changes**, to Dawn V. Wheeler, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461; phone: (301) 405-7892; email: awm@math.umd.edu.

The AWM Workshop for graduate students and postdocs in applied mathematics will take place at the annual SIAM meeting in San Diego in July, organized by Dianne O'Leary (Computer Science, Maryland).

The workshop on Women in Probability, organized by Ruth Williams (UC San Diego) and Molly Hahn, will take place at the MSI at Cornell University in October. The invited speakers are a very good group of women probabilists, and it will provide an excellent opportunity for postdocs and graduate students to interact with them.

These activities have been advertised in this *Newsletter* and/or in the new — and very useful — AWM-Net. I hope many young people will take advantage of these wonderful opportunities!

And, as the end of an unusually severe Winter is finally here, and the teacher's schedules are crowded with end-of-year commitments, I wish you all a productive and sunny Spring!

Cora Sadosky
Washington, DC
30 March, 1994

PATHWAYS FOR WOMEN

Pathways for Women in the Sciences: The Wellesley Report Part I, published by the Wellesley College Center for Research on Women, reports on the first phase of a study funded by the Sloan Foundation addressing why women choose to enter scientific fields and what promotes or impedes their success. Readers are invited to respond to the report and offer suggestions for the next phase. *Pathways* is available for $20 from the Center for Research on Women, Publications Department, Wellesley College, Wellesley, MA 02181-8259, (617) 283-5000.

LIPMAN BERS (1914–1993)

Lipman Bers died on October 30, 1993 after a long illness. He will be remembered by a great number of people including many AWM members. During his long career he made important contributions both as a scientist, as a teacher and as a leader of the professional community. His mathematical interests were broad and had deep impact. He was a great teacher; he had 48 students, 16 of them women,[1] most of whom have gone on to a variety of productive careers as mathematicians, teachers and academic administrators.

Bers' mathematical activities were matched by his concern for people; he cared that the world he lived in was one in which people could live with dignity and freedom, and he cared dearly for the people he lived and worked with.

My purpose here is to try to convey some sense of him as the teacher I had and as the man I knew.

Lipman Bers was born in Riga, Latvia, into a Jewish intellectual family. His father was an engineer and his mother a psychologist. As a teenager he fell in love with his schoolmate Mary Kagan who would become his wife and lifelong companion. During his student years in Latvia, his social conscience brought him into politics. These activities got him into trouble with the Latvian government, and a warrant was issued for his arrest. He escaped from Riga and went to Prague where he decided to study mathematics. He wrote his thesis with the complex analyst Karl Loewner and received his Ph. D. in 1937. By this time, Mary had joined him in Prague. Together they made a well timed move, this time to Paris, just before the Munich Pact was signed in 1938. Prescience and luck were with them again, for they managed to leave Paris with their small daughter just ahead of the occupying forces. They were able to get to Lisbon where they obtained visas for the United States.

In the U.S., Bers' first job was at Brown University. Brown at this time hired many refugees and exploited them egregiously. He had his first students here.

After the war, he moved to Syracuse University where Loewner also had a position. It was here that he had his first woman student. After a visit to the Institute for Advanced Studies in Princeton in the early 50's, he accepted a position at New York University. During this phase of his career, Bers had been working in partial differential equations and developed the theory of pseudo-analytic functions to study subsonic flows. He had many problems for students and took on a disproportionately large share.

In the late 1950's, Bers became aware of quasiconformal mappings, and his mathematics took off in a new and exciting direction. He collaborated with Lars Ahlfors, and together they applied the techniques of quasiconformal mappings to breathe new life into the classification theory for Riemann surfaces, now dubbed Teichmüller theory.[2] This was a fertile area for students, and most of his students from this time on worked in this field.

Bers was particularly special as a mentor and teacher. He loved having students and particularly enjoyed having women students. When Bers came to NYU, it was, under the influence of Courant, already a relatively friendly place for women. Bers made it much more so. When I arrived as a graduate student in 1960, he was graduate director and he worked at recruiting good students of both sexes. Probably since it is an urban university, a comparatively large number of women students applied to NYU, and Bers enticed many of them to work with him. He did this by advising us to take his courses, based on his current work, and then giving clear and elegant lectures, spiced with his own brand of humor. He tempted us further with his warm and personal style. Every Friday was "children's lunch"; all his students and whatever other faculty wanted to come would have lunch together somewhere near NYU. He invited us home to meet Mary, took an interest in our families and found appropriate problems for us to work on. During the four years I spent in graduate school, Bers had about ten thesis students.

During the 50's and 60's there was a large market for mathematicians and the "old boy's network" functioned very well. Often it took only a phone call or two for Bers to find a job for a student. There were students of his and others, especially in the 50's, however, who had a great deal of trouble getting jobs because of the McCarthyite atmosphere. Bers worked particularly hard to find positions for these people and usually succeeded.

In 1964 he moved uptown to Columbia where he continued to lure students into his "mathematical family." He had an active seminar, and those of his former students in the New York area, together with

Linda Keen, Lehman College, CUNY

Jozef Dodziuk, Linda Keen, Jonathan Brezin, Mary Bers,
Troels Jorgensen, Lipman Bers, William Abikoff, Joan Birman

Photos credited to: Katarzyna Gruda

Front row: Samuel Eilenberg, Lipman Bers, Mary Bers
Back row: Troels Jorgensen, William Abikoff, Jozef Dodziuk

his current students, were part of an inspiring and expanding enterprise. This was probably the only time in recent history that scientists were really appreciated in our society. There were jobs and support aplenty. The mood changed, however, as the Vietnam war grew. In 1968, during the student demonstrations at Columbia, Bers played an active role in supporting the students.

During his tenure at Columbia, he exerted both mathematical and professional leadership; he was chair of the department, President of the American Mathematical Society and a leader in the mathematics section at the National Academy. As chair of the National Academy Committee on Human Rights he fought for the rights of oppressed mathematicians whose politics covered the full spectrum from left to right. He organized petitions for jailed mathematicians and raised money. He helped emigrés find jobs and even in some cases helped find housing for them. He had never forgotten the help he had received as a political refugee and felt a strong responsibility to use such power and position as he had to help those who needed it.

It delighted Bers that, in the late 70's, new ideas and techniques from low dimensional topology were introduced into Teichmüller theory by Bill Thurston. He was also thrilled by Dennis Sullivan's adaptation of Teichmüller theory to complex dynamics. He immediately learned and extended these ideas to prove new and important theorems.

In 1984, at age 70, he retired from Columbia. He was not really ready to retire, so he accepted an appointment at the Graduate Center of CUNY where he spent the next five years. It was typical of his personal style and public role that he should have graced the faculties of all the major mathematics departments in New York.

Lipman Bers will be remembered, not only for the grace of his mathematical ideas but for the man he was. He had an uncanny ability to bring out the best in his students; he knew when to support, when to cajole and when to browbeat. He was proud of their accomplishments, whether they proved theorems, taught well or even became deans. He was a man of great integrity in his dealings with people. He was very well read and could always find an appropriate quote or joke. He was warm, funny and almost always on the mark in sizing up a situation. His passing is a great loss.

Notes

1. Bers women students: Elizabeth Ferentz, Dorothy Levy, Tilla Weinstein, Esther Phillips, Sondra Jaffe, Jacqueline Lewis, Linda Keen, Lesley Sibner, Vicki Chuckrow, Michele Linch, Jane Gilman, Judy Wason, Rubi Rodriguez, Noemi Halpern, Gita Resnicoff, Hannah Sandler

2. Bers had great admiration for Teichmüller's mathematics but despised him as an active Nazi leader who helped expel many mathematicians from Germany. In his paper "Quasiconformal mappings and Teichmüller's theorem," in *Analytic Functions*, Princeton, 1960, he states Teichmüller's theorem and footnotes it with a quote from Plutarch, " ... it does not of necessity follow that, if the work delights you with its grace, the one who wrought it is worthy of your esteem."

LETTER TO THE EDITOR

To the Editor:

Perhaps I could add a few remarks to the article by Susan Landau, "A study in complexity: universities and the two-body problem," reprinted in the March–April 1994 *Newsletter*. The problem is an important and increasingly common one, so a more open discussion is overdue.

Everyone who has been around the academic scene long enough is aware of a variety of outcomes to the two-body problem. Many of the women who got Ph.D.'s when I did (in the mid-sixties) married mathematicians who ended up in good research departments, while the women usually found jobs (if at all) in smaller teaching-oriented departments nearby. No one will ever know whether some of these women might, under better circumstances, have developed first-rate research careers. Of course, teaching undergraduates is also an excellent career if that's what you really want to concentrate on.

In what is probably a smaller number of cases, a spouse may get a better job than he or she would have merited just because of a university's desire to recruit the other spouse. My own department is frequently

under pressure to hire a spouse (without even advertising a position) in order to keep another department happy. The more qualified of the two is of course not always the male in these cases: I know of men as well as women who got an easy career ride this way.

While Susan Landau points out some creative possibilities for solving the two-body problem, she doesn't mention at all the group most heavily impacted by the problem: lesbians or gay men in committed relationships with other academics. No dean or department is likely to take any urgent steps to solve the problem in their case. In fact, it may be professionally suicidal for job candidates to mention that the problem exists at all when searching for a job in a socially conservative community, especially when institutions have a religious affiliation. So while we're discussing the issue, let's at least try to be inclusive.

James E. Humphreys, Mathematics & Statistics Department, University of Massachusetts, Amherst

A NOTE ON SISTER CELINE

In 1946 Sister Celine (Mary Celine Fasenmyer) successfully defended her thesis on recurrence relations for hypergeometric polynomial sequences at the University of Michigan. Her thesis was written under the direction of Earl Rainville and was on a topic in the theory of special functions. In the 1980's her work was rediscovered by Doron Zeilberger and forms a starting point of his research with Herbert S. Wilf on computer proofs of combinatorial identities. This current work and its origins were presented by Herb Wilf at the 1994 Florida meeting of the 25th Southeastern International Conference on Combinatorics, Graph Theory, and Computing, along with the surprise of the presence of Sister Celine in the audience — she is 87 years old and resides at the Sisters of Mercy Mother House in Erie, Penna. She spoke briefly of her work with Rainville, commenting, "But I did the work myself!" and was welcomed with warm applause.

Joan Hutchinson, Macalester College, hutchinson@macalstr.edu

Her work appears in "Some generalized hypergeometric polynomials," *Bull. Amer. Math. Soc.*, 53 (1947), 806–812; "A note on pure recurrence relations," *Amer. Math. Monthly*, 56 (1949), 14–17; and in Chapters 14 and 18 of E. D. Rainville's *Special Functions*, Macmillan, 1960. Its role in current research can be found in D. Zeilberger's "Sister Celine's technique and its generalizations," *J. Math. Anal. Appl.* 85 (1982), 114–115.

AGNESI VOLUME

A rare two-volume book by 18th century Italian mathematician Maria Gaetana Agnesi is the two-millionth volume selected for the Iowa State University Library. Agnesi's book, *Instituzioni Analitiche* (*Analytical Institutions*), looks at mathematical concepts that were new at the time it was published in 1748. The book won immediate acclaim in academic circles all over Europe and established Agnesi as the first female mathematician in the Western World.

The Agnesi work was purchased with a $20,000 gift from Evelyn Weber, a biochemist at the University of Illinois, Urbana. Weber received her doctorate from ISU in 1961 in biochemistry. Other books on early women in science have also been purchased for the library with Weber's gift.

In addition to its milestone significance to the ISU library system, Agnesi's work also complements Iowa State's new Archives of Women in Science and Engineering. Allied with Iowa State's Program for Women in Science and Engineering, the archives will document the lives, careers and contributions of women scientists and engineers.

During a public ceremony on April 16, the Iowa State community celebrated the addition of its two-millionth library volume and inaugurate the new archives. The program included remarks from ISU President Martin Jischke and others. The archives is interested in collecting the personal papers of individual women — diaries, photographs, correspondence, research notes, unpublished papers and memoranda. It also is interested in the records of women's organizations in engineering and the other sciences. The women do not need to be famous or celebrated for the materials to have significance.

MYTHS ABOUT THE ROLE OF MARITAL STATUS IN CAREER ADVANCEMENT

Over the years there have been numerous articles, including many in the AWM *Newsletter*, which discuss dual-career couples, child-care, and other problems associated with combining a career with a traditional married family-oriented life-style. These very real problems are easily articulated, but they are not unique to mathematics or science. On the contrary, many positions in the sciences offer greater flexibility than other demanding careers such as law and medicine. Individuals, institutions, government and society can, and should, play a part in enabling women (and men) to combine the career and life-style of their choice. Unfortunately, much of the discussion of this subject leaves the impression that single people have no problems.

Indeed, Susan Landau[1] recently stated that "[i]n limiting [her] discussion to university responses ... [she] does not mean to diminish the difficulties faced by other types of dual-career couples." Her article does, however, appear to diminish the difficulties faced by single women. Near the end, she characterizes "single wage earners" as having the "perfect flexibility to change jobs several times ... " and concludes with "[t]he message we should be getting across ... is that being a scientist does not mean forswearing a life."

Let me assure you that single and/or childless women *do have lives*! Moreover, our personal lives can affect, and be affected by, our career choices and job locations.[2] Anecdotes, such as those Landau cites, in which department chairs use dual career status as an excuse for not hiring or recruiting women are commonplace. And while she may be correct that this is rarely done in "bad faith," neither are single women being swamped by offers from these same universities. On the contrary, the limited statistics available actually suggest that single women have even *more* difficulty[3, 4] with some aspects of career advancement!

For example, one study[5] looked at the percentage of 1970–74 Ph.D.'s who were tenured by 1979. The results were 66% for married men with children, 53% for single men, 51% for married men without children, 51% for married women with children, 41% for married women without children, and only 37% for single women without children. (For single parents, the rates were 80% for men vs. 33% for women, but these are probably very small samples.) There are many notorious cases of prominent women (Mary Ellen Rudin, Julia Robinson, Maria Goeppert Mayer) who were denied "regular" positions for many years because of nepotism rules. Nevertheless, these women did have "irregular" (often unpaid) positions which gave them the opportunity to do the research for which they are now known. By contrast, Emmy Noether, although widely acknowledged as a world-class mathematician, could only obtain a temporary position at Bryn Mawr when she left Germany.[6] Before about 1970, single women rarely got the jobs at the top research institutions from which married women were barred by nepotism; instead, they were (and often still are) relegated to four-year (especially women's) colleges[7] where they were expected to play the role of dedicated teacher with little regard for the limited research opportunities such positions provided. But lest this degenerate into an argument about "who was worse off," let me emphasize that my point is that sex discrimination was, and remains, pervasive regardless of life style. The issue is equity, not marital or family status.

Most scientists now reject the myth that people can be linearly ordered by merit. Even those who claim that departments hire primarily on the basis of merit will admit that other factors, such as subspecialty or teaching ability, often play a role. So I agree that there may be situations in which recruiting a couple may be appropriate. However, I do think we must use caution in advocating hiring practices which might appear to introduce extraneous factors or de-emphasize merit. Consider the following hypothetical example. Suppose that a department has two positions and there is a consensus that the relative scientific merits of the three top candidates are A > C > B. However, A and B are married to each other, while C is single (or, at least, C's job situation is decoupled from marital status). Which two should be hired? Does it matter if the sexes of (A, B, C) are (M, F, M), (F, M, M), (M, F, F), or (F, M, F)? Or even one of the other four possibilities?

Mary Beth Ruskai, University of Massachusetts, Lowell

One myth that is a half-truth is that many single women are reluctant to take positions in isolated small towns (in which so many colleges and universities are located). Based upon my own experience and acquaintances, I believe this perception is correct, but that it is *not* related to the availability of, or lack of, single men. People who really want to get married seem to find each other, even in the most unlikely places (irrespective of adolescent dating traumas or popularity). Those of us who have reached the age of 40 without marrying are not only unlikely to do so; many of us find the prospect of marriage more terrifying than being on a hijacked plane (to invert a widely-publicized statistical assertion).

While there are exceptions and individual variations, many single women do find themselves so excluded from the couple-oriented social life in small towns that it is difficult to "have a life" in the absence of the alternatives offered by an urban center. The following true stories are depressingly typical. At the start of her second year, one woman found herself among a group being told by the department chair that the family of one of their new hires would not be able to join him until the second semester. The chair then urged the other faculty to "invite him to dinner often since he would be here all alone." This woman pointed out that she had been "all alone" for over a year without being invited to dinner. A few weeks later, the chair invited her and the other single woman in his department to dinner, thus fulfilling the department's social obligation for the year. Another woman told me that she spent one year in a college town while in a "commuting relationship." She and her partner were frequently invited to dinner on the alternate weekends when he visited, but *not* in the much longer time periods when she was there alone. Departments in small towns may well have difficulty recruiting single women, but the things they might do to *retain* them should be obvious.

My purpose in writing this is not to criticize, or even respond to, Landau's thoughtful article. Rather, it prompted me to put on paper (via my computer disk) some things which I have long felt needed to be said. A few years ago , during a VPW meeting at NSF we broke into groups to discuss "combining a career and family." Because those in my group had spent a good part of their career without partners, most of our discussion focused on the problems of single women, including some of the anecdotes recounted above. However, at the end, the coordinator insisted that we return to the assigned theme of career and family, and only this aspect was reported on. Another group included an openly lesbian woman, who made a separate statement about her dual-career experiences without any indication of support from the group spokesperson.

Most of us believe that career advancement should be based upon merit, even though we also recognize that there is too much subjectivity to make pure merit anything but an idealistic goal, and that other factors can play a legitimate role. But we should also remember that much of the sex discrimination of the past (especially differential pay scales)[8] was based upon a societal belief in the desirability of a traditional family life-style. It is a very small step to replace that by a more enlightened and accommodating attitude toward dual-career couples. Real progress will come when all of us have the opportunity to follow whatever career path we choose irrespective of sex, marital status, family obligations, race, ethnicity, etc.

Notes

1. S. Landau, "A Study in Complexity: Universities and the Two-body Problem," Computer Research Assoc. *Newsletter*, reprinted in AWM *Newsletter* 24, 13–15 (Mar.–Apr., 1994).
2. M. Murray, "Is Geography Destiny? One Perspective," AWM *Newsletter* 23, 10–11 (May–June, 1993).
3. L. Billard, "The Past, Present and Future of Academic Women in the Mathematical Sciences," AMS *Notices* 38, 707–714 (Sept., 1991).
4. On one occasion I even observed a hiring committee's bias against a single man. There were two (male) candidates for one position. Scientifically, X was much, much better than Y, but Y was also good and had some strong supporters pushing his case. Both candidates had positions (or offers) at better universities elsewhere but had personal reasons for preferring the Boston area. When it was reported that Y had a girl friend in Boston, it was not only accepted but increased his support. However, X, who was single, was regarded with a suspicious "if he's really so good why does he want to come here?" Subsequently, offensive remarks were made about X's marital status during his interview, and Y eventually got the position!
5. N.F. Ahem and E.L. Scott, *Career Outcomes in a Matched Sample of Men and Women Ph.D.'s: An Analytical Report* (National Academy Press, Washington, DC, 1981) as cited in Ref. 3.
6. Her only other offer was a similar position in England.
7. For example, among those who received their Ph.D. in mathematics in 1988–93, 15% of women vs. 10% of men took their first position in a Bachelor's institution. In 1992, about 46% of both tenured and untenured women mathematics faculty had positions in four-year colleges, vs. only

28% of tenured and 33% of untenured men. That women are disproportionately located in four-year colleges is not an artifact of past employment practices, but a continuing phenomenon. This data was compiled from the Annual AMS-IMS-MAA Surveys as reported in the AMS *Notices*, e.g. 40, 1165, Table 3B (Nov. 1993) and 40, 601, Tables 2B, 3C & 3D (July/Aug. 1993). These comments should not be misconstrued as demeaning the rewarding career opportunities at four-year colleges; the point is that the opportunities for women at top research institutions are still very limited and both choices should be available to all women.

8. Some years ago a friend showed me a stack of very old *Life* magazines, one of which had two fascinating items. The first was a full page ad showing a porch with an empty rocking chair and the large caption "Aunt Emma doesn't stay here any more." What was being advertised? The fine print explained "She's a modern woman. She drives an automobile...." The other was a letter about the dearth of male teachers in K–12. The writer asserted that the problem arose because men couldn't possibly support a family on a teacher's salary, but whenever school boards tried to pay them more, the single women insisted on equal pay — a position he clearly regarded as placing unreasonable demands on local school budgets.

MATHEMATICS AWARENESS WEEK

"Mathematics and Medicine" was the theme for Mathematics Awareness Week this year, April 24–30. The theme was chosen to highlight the critical involvement of the mathematical and computational sciences in mathematical biology and in developing new technologies and decision making tools in medicine.

A number of areas of medicine rely heavily on mathematics: reconstructive mathematical techniques that build medical images through computerized axial tomography (CAT), magnetic resonance imaging (MRI), or positron emission tomography (PET); new drugs that are being designed through the development of mathematical algorithms that support building computational models of molecular structures; the prediction of heart attacks that is being explored through nonlinear dynamics; and blood flow and the motion of heart walls that are being assessed through fluid flow dynamics.

This year's MAW poster, produced by the Computer Graphics Laboratory, University of California, San Francisco, displays two computer-generated views of tenfold B form DNA. The DNA is examined using techniques of topology and differential geometry, as well as computer simulation.

AWM has contributed to MAW in two ways. We were a sponsor of a session organized by Denise Kirschner for the First World Congress on Computational Medicine, Public Health, and Biotechnology held at the University of Texas, Austin during that week. Also, Sally Lipsey's article "Mathematical Education in the Life of Florence Nightingale," which appeared in this *Newsletter*, July-August 1993, pp. 11-12, was included in the MAW information packet distributed widely by the Joint Policy Board for Mathematics. In that article, Lipsey noted that "although [Nightingale's] nursing ability was very remarkable and greatly appreciated, her long-lasting effectiveness can be ascribed more to her creative use of mathematics and statistics than to her nursing ability."

WOULD YOUR DEPARTMENT LIKE TO OPERATE A PROGRAM TO BRING MORE WOMEN INTO MATHEMATICS?

With support from the National Science Foundation (NSF), Mills College will hold a conference at the University of California at Berkeley, July 14–16, 1994, to bring together people interested in developing projects to increase the flow of women into graduate programs in the mathematical sciences. Some funds are available to help defray travel cost for eight to ten conference participants. Mills College will operate one such project for the fourth summer, in 1994. The NSF has encouraged us to find other institutions wishing to develop related projects beginning in 1995. Out of this conference will come a proposal to the NSF for funding projects at more than one institution. Interested individuals should contact Leon Henkin by sending e-mail to kathyg@mills.edu or by telephoning (510) 430-2227. Please discuss the matter with colleagues and your department chair before phoning.

GENDER DIFFERENCES IN BEHAVIOR AND ACHIEVEMENT:
A TRUE EXPERIMENT INVOLVING RANDOM ASSIGNMENT TO SINGLE SEX AND COEDUCATIONAL ADVANCED PLACEMENT (BC) CALCULUS CLASSES

Study Objectives

The objective of this study was to examine how gender differences in students' perceptions of themselves as learners of mathematics and classroom interaction patterns correlate with achievement in the high school calculus classroom. The study was conducted at Hunter College High School, a publicly funded school for academically gifted students in New York City. For the academic years 1988–1989 and 1989–1990 (years 1 and 2, respectively), students who elected Advanced Placement BC Calculus, the highest level mathematics course generally offered on the high school level, were randomly assigned to experimental single sex or traditional mixed gender classes. The uniqueness and importance of the study lies in this random assignment to classes following identical curriculum strategies and plans.

Student Assignment to Classes

In year 1, 35 girls and 50 boys were programmed at random to one of four calculus classes. In addition, 17 girls in the Advanced Placement BC Calculus class at the Brearley school participated in the study. Brearley is an independent all girls' school with an academically strong student body, located near Hunter in New York City. In year 2, 36 girls and 48 boys at Hunter were assigned to one of four calculus classes. The same two teachers instructed the classes at Hunter for the two years of the study. One teacher (teacher B) taught one of the all boys' classes in the 1988–1989 academic year and the all boy's class in 1989–1990, with the remaining six classes at Hunter taught by the other instructor (teacher A). Table 1 summarizes the breakdown by teacher and gender of the study participants.

Overview of Each Project Year

In the pre-experimental phase, a calculus readiness test was given to all participants at the end of the precalculus year to assess past mathematics achievement, each participant's PSAT-M and SAT-M scores were averaged to assess mathematics aptitude, an attitude questionnaire was given to all participants at the end of the precalculus year to assess individual self-concept with regard to mathematics and the mathematics classroom experience, and random assignment to single-sex or coed classes was done, within the limitations of the school's schedule.

During the experimental phase, teacher given exams were created to be as identical as possible across participating classes; a calculus class-year average was then computed as an outcome measure. Fourteen twenty-minute observations were performed each year in each class. Student interviews and videotaping were performed to explore subjects' experiences in their respective calculus classes. The videotaping of classes was performed approximately six times per year in each class to provide further anecdotal data.

In the post-experimental phase, the attitude questionnaire was given to each participant at the end of the calculus year to assess again individual self-concept with regard to mathematics and the mathematics classroom experience. The Advanced Placement BC Calculus Exam, the standardized exam in calculus given nationally by the College Board and Educational Testing Service to students who have completed the course curriculum, was used as an outcome measure for calculus achievement.

Background Variables for Mathematics Achievement

Though the assignment to the different gender type classes was random within the structure of the school's schedule, measures were utilized to assess comparability of groups. Permission was given by the Mathematics Association of American to administer to study participants the Calculus Readiness Test (CRT), one of the exams in its Placement Test Program. On this 25-item multiple choice exam, a student earns one point for each correct response and is not penalized for guessing. The

Shiela M. Strauss and Rena F. Subotnik, Hunter College Campus Schools and Hunter College; from a final report to the NSF

CRT, designed for college placement in math courses, was employed in this study to measure past mathematics achievement as it related to calculus readiness. As a second measure of calculus background comparability, an average of each student's PSAT-M and SAT-M (SAT-math) was used to assess mathematics aptitude.

In subsequent analyses, CRT and SATmath scores are used as control variables, so as to adjust for the possible initial incomparability of groups.

Table 1: Study Participants

year	school	teacher	class	n (girls)	n (boys)
1	Hunter	A	all girls	20	0
1	Hunter	A	coed	15	13
1	Hunter	A	all boys	0	15
1	Hunter	B	all boys	0	22
1	Brearley	C	all girls	17	0
2	Hunter	A	all girls	19	0
2	Hunter	A	coed	9	9
2	Hunter	A	coed	8	15
2	Hunter	B	all boys	0	24

Analysis Structure

Analyses were conducted using four "gender groups" at Hunter: males in single sex classes, males in coed classes, females in single classes, and females in coed classes. For the 1988–1989 academic year (year 1), an additional "gender group" was added to represent the Brearley class. At Hunter, gender differences were also explored by collapsing both groups of boys and both groups of Hunter girls.

ACHIEVEMENT RESULTS

Adjustments for Initial Differences at Hunter

At Hunter, gender and gender group differences were analyzed for "year average," the average of teacher given classroom tests during the two semesters of the calculus course. A second analysis for gender and gender group differences in calculus year average was performed after each student's average was statistically adjusted to account for initial differences in mathematics achievement and aptitude as measured by CRT and SATmath. Charts 1 and 2 depict initial differences in these background characteristics for the study participants, both by gender and gender group. As can be seen from the charts, boys significantly outperformed their female peers on both background variables. Statistically significant differences among the gender groups reveal that the girls in the all female classes scored lower on the CRT than did the males in the all male classes and that these same girls scored significantly lower than both groups of boys on SATmath. No other statistically significant differences occurred concerning the other gender groups.

Chart 1: Average Calculus Readiness Test Scores
(standard deviations shown in parentheses)

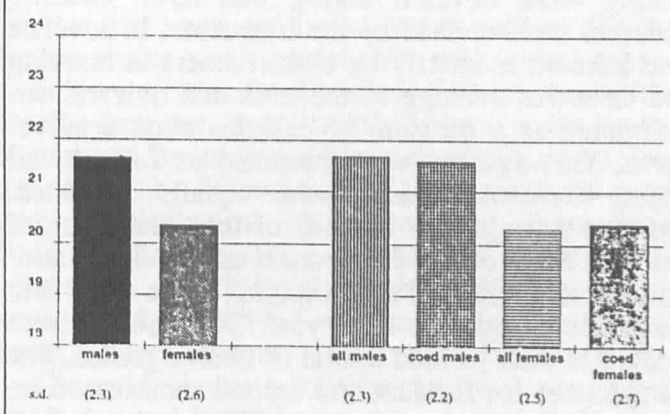
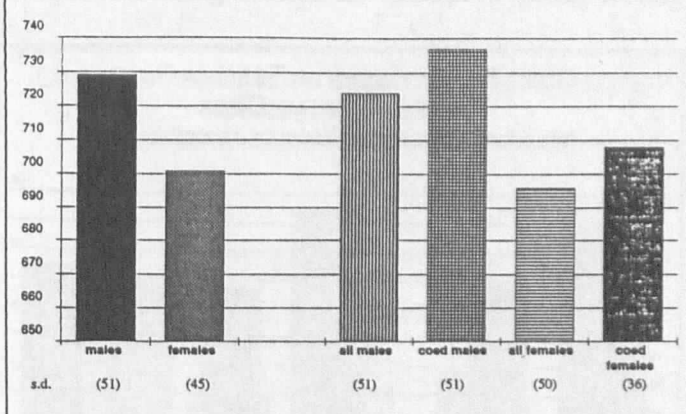


Chart 2: Average SATmath Scores
(standard deviations shown in parentheses)

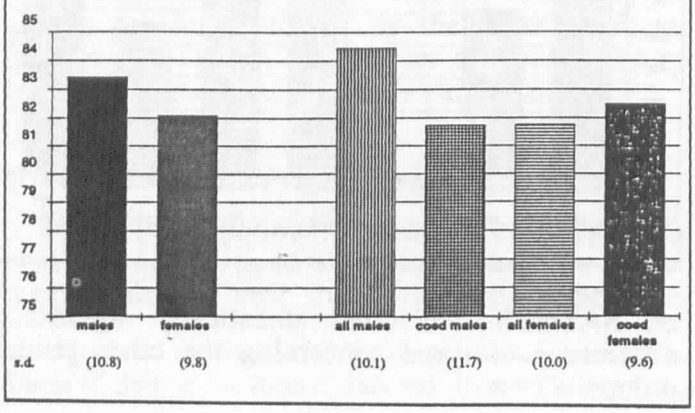


Averages on Teacher Given Tests in Calculus Class at Hunter

The two calculus teachers at Hunter worked closely and consistently to assure virtually identical curriculum content. All exams and quizzes were given on the same day and with identical instructions to all students. A total of eight 40-minute exams, approximately one per month, were administered each year in each class. In the weeks during which there was no exam, one 15-minute quiz was given on recently covered course material. At the end of the first semester, an 80-minute final exam was administered to test the coursework covered during that semester. An optional 80-minute final exam was given at the end of the second semester testing work covered during that term. Grading schemes were created by the instructors in advance and adhered to strictly by both teachers in marking the tests. An average of the tests and quizzes was computed as a measure of calculus class achievement. This average was computed as follows: all eight 40-minute exams were equally weighted. Quizzes were graded in units of four: the mean of the best three out of four consecutive quizzes constituted an additional exam grade. There were four such sets of quizzes each year. Thus, the quizzes and class tests yielded a total of twelve grades. The final exams for the first and second semesters were each weighted as two exams. The optional final exam for the second semester was only credited if it served to improve a student's average; this occurred for about 25% of the students.

Chart 3A shows a comparison by gender and gender group at Hunter on teacher given test scores.

Chart 3A: Averages on Teacher Given Tests in Calculus Class
(standard deviations shown in parentheses)

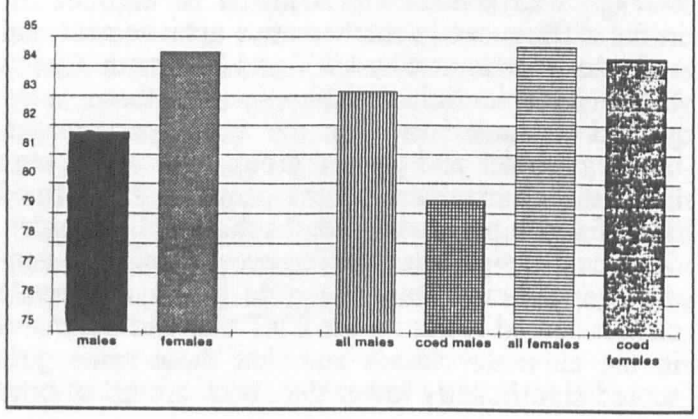


There were no significant differences on this measure. Chart 3B presents the significant results on calculus test year average when initial differences in mathematics achievement and aptitude are taken into account. Analysis shows that *girls* had *higher* adjusted class averages than did their male peers. In particular, girls in the all female classes had significantly higher adjusted class grades than did the boys in the coed classes. There were no other statistically significant differences between the gender groups. The residual standard deviations of the adjusted calculus class averages for the gender and gender group analyses were each 8.2.

Adjustments for Initial Differences during Year 1 at Hunter and Brearley

Hunter students may elect Advanced Placement BC Calculus after completing the eleventh grade math course. Though math department approval is required for registration in the course, enrollment is effectively a student self-selective process. At Brearley, almost all students enroll in calculus during their senior year. The three heterogeneous calculus classes created in September remain intact through November, at which point the classes are reorganized. About one third of the highest achieving calculus students are invited to enter an Advanced Placement BC Calculus class, with the remaining students scheduled for the two less rigorous and less demanding AB Calculus classes. The present study included the Advanced Placement BC Calculus class at Brearley, whose students demonstrated excellence through their achievement in the first two months of calculus.

Chart 3B: Averages on Teacher Given Calculus Tests after Adjusting for Initial Differences in Calculus Readiness



For the year 1 participants, including both the Hunter and Brearley students, analyses of class achievement were conducted using the average of four common Hunter-Brearley class exams. A second analysis for gender group differences in this average of the four common exams was performed after each student's average was statistically adjusted to account for initial differences in mathematics achievement and aptitude as measured by CRT and SATmath. Charts 4 and 5 show initial differences in the background characteristics for the year 1 study participants. As the charts indicate, the Brearley class scored significantly higher on the CRT than did the group of girls in Hunter's year 1 all female class (Chart 4). This may, in part, be a reflection of the selection process for the Brearley Advanced Placement BC Calculus class. However, the Brearley students scored significantly lower than did each of the male groups at Hunter on SATmath (Chart 5). This latter result is consistent with a similar one at Hunter, where over the two years of the study, the girls in the all female classes scored significantly lower on SATmath than did either group of boys. No other statistically significant differences on these measures appeared among the gender groups in this population.

Hunter-Brearley Calculus Classroom Achievement Comparisons

The Brearley and Hunter teachers collaborated during the 1988–1989 academic year to administer four identical exams, two each semester, to all study participants. During the first semester, all students sat for an exam created for the Brearley class and for the first semester's final exam written for the Hunter students. All participants took a comprehensive exam written for Brearley students during the second semester, and a jointly written exam by the Hunter and Brearley teachers was administered near the end of the second term. All exams were given with identical time allocations and instructions. Grading schemes were created in advance and adhered to strictly by all teachers. All four exams were equally weighted and an average was computed for each student.

Chart 6A shows a comparison by gender group at Hunter and Brearley on the average of the four common Hunter and Brearley class exams. As can be seen from the chart, Brearley students scored significantly higher on this measure of common Hunter-Brearley achievement than did all gender groups at Hunter, except the group of males in the

Chart 4: Average Calculus Readiness Test Scores (1988–1989)
(standard deviations shown in parentheses)

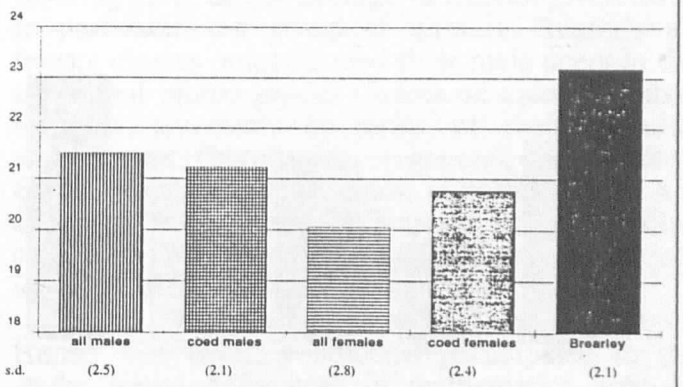


Chart 5: Average SATmath Scores (1988–1989)
(standard deviations shown in parentheses)

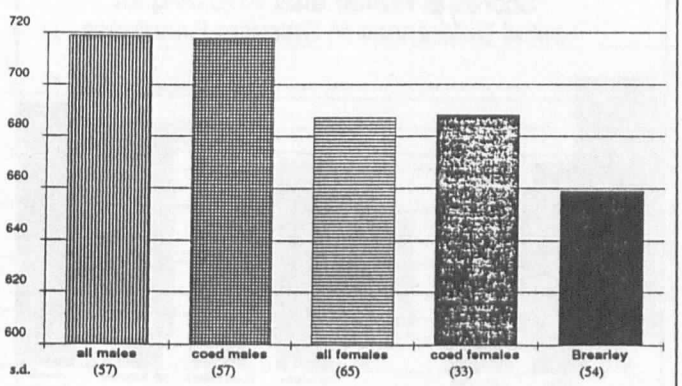


Chart 6A: Averages on Common Hunter-Brearley Tests (1988–1989)
(standard deviations shown in parentheses)

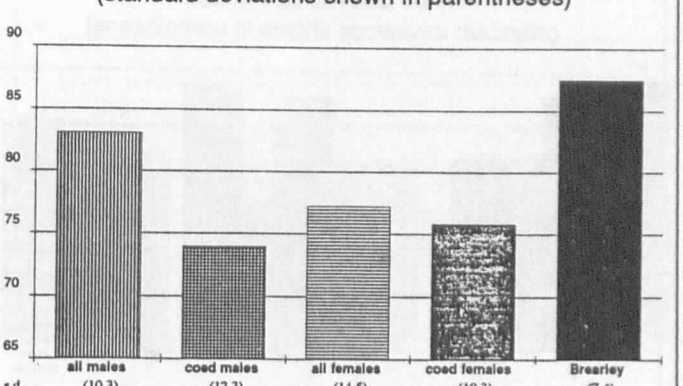
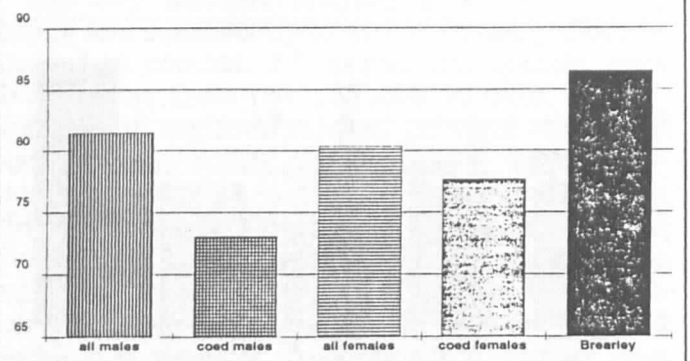


Chart 6B: Averages on the Common Hunter-Brearley Class Exams in Calculus after Adjusting for Initial Differences in Calculus Readiness



all male classes. No other statistically significant differences on this measure appeared among the gender groups in this population.

Chart 6B reveals that when initial differences in aptitude and achievement are taken into account statistically, the Brearley class and the all male group performed better on these common exams than did the boys in Hunter's coed class. No other statistically significant differences on this measure appeared among the gender groups in this population. The residual standard deviation of the adjusted common Hunter-Brearley exam averages was 8.6.

Advanced Placement Exam Scores

The Advanced Placement Examination in BC Calculus is a comprehensive three hour test which covers the entire course curriculum. The exam is composed of a multiple choice and a free response section, with each part equally weighted. A maximum of 54 points can be earned on each section, thus producing a possible perfect raw score of 108. Written and administered by the Educational Testing Service, students who have completed the course may sit for this exam, given annually in May. As the Advanced Placement program is nationally recognized for its excellence by our nation's colleges and universities, a high score on this exam may earn college placement and credit. Scores are traditionally reported to students and colleges as 1, 2, 3, 4, or 5, with a '5' often regarded as analogous to an 'A'. In each of the two years of the study, participants sat for the Advanced Placement exam in BC Calculus. For the purposes of more precise analysis, the Educational Testing Service released participating students' raw scores on the exam. These raw scores provided an additional outcome measure for achievement.

Results at Hunter

As can be seen from Chart 7A, there were no significant differences by gender or by gender group at Hunter on the achievement measure of AP raw scores.

After controlling for initial differences as measured by CRT and SATmath; no significant differences existed on the raw scores for the Advanced Placement BC Calculus exam among the genders or among the gender groups at Hunter during the two years of the study. These adjusted AP raw score results are presented in Chart 7B. The residual standard deviations of the Advanced Placement Exam raw scores were 14.9 for the male-female difference and 15.0 for the four gender groups.

Chart 7A: Averages on Advanced Placement Raw Scores at Hunter
(standard deviations shown in parentheses)

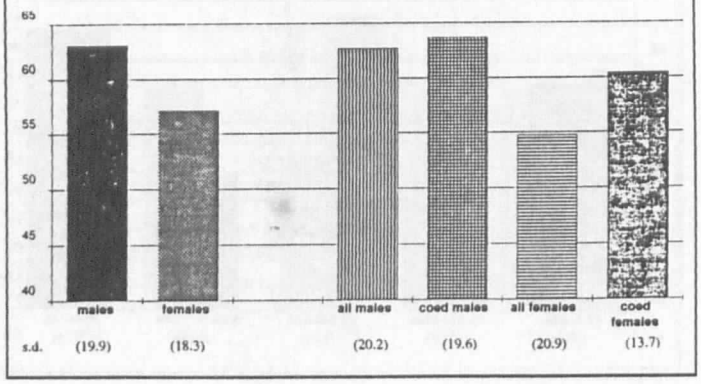
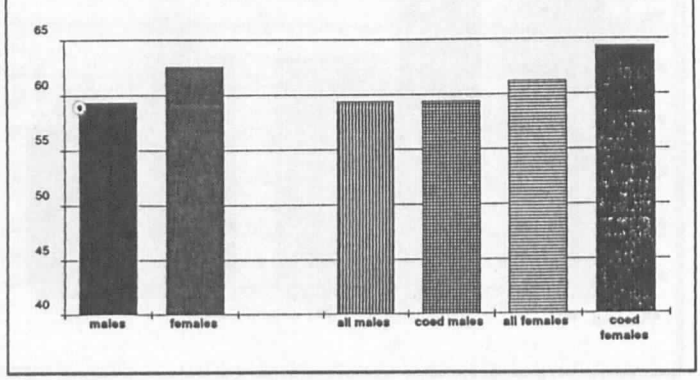


Chart 7B: Average Advanced Placement Exam Raw Scores at Hunter after Adjusting for Initial Differences in Calculus Readiness



Results at Hunter and Brearley (1988–1989)

Chart 8A shows that the Brearley students performed significantly better on the Advanced Placement exam in BC Calculus than did the group of girls in Hunter's all female year 1 class. No other significant differences existed on the Advanced Placement exam raw scores among the gender groups in this population.

Chart 8B indicates that after controlling for initial differences as measured by CRT and SAT math, no significant differences existed on the raw scores of the Advanced Placement BC Calculus exam among the year 1 study participants. The residual standard deviation was 13.5.

Summary of Achievement Analysis

Though students were assigned at random to the gender differentiated classes, initial differences existed in mathematics aptitude and achievement among both the genders and gender groups. For the two years of the study at Hunter, girls enrolled in Advanced Placement BC Calculus were weaker than their male peers on measures of mathematics aptitude and achievement. Those girls assigned to the all female class showed the lowest scores on these measures. Given the relative weakness of these girls in terms of their readiness for calculus, it is reassuring to note that on both the average of teacher given exams and on the standardized Advanced Placement, there were no statistically significant differences among the genders or the gender groups. In fact, when initial differences in mathematics achievement and aptitude are taken into account, though there were still no differences present among the genders or gender groups on the Advanced Placement exam, there was a difference, favoring girls, on the average of teacher given tests. In particular, the group of girls in Hunter's all female classes outperformed their male peers in the traditional mixed gender classes on calculus classroom achievement. In terms of their calculus achievement, Hunter girls, in general, and Hunter's experimental all female class, in particular, do not appear to have been handicapped in the calculus classroom by a weaker background and mathematics aptitude than those of Hunter boys.

For the 1988–1989 academic year, in which both Hunter and Brearley students participated in the study, initial differences in mathematics aptitude and achievement were again present. In this population, Brearley students showed themselves to be superior to Hunter's experimental all female class on past mathematics achievement, but this same group of Brearley students were weaker than each gender group of Hunter boys in mathematics aptitude. As noted earlier, the selection process for Brearley's Advanced Placement BC Calculus class, based on early calculus achievement, may account for the high mathematics achievement scores at Brearley. Overall, Brearley students showed classwork results superior to those of the boys in Hunter's coed class. In addition, the Brearley class outperformed Hunter's all female experimental class in both calculus classwork and on the standardized Advanced Placement exam, but this difference disappears when initial mathematics achievement and aptitude are taken into account.

Chart 8A: Average Advanced Exam Raw Scores at Hunter and Brearley during Year 1
(standard deviations shown in parentheses)

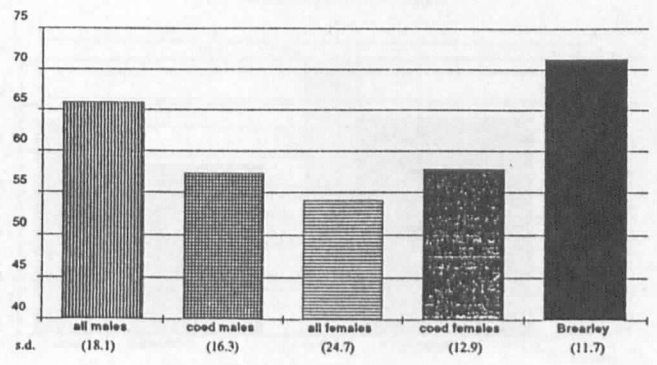
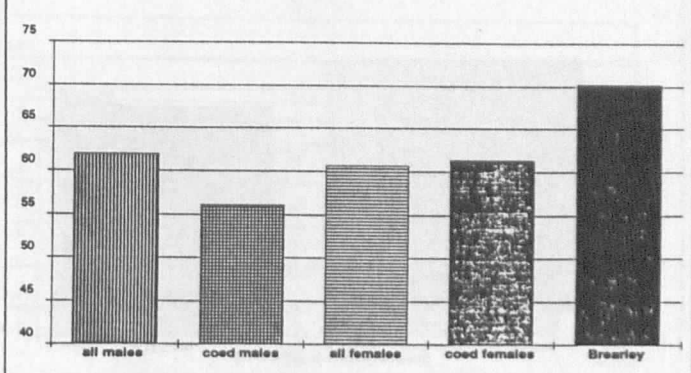


Chart 8B: Average Placement Exam Raw Scores at Hunter and Brearley after Adjusting for Initial Differences in Calculus Readiness (1988–1989)



QUESTIONNAIRE ANALYSIS

Analysis Structure

Before the calculus course, study participants completed an attitude questionnaire assessing their self-perceptions as mathematics learners and their mathematics classroom experiences. Participants completed this same questionnaire a year later at the end of the calculus course. The questionnaire analysis took into account the initial precalculus responses of the students. In this manner, significant differences in those attitudes and self-perceptions which were present at the end of the calculus class were examined. Thus, the differences reported below reflect only the statistically significant changes in attitude and self-perception among study participants which occurred over the course of the calculus year.

Analyses were again conducted using four "gender groups" at Hunter: males in single sex classes, males in coed classes, females in single sex classes, and females in coed classes. For the 1988–1989 academic year, an additional "gender group" was added to represent the Brearley class. At Hunter, gender differences were also explore by collapsing both groups of boys and both groups of Hunter girls.

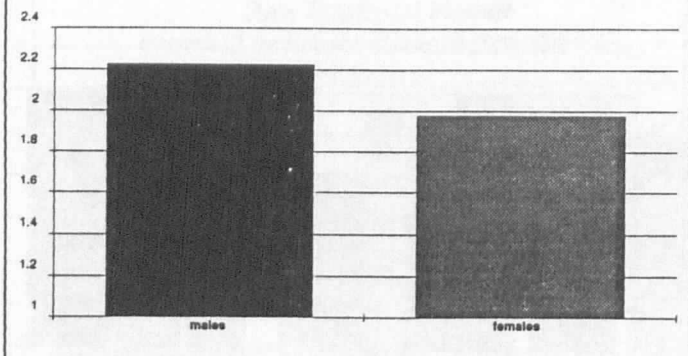
Gender and gender group differences emerge in the analysis of some questionnaire items. Key findings are cited below and are organized in the following categories: those questions which yielded overall gender differences but not gender group differences, those items in which both gender and gender group differences appeared, and those items in which gender group differences appeared in year 1 which included the Brearley class.

Items for Which Gender Differences But Not Gender Group Differences Appeared at Hunter

When the precalculus questionnaire responses are taken into account, girls rated themselves lower in their rank in math class than did their male peers (see Chart 9). (This same lower female self-perception held even without adjusting for the precalculus self-assessment of class ranking.) Though the boys' actual class grade average in calculus and their standardized Advanced Placement BC Calculus exam raw scores were higher than those of their female peers, these grades were not significantly better. At the end of the calculus year, girls clearly had a lower self-perception of achievement than did boys in this advanced mathematics class environment, in spite of similar performance between the genders.

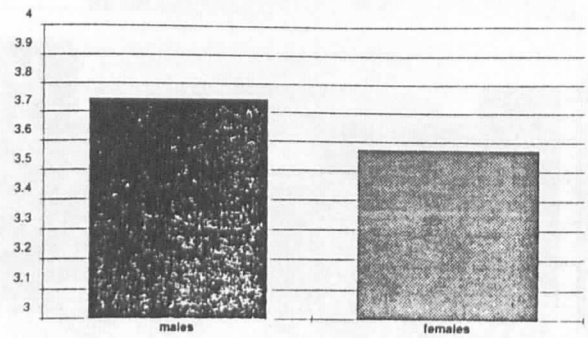
When precalculus responses are taken into account at the end of the calculus year, boys, more than girls, reported seeing the mathematics classroom as a place in which methods of solution are exchanged (see Chart 10). Further, girls indicated less comfort than did boys in sharing methods of solution in the math classroom (see Chart 11). It appears that since boys report greater comfort than girls in volunteering methods of solution, the boys tend to see the classroom as one in which methods are discussed more frequently than do their female peers.

Chart 9: Perception of Rank in Math Class
(1 = bottom third; 3 = top third)



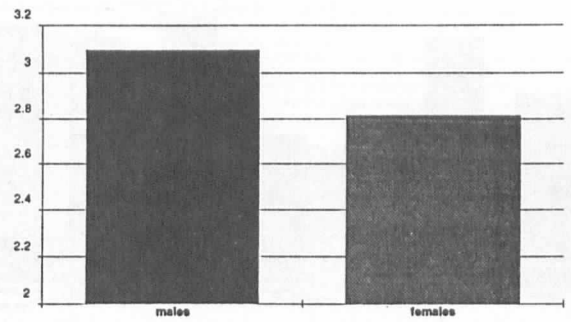
(residual standard deviation = .78)

Chart 10: Degree to Which the Math Classroom Is Seen as a Place to Share Methods of Solution
(1 = student solutions never shared;
4 = student solutions frequently shared)



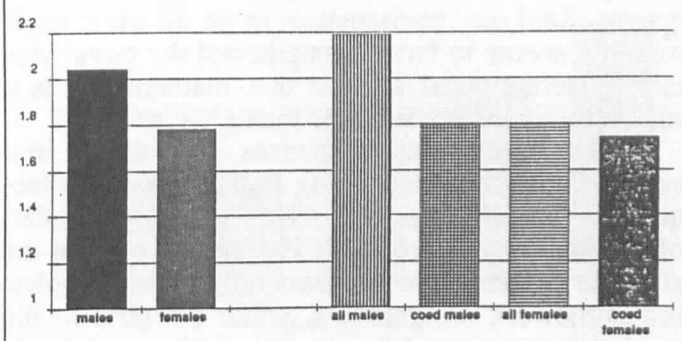
(residual standard deviation = .55)

Chart 11: Degree of Comfort in Sharing a Solution in Math Class
(1 = always uncomfortable; 4 = usually comfortable)



(residual standard deviation = .77)

Chart 12: Assertiveness in Correcting Teacher Errors
(1 = nonassertive; 3 = assertive)



(male/female residual standard deviation=.62) (gender group residual standard deviation=.61)

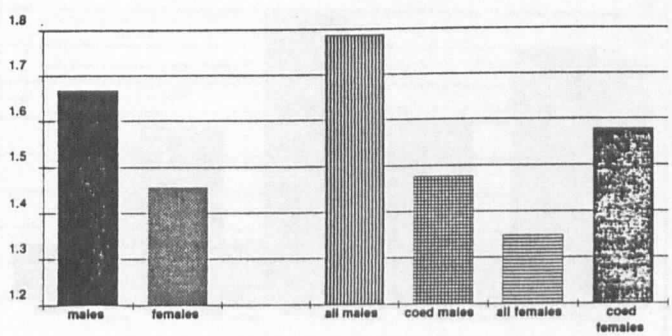
Items for Which Both Gender and Gender Group Differences Appeared at Hunter

At the end of the calculus course, when precalculus responses are taken into account, girls, more than boys, reported that they were unlikely to be assertive in correcting the errors made by their math teacher in class (see Chart 12). The girls also indicated less likelihood of interrupting a student contributing in the math class than did their male peers (see Chart 13). These responses suggest that the girls were conforming to the societal stereotype of being more polite and more nonassertive than boys.

When precalculus responses are taken into account, the boys in the all male classes reported that they were the most likely of all the gender groups to challenge the teacher when an error was made, and this same group of boys indicated that they were more likely than both their male peers in the coed classes and the girls in the all female classes to interrupt a participating subject. The ambiance of the all male classes seems to have encouraged the mindset of assertive behavior among its members.

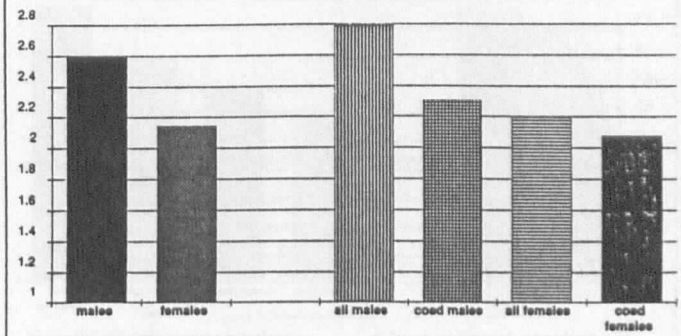
At the end of the calculus year, taking into account precalculus responses, girls expressed a greater lack of confidence before a math exam than did their male peers (see Chart 14). In particular, the boys in the all male classes expressed greater confidence than did either group of girls. This is in spite of the fact that there were no significant gender or gender group differences on the achievement measures of calculus class year average and Advanced Placement BC Calculus exam raw scores. Analysis shows, in fact, that girls effectively outperformed their male peers in their class grades, a phenomenon especially true for the girls in the all female classes.

Chart 13: Likelihood of Interrupting a Participating Student
(1 = unlikely; 3 = likely)



(male/female residual standard deviation=.50) (gender group residual standard deviation=.49)

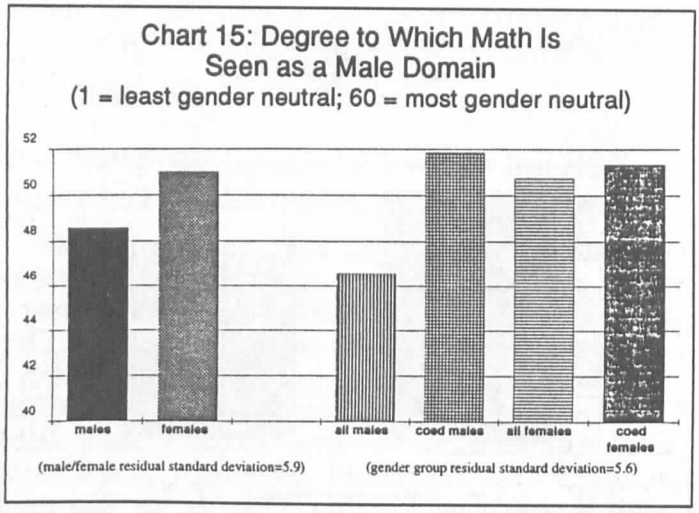
Chart 14: Degree of Confidence before a Math Exam
(1 = not confident; 4 = very confident)



(male/female residual standard deviation=1.1) (gender group residual standard deviation=1.1)

Girls reported viewing math as more gender neutral than did their male peers (see Chart 15). In particular, the boys in the all male classes saw math as more of a male domain than did any of the other groups. Studying mathematics in an all male environment seems to have strengthened the boys' culturally stereotypical attitude that mathematics is a subject in which boys, rather than girls, excel.

When precalculus responses are taken into account, girls reported doing homework more frequently than did boys (see Chart 16). In particular, of the four gender groups at Hunter, the boys in the all male classes were the least diligent in completing homework assignments, while the girls in the coed classes reported that they were the most likely to complete assigned homework.

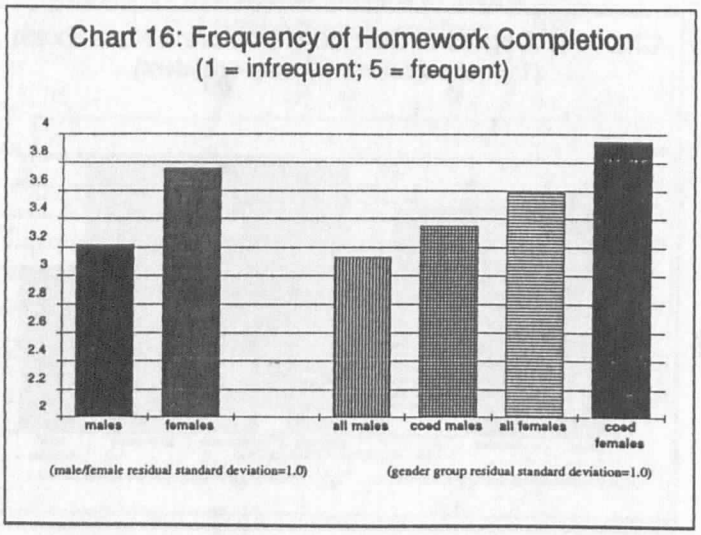


Items for Which There Was a Gender Group Difference for Year 1 which Included Brearley and Hunter Participants

Differences in questionnaire responses between the gender groups at Hunter and the Brearley class speak to the different ambiance at the two schools. Through these differences, a picture emerges of different classroom experiences, reflecting different teacher styles and student involvement in the learning process.

When precalculus responses are taken into account, Brearley students reported that they were discouraged from questioning or commenting again in class more than did students in Hunter's single sex classes (see Chart 17). Further, Brearley students reported being less assertive in correcting teacher errors than were the boys in Hunter's all male classes (see Chart 18). These responses may be the result of different teacher styles as well as a different school ambiance. The Brearley teacher was perceived by her students as being a good, "no nonsense" teacher. Hunter students were used to discussion in their classes and seemed to find the single sex classroom environment an encouraging forum in which to question and engage in dialogue with the teacher. As was noted in Chart 12, the boys in the all male Hunter classes reported that they were the most assertive of their Hunter peers in correcting teacher errors. This same contrast appears with the Brearley students, who perceived themselves to be more reticent than were these boys in the classroom.

After adjusting for precalculus differences, both groups of Hunter boys reported completing their homework less frequently than did the Brearley students (see Chart 19). Brearley students were



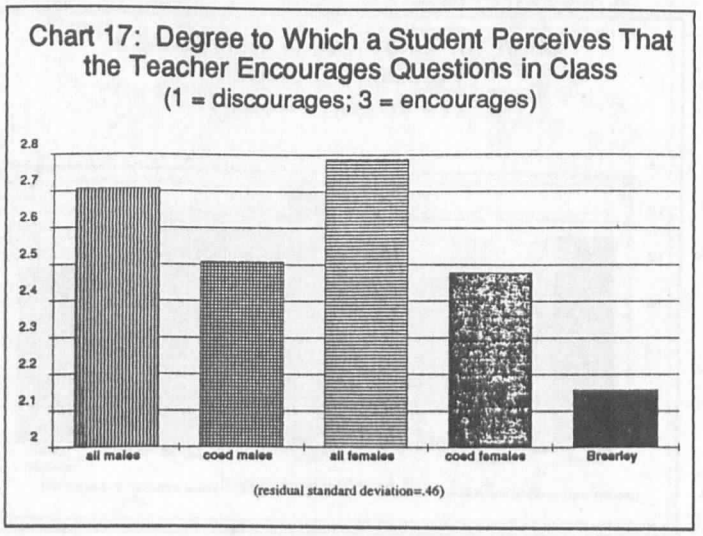
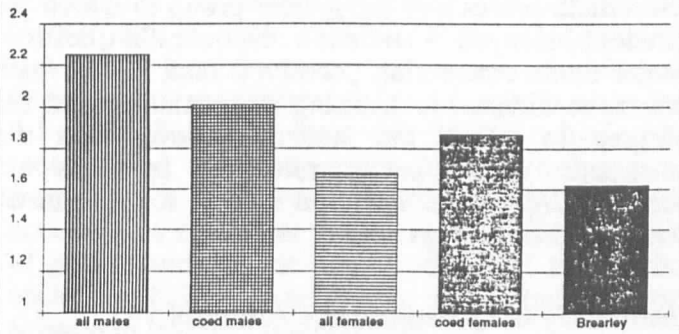
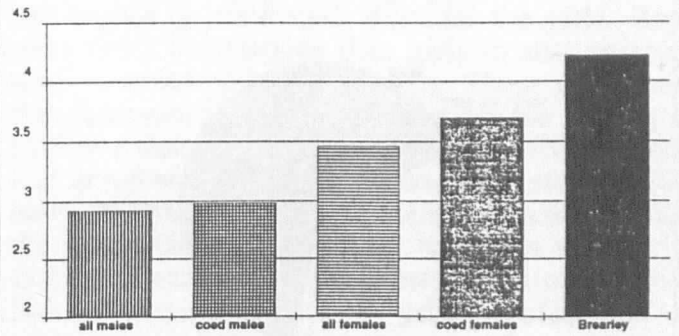


Chart 18: Assertiveness in Correcting Teacher Errors
(1 = nonassertive; 3 = assertive)



(residual standard deviation=.60)

Chart 19: Frequency of Homework Completion
(1 = infrequent; 5 = frequent)



(residual standard deviation=.99)

required to turn in daily assignments and were publicly rebuked for failure to do so. While Hunter students were expected to complete homework assignments, less teacher monitoring of its completion was the norm. In general, Hunter students are expected to assume much of the responsibility for their own learning; however, some students acknowledge that they do not consistently meet all of their obligations and responsibilities as learners.

When precalculus responses are taken into account, Brearley students reported a greater incidence of nonrecognition by the teacher when their hands were raised than did either group of students in Hunter's coed class (see Chart 20). As there were generally fewer students who wished to participate in the coed Hunter classroom than in the Brearley class, student responses on this questionnaire item may be primarily a result of the different participation patterns in the two classrooms.

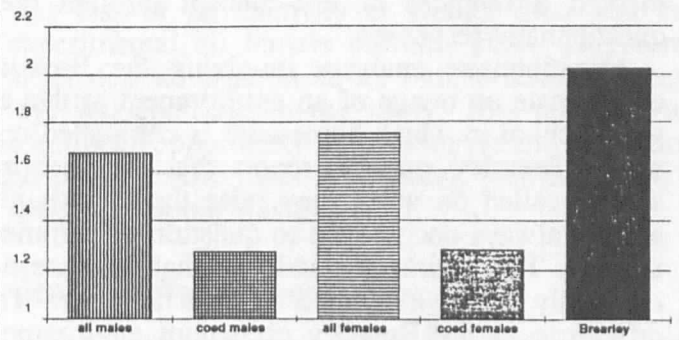
Questionnaire Items as Predictors of Achievement Measures

Regression analysis shows that over 40% of the variation in each of the three achievement outcome measures can be explained if a student's CRT and SATmath scores and gender group are known. Individual post experimental phase questionnaire items were examined to see how well known responses could aid in predicting achievement outcomes with even more accuracy.

Items Which Predicted Class Average at Hunter

If, in addition to knowing a student's CRT and SATmath scores and the gender group to which the student belonged, the student's perception of her/his rank in the math classroom were known, 70% of the variability in class average could be predicted.

Chart 20: Frequency with Which a Student Perceives That She/He Is Not Recognized When Hand Is Raised in Class
(1 = least frequent; 3 = most frequent)



(residual standard deviation=.67)

Chart 21: Questionnaire Items That Contribute to Explaining Variation in Calculus Classroom Averages at Hunter

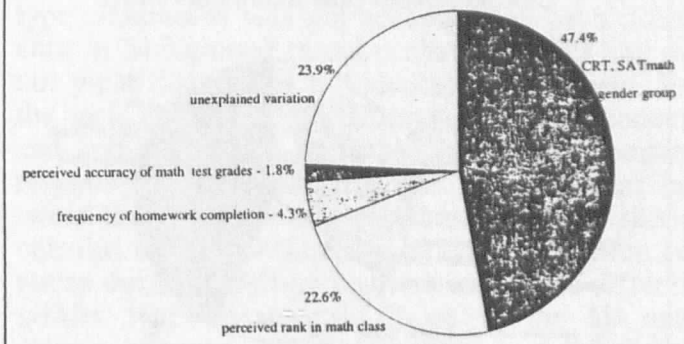
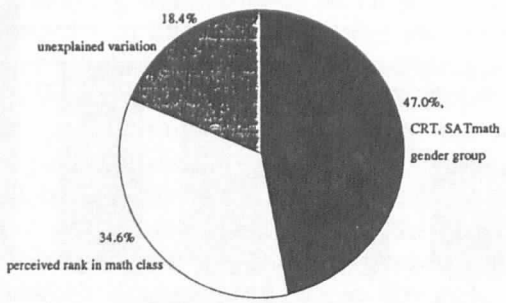


Chart 22: Questionnaire Items That Contribute to Explaining Variation in the Common Hunter-Brearley Test Average in Year 1

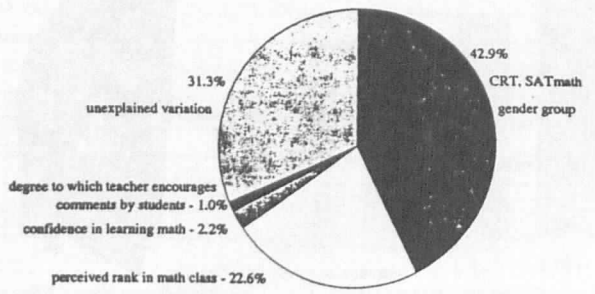


Other information, as given by the student's responses on the questionnaire concerning the frequency with which that student completes homework assignments and a student's feeling about the accuracy of math test grades in assessing how well the material was learned, add to the ability to predict the student's classroom mathematics average. Chart 21 shows the hierarchical contribution of these variables (in a clockwise direction).

Items Which Predicted the Year 1 Average on the Common Hunter-Brearley Exams

If, in addition to knowing the student's CRT and SATmath scores and the gender group to which the student belonged, the student's perception of his/her rank in the math classroom was known, 81% of the variation in the average of the common Hunter-Brearley exams could be explained (see Chart 22).

Chart 23: Questionnaire Items That Contribute to Explaining Variation in Advanced Placement BC Calculus Exam Raw Scores at Hunter



Items Which Predicted AP Raw Scores at Hunter

If, in addition to knowing a student's CRT and SATmath scores and the gender group to which the student belonged, a student's responses to questionnaire items concerning perceived rank in the math class, confidence in learning mathematics, and the degree to which the student believes that the instructor encourages commenting in class are known, 2/3 of the variation in AP scores can be explained (see Chart 23).

Summary of Questionnaire Analysis

From the analysis of questionnaire responses, a picture emerges of both gender and gender group differences in advanced mathematics learners. The Hunter girls in the study were less confident before an exam and perceived themselves to be lower in class rank than did the boys. Though viewing math as more gender neutral than did their male peers, these young women reported that they were less comfortable sharing a method of solution and saw the math classroom as less of an arena for sharing solutions than did the boys. The girls reported being more diligent in completing homework assignments than the boys, and consistent with societal stereotypes, these girls reported being less assertive in correcting teacher errors or interrupting participating students than the male respondents.

The gender differentiated groups seem to have had the greatest impact on the self-concept of those in the all male classes. These boys reported being more assertive in correcting teacher errors and in interrupting participating students, indicated confidence before exams, were least diligent in completing homework assignments and saw math as a male domain. In these aspects, they differed from their male peers in the coed classes, as well as from the girls. The two groups of girls did not exhibit marked differences in self-concept through their questionnaire responses.

Questionnaire analyses involving the Brearley class create an image of an environment at this all girls' school in which homework is completed regularly. Brearley students report that they are not always called on when they raise their hands and are not always encouraged to question or comment in class. These girls also indicate that they are not especially assertive in correcting teacher errors. The difference in the Brearley classroom environment form the ambiance at Hunter may account in large

part for the difference in perception of the Brearley students from those at Hunter.

Beyond knowing a student's CRT, SATmath and gender group, awareness of how a student perceived his/her rank in math class was highly significant in accounting for the variation in student achievement. Other questionnaire item responses which were useful in predicting at least one of the achievement measures in the study were those concerning the frequency of homework completion, the perceived accuracy of math test grades in assessing the level of understanding, the degree to which the teacher encourages class participation, and a student's confidence in learning mathematics.

DISCUSSION AND CONCLUSIONS

For years, many in the United States have lamented the decline in the number of students who persist in the study of mathematics and the technical sciences. It was noted that women were especially underrepresented in these areas. This, together with the emergence of the women's movement's emphasis on equal opportunity for both sexes, have led to an examination of the causes and ramifications of gender differences in mathematics learning. This study focused on a very select group of mathematics students: those who were so mathematically able that they were prepared to study a rigorous college level calculus course while still in high school. These students are representative of those in this country who are most likely to take positions of leadership in mathematics and the sciences.

To aid in understanding different achievement patterns and self-perceptions among the genders, it was felt that observations made in both single sex and coeducational classroom environments would be helpful. As each year's Advanced Placement physics class at Hunter is populated predominantly by boys, the experimental all male calculus class was less of an anomaly at Hunter than was the experimental all female calculus class. Therefore, an all female class in an all female school (Brearley) was included in the study. This provided an additional opportunity to investigate the ambiance of an all female class in a setting in which such a gender grouping was the norm.

Gender Differences at Hunter

Precalculus mathematics achievement and aptitude scores indicated that Hunter males were more ready for calculus than were Hunter females. Consistent with cultural stereotypes, the boys reported themselves as being more assertive, more confident, and higher in class rank than did the girls. Boys were more comfortable than girls in sharing solutions to math problems in class. These males saw the classroom as more of a place for the sharing of solutions than did their female peers. Even among this group of mathematically excellent students, the boys saw math as more of a male domain than did the girls. The initial calculus readiness superiority and better mathematics self-perception of the boys did not translate into a gender difference in achievement, both as measured by the average of teacher given tests and by the raw scores on the Advanced Placement BC calculus exam. In fact, when mathematics background disparities are taken into account, the girls actually outperformed their male peers on teacher given calculus tests. It is helpful to note that girls reported attempting to complete homework assignments more frequently than did boys and that homework diligence was an important factor in explaining the variation on the averages of in-class calculus tests.

It was beyond the scope of this study to examine the implications of gender differences in self-concept and self-perception as related to issues other than achievement. It may be helpful and instructive to determine if these differences impact on persistence in the study of mathematics in college and in ultimate career choices.

Gender Group Differences at Hunter

When the genders are split among those who were in traditional coeducational classrooms and those who were in experimental single sex classrooms, gender differences in achievement and self-concept are further clarified. Within each gender, the assignment of students to the different gender type classrooms was not accompanied by a difference in background calculus characteristics and did not yield differences in calculus achievement. For the girls at Hunter, no differences in self-concept and self-perception, as measured by questionnaire responses, developed over the calculus year between those in all female and those in coeducational calculus classes. Differences emerged, however, between the boys' self-perceptions in the two different gender type classrooms. Those in the all male classes reported greater likelihood in correcting teacher errors and interrupting students participating

in class and viewed math as more of a male domain than did their male peers in the traditional coeducational classes. This difference in perceptions of assertiveness and male dominance in mathematics did not translate into greater achievement in calculus on the part of the boys in the single sex classes as compared with the boys in the coeducational classes.

Cross sex comparisons among students in single sex and coeducational classes help clarify the gender differences in self-concept and achievement noted earlier. On issues of self-perception and self-concept, as measured by questionnaire responses, it was the group of boys in the all male classes that differed from one or both groups of girls. These boys reported that they were more likely to be assertive in correcting teacher errors, interrupt participating students, had greater confidence before a math exam, saw math as less gender neutral, and completed homework assignments less frequently than did either or both groups of their Hunter female peers.

Those girls randomly assigned to all female classes were less mathematically prepared for calculus than were the Hunter boys. However, the actual achievement of these girls did not differ from their more calculus ready male peers. In fact, after adjusting for precalculus differences, these girls outperformed their male peers in the traditional coeducational classrooms.

Differences between Hunter and Brearley

When comparing the group of Brearley students to the group of girls in Hunter's all female class in 1988–1989, the Brearley students began more calculus ready than did this Hunter group and ended the year scoring higher on both the average of teacher given tests and on the Advanced Placement BC calculus exam. However, after adjusting for the precalculus measures, these differences disappear.

In a broader sense, Brearley students outperformed both genders in Hunter's coeducational class as well as the all female experimental class on teacher given calculus tests. Even when adjusted by calculus readiness measures, Brearley students achieved better on teacher given tests than the boys in Hunter's coeducational class. The only Hunter-Brearley difference involving the Advanced Placement BC calculus exam scores was with the all female class at Hunter, as reported earlier in this section.

Questionnaire responses primarily contrast Brearley with each group of Hunter boys. As compared with the boys in Hunter's all male classes, Brearley students reported that they were less likely to be assertive in correcting teacher errors, less encouraged to participate in class, and more likely to complete homework assignments. When contrasted with the boys in Hunter's traditional coeducational class, Brearley students indicated that they were less likely to be called on by the teacher in class and more likely to complete assigned homework. These differences between Brearley and the two groups of boys at Hunter are likely to be the result of different teacher styles and classroom ambiance.

Predictors of Achievement

For each of the three outcome measures, almost half of the variation can be explained if a student's precalculus achievement and the type of gender composition of the calculus classroom in which the student learned is known. If, in addition, a student's perception of rank in the math class is also known, much more of the variation in achievement can be explained. Other useful predictors for achievement include a student's reported consistency of homework completion, perceived accuracy of math test grades, confidence in learning mathematics, and the degree to which the teacher is seen as encouraging classroom participation by students. Mathematics teachers of very able high school students can aid their students by encouraging them to participate in class and to complete assigned homework. Building student self-confidence also appears to be a key factor in high mathematics achievement. Though certainly not new concepts, this study's outcomes corroborate the importance of these basic elements in mathematics classroom success.

Educational Implications

This study adds to the knowledge concerning the achievement and self-concept of mathematically talented young adults. The results of the study do not support the creation of all female classes in coeducational schools as a way to boost mathematically talented girls' self-perception and achievement. Insights can be gained, however, from considering the all girls' class at the all female school. The precalculus strength and calculus achievement of the girls in this class demonstrate the positive

impact of consistency in homework completion. A strong teacher who has high expectations for females who study mathematics, discourages copious note taking, and does not coddle students in the classroom, bodes well for high female achievement. Both genders can benefit from a classroom atmosphere that expects students to accept a substantial share in responsibility for their own learning.

Study results indicate that greater male calculus readiness and greater male positive self-concept do not necessarily produce greater male calculus achievement. Furthermore, if precalculus differences are adjusted, girls' calculus achievement is greater than boys'. To raise girls' precalculus understanding and retention of concepts, cooperative learning experiences may be useful. Learning can then proceed in a nonthreatening environment with peers. Challenging mathematics problems, which require the integration of several mathematical concepts, are most useful in this setting.

The genders view themselves and the atmosphere of the classroom in different ways; males are more comfortable and confident in the advanced mathematics classroom than are females. The all male environment strengthened these feelings. More consistent female than male homework completion may have helped the girls compensate, in part, for a less positive mathematical self-concept. Nonetheless, if comfort and confidence with mathematics learning are likely to lead to continued study in math and the sciences, building positive female self-image in mathematics is essential. As we continue to understand the different ways in which the two genders learn mathematics, our challenge as educators is to incorporate this knowledge into our classrooms and to adjust our teaching methodologies to impact positively on both genders. Only then will we have created an educational environment of true equal opportunity in mathematics and the sciences for all of our students.

SYMPOSIA

A Symposium on Diophantine Problems in Honor of Wolfgang Schmidt's 60th Birthday will be held in Boulder, CO from June 25 to July 1, 1994.

Talks will start Sunday morning and will end Friday afternoon. Each day there will be lectures by three or four invited speakers, along with special sessions of shorter talks. The following have agreed to speak: A. Baker (Cambridge), R. Baker (Provo), J. Beck (Rutgers), W. D. Brownawell (Penn State), J. Coates (Cambridge), D. W. Masser (Basel), P. Philippon (Paris), P. Sarnak (Princeton), H. P. Schlickewei (Ulm), A. Schinzel (Warsaw), J. Silverman (Brown), H. Stark (San Diego), C. L. Stewart (Waterloo), R. Tijdeman (Leiden), R. C. Vaughan (Imperial), P. Vojta (Berkeley), M. Waldschmidt (Paris), and G. Wustholz (Zurich).

For more information, contact: Professors D. Grant and R. Tubbs, Department of Mathematics, Campus Box 395, University of Colorado, Boulder, CO 80309; email: meeting@euclid.colorado.edu. There is some support available for graduate students and unsupported, untenured mathematicians; women and minorities are especially encouraged to apply.

An international symposium, "Women in Science and Engineering," will be held June 16–19 at Iowa State University in Ames, IA as part of the National Women's Studies Association conference "Teaching, Theory, and Action: Women Working in a Global Context," June 15–19, 1994. Possible program topics are: barriers to educational equity for girls and women in science, strategies for pedagogical and curricular reform, history of women in science and engineering, and critiques of scientific paradigms. Possible workshop topics are: funding and grantsmanship, mentoring and networking, K–12 science education, and faculty development.

A partial list of speakers, representing a variety of disciplines from academia, industry and government, is: Pam Abder, Karen Barad, Alice Dan, Sandra Harding, Elizabeth McGregor, Sue Rosser, Margaret Rossiter, Bonnie Spanier, and Mariamne Whatley. A book containing selected articles generated as a result of the science symposium is planned for publication by the Iowa State University Press.

For more information on the symposium or registration materials, contact: Lorraine Ryan, Iowa State University, Women in Science and Engineering Program, Ames, IA 50011; phone: (515) 294-4535; fax: (515) 294-8627.

Nawal el Sadaawl, Egyptian novelist and medical doctor, will be delivering the keynote address at the NWSA conference. The plenary topics of the conference are: politics of women's work, conceptualizing the body (comparative perspectives),

human rights/women's rights, and feminist theories in a global perspective. Papers, panels and workshops will be presented on topics including: global feminism; international women's studies; cross cultural perspectives on sexuality, violence, reproductive rights, human rights, age, religion, science, agriculture, literature, and art; feminist pedagogy; and multicultural and women's studies curricula.

Early registration must be postmarked by May 6 ($95, NWSA members; $120, non-members); pre-registration, by June 6 ($115, members; $140, non-members). Accommodations are available on campus and in nearby motels. A cultural pass for the evening entertainment may be purchased for $15 at early registration, $20 at pre-registration.

Questions about the conference may be directed to: Kris Anderson, NWSA Conference Office, 105 Landscape Architecture, Iowa State University, Ames, IA 50011.

EDUCATION COMMITTEE

Mississippi State Report on the National Network of Eisenhower Mathematics and Science Regional Consortia and National Clearinghouse

President Bush established the National Network of Eisenhower Mathematics and Science Regional Consortia and National Clearinghouse to be part of a national infrastructure focused towards improving mathematics and science education in the United States, Puerto Rico, U.S. Virgin Islands, American Samoa, Mariana Islands, Micronesia, Guam, Marshall Islands, and Palau. The organization facilitates sharing successful educational programs and coordinates complementary educational reform research across state and local school systems. They also sponsor teacher workshops. Ten regional consortia comprise the National Network, and Mississippi is housed within the South Eastern Regional Vision for Education (SERVE). The SERVE Office is located in Tallahassee, FL and is under the direction of Francena Cummings.

A. Louise Perkins, John C. Stennis Space Center, Mississippi

Any questions or comments on either article? Write to: AWM Education Committee, c/o Sally I. Lipsey, Chair, 70 E. 10th St., #3A, New York, NY 10003-5106.

Elementary and Secondary Education is administered under state and local governments, which are working individually to solve their specific problems. The National Network is not an additional level of administration. Rather, it was established to accelerate educational improvement within each state by communicating and sharing successful programs among different states.

This is being prosecuted at two levels. At the higher level (one might say at the political level), goals are clarified. For example, under the Bush Administration these higher level goals were referred to as "Education 2000," because one of the goals was for the U.S. to place first in standardized testing scores in mathematics and science by the year 2000. The Clinton Administration has renamed the program "GOALS 2000." Many of these high level goals read more like political campaign promises. Fortunately some of the goals are constructive. The goal of top-down standardization of educational reform nationwide will provide each state with a set of standards that enumerates, as Francena Cummings paraphrased, "What to teach, to whom, and how."

At the second level, the regional offices work toward accomplishing the national goals. This includes providing teaching improvement courses and has the potential to be very successful. Here is an example of how it might work. Suppose two states were both using a study of ants in their fourth grade science curriculum. Let the first state use a book about ants which the students read and then discuss in class. Let the second state use the same book and classroom activities but also augment the study with a field trip where each student collects ants and then observes how the ants reestablish their society in an ant farm. The regional consortia would then measure the value added by the field project. If one method of instruction produced measurably superior results to the other, they would inform the states in their region about the value added improvement to the ant curriculum. If regionally successful, they would also propose the curriculum change to the national standardization committee.

The establishment of achievement standards, the development of a curriculum framework within which these standards should be achievable, and the concomitant instructional guidelines and assessment strategies needed to insure that the standards are achieved are the integral parts of this systemic reform approach.

Part of the assessment measurement defines a successful teaching approach as one that does not produce learning inequities across race or sex lines. For example, the mathematics unit attempts to combine sufficient theoretical development with "hands on" involvement, beginning even at the earliest ages, to keep all students excited about the topics and eager to understand the theoretical relevance.

Mississippi is enthusiastically accepting the guidance and assistance of SERVE. The SERVE Consortium is cooperating with the "Algebra Project" in the Mississippi River Delta region, which is one of the poorest areas in the United States. David Dennis works with the Delta project, and he believes that SERVE has been extremely helpful. SERVE is assisting with teacher training programs by providing multi-year funding. In 1993, 120 middle school teachers from the Delta region of Mississippi attended a two-week summer program designed to help them take the everyday experiences of children and quantify those experiences into pre-algebra concepts. The teachers are currently pleased with the results obtained in the classroom.

The POEMT Project

Have you ever seen a group of adults bouncing balls, lying down on the floor, measuring each other, blowing hard at balloons ... ? Who are these adults? They are college and university professors of mathematics content and methods courses in the preservice education of elementary teachers! These professors come from states all over the nation. What are they doing? They are trying to experience how elementary school students should learn or be taught. This is one of the daily scenes you would have observed during two and a half weeks last summer, 1993, at the Youth Center in Miami, Florida. The professors are participants in an ongoing project, Preparation of Elementary Mathematics Teachers (POEMT).

POEMT is a two-year project funded by the National Science Foundation at Florida International University (FIU) in Miami and directed by Dr. Robert Gilbert, Principal Investigator. The first year (starting summer, 1993) included an extensive residential institute at FIU with a K–3 focus, followed by courses covering strategies, ideas and materials given by participating professors at their home institutions. During the second year, the focus will be on grades 4–6. POEMT staff will visit each participant's campus during the second academic year, during which encouragement and support will be given and progress assessed. Participants will convene during the 1994 annual meeting of the National Council of Teachers of Mathematics (NCTM).

The main objectives of the POEMT project are to: 1) provide opportunities for professors of mathematics content and methods courses jointly to pursue studies and activities consistent with recommendations of the Mathematical Association of America (MAA) and the NCTM in reforming elementary school mathematics teaching, 2) develop a model preservice elementary teacher preparation program, and 3) establish other college/university centers for teacher preparation programs similar to the POEMT model.

The summer institutes consist of three major components: instructional units, clinical experience and reflection time. The instructional units are organized and taught by an outstanding group of professors and leaders. The philosophy of teaching developmentally with assessment of learning, writing in mathematics, problem solving and use of technology are woven into the institute program. Some informal afternoon and evening seminars are scheduled to provide an opportunity for participants to reflect on and discuss their learning. In addition, participants develop lessons (in pairs), teach them to groups of preservice and inservice teachers (while observed by other participants) and then discuss the lessons with observers and staff.

As a participant in this project, I thoroughly enjoyed the first summer institute. I felt the collegiality, especially in comparison with my former teaching environment where I experienced difficulties in reaching out to my colleagues who were teaching the mathematics content of my preservice elementary teachers. The staff and instructors were excellent about sharing their expertise with us. The participants were open to and enthusiastic about trying new ideas. Many of the instructional ideas reinforced the ways I practice and confirmed my beliefs and philosophies. The wonderful interactions we had in summer 1993 have carried over to 1994 through email, newsletters, and individual correspondence. I am looking forward to both the NCTM conference where we will meet and to the coming 1994 summer institute.

Yee Ping Soon, College of Education,
Florida International University

TEACHER TRAINING WORKSHOP

The National Women's History Project is sponsoring "A Woman's Place Is ... in the Curriculum," a teacher training workshop, in Northern California July 25–28, 1994. The workshop is designed for classroom teachers, teacher trainers, equity and multicultural specialists, and curriculum specialists. The conference fee is $350 for registration by July 1; it includes registration, conference materials, and lunches. For more information or to register, contact: National Women's History Project, 7738 Bell Road, Windsor, CA 95492, (707) 838-6000.

SLOAN RESEARCH FELLOWSHIPS

Nominations for candidates for Sloan Research Fellowships are due by September 15. Candidates must be members of the regular faculty at a college or university in the United States or Canada and must be at an early stage of their research careers. For information write: Sloan Research Fellowships, Alfred P. Sloan Foundation, Suite 2550, 630 Fifth Avenue, New York, NY 10111.

FEAR OF MATH

Claudia Zaslavsky's latest book is *Fear of Math: How to Get Over It and Get on with Your Life!* She has helped thousands of men and women understand why math made them miserable. Let her introduce you to real people who fled from anything to do with math. All of them — White, African American, Asian American, Latino, artist, homemaker, manager, teacher, teenager, or grandparent — came to see that their math troubles were not their fault. Social stereotypes, poor schools, and well-meaning parents had convinced them that they couldn't, or shouldn't, do math.

Zaslavsky shows how the school math many dread is a far cry from the math really needed in life (and that many people know better than they imagine). She gives a host of reassuring methods, drawn from many cultures, for tackling real-world math problems. She explodes the myth that women and minorities are not good at math. With her help, it is possible to see why math matters and how to get over the math barriers that hold people back.

If you request the special 10% discount, copies are $13.45 paper and $33.30 until September 1, 1994. Call (800) 446-9323 to make a credit card order, or write Rutgers University Press, 109 Church St., New Brunswick, NJ 08901 (s/h $3.00 first book, $.75 each additional; NJ sales tax 6%; Canadian GST 7%).

NSF-AWM TRAVEL GRANTS FOR WOMEN

The objective of the NSF-AWM Travel Grants is to enable women to attend research conferences in their fields, thereby providing a valuable opportunity to advance their research activities and their visibility in the research community. By having more women attend such meetings, we also increase the size of the pool from which speakers at subsequent meetings may be drawn and thus address the persistent problem of the absence of women speakers at some research conferences.

Travel Grants. These grants provide full or partial support for travel and subsistence for a meeting or conference in the applicant's field of specialization. A maximum of $1000 for domestic travel and of $2000 for foreign travel will be applied. International travel must be on U.S. flag carriers.

Eligibility. These travel funds are provided by the Division of Mathematical Sciences of NSF, and the research conference must be in an area supported by DMS. For example, this includes certain areas of statistics, but excludes many areas of mathematics education and history of mathematics. Applicants must be women holding a doctorate (or equivalent experience) and having a work address in the U.S. (or home address, in the case of unemployed mathematicians). Anyone who has been awarded an AWM-NSF travel grant in the past two years or who has other sources of external funding, such as a regular NSF grant, is ineligible. Partial institutional support does not however make the applicant ineligible.

Target Dates. There will be three award periods per year, with applications due February 1, May 1 and October 1. An applicant should send *five copies* of 1) a description of her current research and of how the proposed travel would benefit her research program, 2) her curriculum vitae, 3) a budget for the proposed travel, and 4) information about all other sources of travel funding available to the applicant, to: Travel Grant Selection Committee, Association for Women in Mathematics, 4114 Computer & Space Sciences Building, University of Maryland, College Park, MD 20742-2461; (301) 405-7892.

ADVERTISEMENTS

ARIZONA STATE UNIVERSITY - DEPARTMENT OF MATHEMATICS - The Department of Mathematics at Arizona State University invites applications for a one-year postdoc position with the possibility of an extension by another year, to begin no later than October 15, 1994. Applicants must have a Ph.D. in mathematics, physics or related field. The position will be funded by a grant from DOE to characterize the dynamics of spatio-temporal data. Applicants must have strong background in dynamical systems and computational proficiency. For more information on this position contact: Dieter Armbruster (email dieter@math.la.asu.edu) or Eric Kostelich (email kostelich@asu.edu). Applicants must send their resume and arrange for three letters of recommendation be sent to: **Eric Kostelich, Department of Mathematics, Box 871804, Arizona State University, Tempe, Arizona 85287-1804**. The application deadline is June 1, 1994 and the first of each month thereafter until the position is filled. Arizona State University is an Affirmative Action/Equal Opportunity Employer.

COTTEY COLLEGE - Assistant Professor, full-time, tenure-track faculty starting Fall 1994; three person department. Curriculum now includes algebra, trigonometry, statistics, calculus and differential equations; four sections per semester load. Ph.D. preferred; ABD considered for initial appointment, but continuation requires doctorate. Teaching oriented, small, private, (not church-related), two-year, residential, liberal arts college for women. 10:1 students/faculty ratio, students from 35-40 states and 18-20 countries. 80 miles from Kansas City metropolitan area, 40-140 miles from Ozark recreation areas. Our mission is the development of intellect, leadership and self-esteem in young women. Trustees' formal budgetary approval will be in April 1994, but potential applicants should send c.v. and letter expressing interest now to: **Vice President for Academic Affairs, Cottey College, Nevada, Missouri 64772**

LOUISIANA TECH UNIVERSITY - DEPARTMENT OF MATHEMATICS AND STATISTICS - Applications are invited for an anticipated tenure-track assistant professorship specializing in an area of mathematics closely related to computational analysis and modeling. Applicants must have a Ph.D. by the time of the appointment (9/94) and are expected to show strong potential for excellence in both teaching and research. A current resume and three letters of recommendations should be sent to: **R. J. Greechie, Head, Department of Mathematics and Statistics, Louisiana Tech University, Ruston, Louisiana 71272**. The screening of applicants will begin on June 1st and will continue until the position is filled. Louisiana Tech University is an Equal Opportunity/Affirmative Action Employer. We are interested in receiving applications from qualified women and minorities.

NORTHWESTERN UNIVERSITY - DEPARTMENT OF MATHEMATICS - The Department of Mathematics, Northwestern University invites applications for the newly create position of Lecturer in Mathematics. This position carries a two course teaching responsibility in each of the three quarters of the academic year. The term of appointment will be for one year and will be renewable twice upon evidence of excellence in teaching. Candidates must have the Ph.D. degree or its equivalent and must present solid evidence of teaching excellence and the ability to communicate clearly and effectively in English. Teaching performance should be substantiated, if possible, by student evaluations. Send applications and three letters of reference to: **Chairperson, Personnel Committee, Department of Mathematics, Northwestern University, Evanston, Illinois 60208-2730**. Northwestern University is an Equal Opportunity/Affirmative Action employer and encourages applications from minority and women candidates.

PACIFIC LUTHERAN UNIVERSITY - DEPARTMENT OF MATHEMATICS - One year visiting assistant professor (sabbatical replacement) beginning in Fall 1994. Possible extension(contingent on funding) beyond next year. Ph.D. in statistics or in mathematics with expertise in statistics and a commitment to quality teaching in an undergraduate program. Teach six courses in statistics and mathematics. Application review will begin April 18. Send cover letter with brief statements of teaching philosophy and scholarly interest, resume, transcripts, and 3 letters of reference (at least one on teaching ability) to: **Prof. Michael B. Dollinger, Search Committee, Mathematics Department , Pacific Lutheran University, Tacoma, Washington 98447**. Pacific Lutheran University embraces the goal of Equal Opportunity and Affirmative Action and actively encourages applications from women and ethnic minorities.

SOUTHERN ILLINOIS UNIVERSITY @ CARBONDALE - DEPARTMENT OF MATHEMATICS - Temporary Positions 1994-95 - Temporary Positions are anticipated starting on August 16, 1994 as Lecturer. Masters degree in mathematics or admission to candidacy required; Ph.D. preferred. Applicants should provide evidence of excellence in teaching and foreign applicants must provide evidence of ability to teach in English effectively. Preference given to applicants with research interests compatible with those of the faculty. The duties will consist of 12 hours of undergraduate mathematics instruction each semester. Closing date May 15, 1994 or until positions are filled. Send applications (including transcripts) to: **Temporary Positions, c/o Ronald Kirk, Chair, Department of Mathematics, Southern Illinois University @ Carbondale, Carbondale, Illinois 62901**. SIUC is an Equal Opportunity/Affirmative Action Employer.

ANNOUNCEMENTS

CALL FOR VOLUNTEERS

San Diego, California -- Minneapolis, Minnesota -- San Francisco, California

During the next year, the **Association for Women in Mathematics** will be attending the SIAM meeting and the AMS-MAA Joint Mathematics meetings to promote **AWM** and we need ***VOLUNTEERS.***

1994 SIAM Annual Meeting	San Diego, California	July 25-29, 1994
AMS-MAA Mathfest	Minneapolis, Minnesota	August 15-17, 1994
AMS-MAA Joint Mathematics Meeting	San Francisco, California	January 4-7, 1995

We need help **STAFFING OUR INFORMATION TABLE** and we feel that our **MEMBERS** are one of our best resources to help represent the **AWM.** If you are already attending one of these meetings and could spare some time, we would appreciate your help.

If you are interested in helping out, please send you name, address, telephone number and/or e-mail address to:

Dawn V. Wheeler, Association Administrator, Association for Women in Mathematics
4114 Computer and Space Sciences Bldg., University of Maryland, College Park, Maryland 20742-2461
Phone: 301-405-7892 E-mail: awm@math.umd.edu

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ASSOCIATION FOR WOMEN IN MATHEMATICS

1993/1994 MEMBERSHIP FORM

AWM's membership year is from October 1, 1993 to September 30, 1994. If you haven't renewed your membership or would like to join, please fill-in this information and return it along with your DUES to:

AWM Membership
4114 Computer & Space Sciences Building
University of Maryland
College Park, MD 20742-2461

The AWM Newsletter is published six times a year and is part of your membership. Questions? (301) 405-7892, or awm@math.umd.edu

LAST NAME **FIRST NAME** **M.I.**

ADDRESS_____

Home Phone: **Work Phone:**

E-mail:

Please include this information in: (1) the next **AWM Speaker's Bureau** (Yes/No) _____ (2) the next **AWM Membership Directory** (Yes/No) _____

PROFESSIONAL INFORMATION:

Position:
Institution/Company:
City, State, Zip:

DEGREES EARNED:

	Degree(s)	Institution(s)	Year(s)
Doctorate:			
Masters:			
Bachelors:			

INDIVIDUAL DUES SCHEDULE FOR MEMBERSHIP YEAR 1993/1994

Please check the appropriate membership category below. Make checks or money order payable to: **Association for Women in Mathematics**.
NOTE: All checks must be drawn on U.S. Banks and be in U.S. Funds. AWM Membership year is **October 1st to September 30th.**

REGULAR INDIVIDUAL MEMBERSHIP (Base dues $25 plus $5 prize fund and $10 general)..... $ 40 _____

2ND FAMILY MEMBERSHIP (Base dues $15 plus $5 prize fund and $10 general)..... $ 30 _____
(NO newsletter) Please indicate regular family member: _____

CONTRIBUTING MEMBERSHIP..... $100 _____
Indicate if you wish for this contribution to remain anonymous: _____

STUDENT, RETIRED, OR UNEMPLOYED MEMBERSHIP (circle one)..... $ 8 _____

ALL FOREIGN MEMBERSHIPS (INCLUDING CANADA & MEXICO) .....ADD $ 8 _____

All payments must be in U.S. Funds using cash, U.S. Postal orders, or checks drawn on U.S. Banks.

INSTITUTIONAL DUES SCHEDULE FOR MEMBERSHIP 1993/1994)

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_____Sponsoring CATEGORY I (may nominate 10 students for membership).....	$120	$200	_____
_____Sponsoring CATEGORY II (may nominate 3 students for membership).....	$ 80	$105	_____

INSTITUTIONAL MEMBERS RECEIVE TWO FREE ADVERTISEMENTS IN OUR NEWSLETTER PER YEAR. All institutions advertising in the AWM Newsletter are Affirmative Action/Equal Opportunity Employers. Also, Institutions have the option to nominate students to receive the newsletter as part of their membership. NOTE: List names and addresses of student nominees on opposite side or attach separate page. [ADD $8 ($16 for foreign members) for each additional student add-on over initial 10 students for Category I; over initial 3 students for Category II]

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ORDER FORM - AWM CAREER BOOKLETS

These publications are for students, professors, and career resource centers.

Careers That Count: Opportunities in the Mathematical Sciences -- This brochure encourages individuals to look at the mathematical sciences as a possible career choice.

Profiles of Women in Mathematics: The Emmy Noether Lecturers -- AWM established in 1980 the annual Emmy Noether Lecture series. In these lectures, prominent women mathematicians give survey talks on the fundamental contributions. This booklet includes profiles of the mathematicians who have presented the Noether Lectures. **NEWLY UPDATED!**

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☐ Check or money order enclosed for $_____ (Make checks or money orders payable to AWM; must be in U.S. Funds, drawn on U.S. Bank)

☐ Please invoice my institution/organization for this order. **P.O. NUMBER IS:**_____(if needed)

MAIL A COPY OF THIS FORM: *CAREER BOOKLETS ORDER*, ASSOCIATION FOR WOMEN IN MATHEMATICS, 4114 Computer & Space Science Bldg., University of Maryland, College Park, MD 20742-2461

IT'S THE END OF THE SEMESTER -- DO YOU HAVE A NEW ADDRESS? Please inform us of any changes, so we can keep our database up-to-date. Fill out the changes using the **form on the BACK COVER** or drop us an **E-MAIL – awm@math.umd.edu**

AWM

Newsletter

Volume 24, Number 3, May–June 1994

ADDRESS CORRECTION FORM

❒ Please change my address to:
❒ Please send membership information to my colleague listed below:
❒ No forwarding address known for the individual listed below (enclosed copy of label):
(Please Print)

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❒ You may include this information in the next AWM Membership directory.

MAIL TO:

Dawn V. Wheeler, AWM
4114 Computer & Space Sciences Bldg., University of Maryland, College Park
Maryland 20742-2461

or E-MAIL:

awm@math.umd.edu

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