

Creating a Warmer Environment for Women in the Mathematical Sciences and in Philosophy

Samantha Brennan, University of Western Ontario, conducts research in moral and political philosophy, including feminist approaches to ethics.

Rob Corless, University of Western Ontario, conducts research in computer algebra, numerical analysis, dynamical systems, complexity theory, special functions, and mathematical modeling.

Abstract

Speaking from our experience as department chairs in fields in which women are traditionally underrepresented, we offer reflections and advice on how one might move beyond the chilly climate and create a warmer environment for women students and faculty members.

Résumé

En nous basant sur notre expérience à titre de chaires de département dans des domaines où les femmes sont traditionnellement sous-représentées, nous offrons des réflexions et des conseils sur la façon dont on peut aller de l'avant dans un climat plutôt froid, et créer un environnement plus chaleureux pour les étudiantes et pour les membres de la faculté.

How does one go about creating a warmer climate for women in disciplines in which women have been historically under-represented? This paper reports on our attempts to do so. We became chairs of our respective departments (Philosophy and Applied Mathematics) at the University of Western Ontario (UWO) in 2002, each for a five year term. We first met officially on University Senate and served on many university committees together. As chairs we shared a commitment to improving the situation of women in our departments and in our disciplines. Throughout the five years this subject continued as a matter for debate and discussion. The University of Western Ontario provided an interesting place in which to pursue these goals in the sense that the problems had already received official recognition and concrete steps had been taken to improve the situation for women at Western. Western's experiences with climate issues for women had prompted several reports, a book and a movie. *Breaking Anonymity: The Chilly Climate for Women Faculty* by The Chilly Collective contains both the "Backhouse Report" (by Constance Backhouse) and "The Chilly Climate for Faculty Women at Western: A Postscript to the Backhouse Report" by Constance Backhouse *et al.* (Backhouse *et al.* 1995). The video, *The Chilly Climate for Women In Colleges and Universities*, also published in the early 90s, is now used as a teaching tool at colleges and universities around the world. By the time we became chairs at Western many of the women who were involved in the reports and the book, which caused a great deal of controversy when published, were now themselves members of the university's administration. Thus our experience of the

campus has been, for the most part, very different from their experience, and we are grateful to all of the feminists on campus who did much of the really hard work.

As chairs, one of our goals was to go beyond the formal mechanisms required to protect women - from discrimination and sexual harassment - and to think more generally about the issue of what makes an academic environment positively hospitable for women. We both felt that we were in an environment that was supportive of these efforts. This task of taking responsibility for improving one's local culture matters for department chairs because issues of local culture and climate seem, at least at the outset, easier for a department chair to understand and to shape. As well, while we were responsible for seeing that university rules and guidance on issues of equity were followed, for the most part the setting of those formal rules occurred outside the department structure. The bulk of our conversation as chairs concerned the relationship between rules and culture, and how to influence local academic environments in ways that improved things for women. The "Educating Women/Women's Education in the Post-Secondary Context" conference at Mount Saint Vincent University in February 2007 provided us with an opportunity to broaden the conversation about improving the climate for women in our departments to include conference participants from other universities and academic disciplines. In the discussion that follows Samantha talks about the situation for women in philosophy, and Rob talks about the situation in applied mathematics.

The Situation of Women in Philosophy

With regards to the position of women, philosophy is an unusual discipline. While women typically fare well in the humanities, philosophy is the only humanities discipline in which the numbers of women (at all levels) more closely resemble the sciences. Outside of the sciences, the only discipline with fewer women than philosophy is theology. For an excellent discussion of the

status of women in philosophy in North American universities one should read Sally Haslanger's paper "Changing the Ideology and Culture of Philosophy: Not by Reason (Alone)" (2008). Haslanger's paper gives the reader some sense of the depth of the problem and of the wide range of ways in which discrimination against women affects the lives and careers of female philosophers. You can get a quick sense of the problem by looking at the number of women in philosophy. The Philosophical Gourmet Report (www.philosophicalgourmet.com) ranks some graduate programs in philosophy and provides some useful data on the numbers of women in the top ranked programs. The total number of tenured/tenure-track faculty at Top-54 doctoral programs in the 2006-2008 Gourmet Report is 1033. The number of those who are women is 191, or 18.49%. This number isn't representative of philosophy overall since there are more women in schools without graduate programs and in those schools with less well ranked grad programs. The number of women PhDs in Philosophy has remained constant, at about 25%, since the early 90s. In the decades prior it was closer to 10-15%.

The picture does not look that different in philosophy at Western. There are 30 faculty members in philosophy, 7 of whom are women (but note these include the Dean of Arts and Humanities, the Department Chair, and the Chair of Women's Studies.) There are advantages and disadvantages to the over-representation of women in the administration of the department. Numbers do not tell the whole story. There are some departments at my university with many more women but which are unlikely to have, in the near future, a female chair. Having women in leadership positions has kept the issue of gender equity on our department's agenda. It also sends a strong signal to young women that they will be taken seriously as philosophers and if hired as philosophers that they can expect to move up through the ranks at Western. The downside has been maintaining our own research profiles in our respective fields given the serious

administrative load. Sometimes it can feel that women do the work of running the university, leaving men to do what "really matters," research and publishing. There are approximately 60 graduate students in Philosophy's MA and PhD programs combined. Of these about one third are women. One very good feature of our graduate student profile, though, is that there are women across the various areas of research represented in the department. The undergraduate classes start out at 50-50 in first year and end up 2/3 male by 4th year.

There are various things that my department has done right. First, it's worth noting that I was not the first female chair. Kathleen Okruhlik, now Dean of the Faculty of Arts and Humanities, was the chair when I was hired. Second, there was a shift to a more rule-governed working and learning environment in the 90s, in part as a result of the response to the chilly climate process, with an emphasis on protecting female students. This meant moving from a more informal department culture that allowed certain kinds of bias to influence decisions to one that emphasized process, rules, and transparency in decision making. For example, the philosophy graduate students now take their comprehensive exams on computers and the exams are graded by committee without knowledge of the students' identities. It's this rule-oriented background that makes it possible for us to think in more positive terms and focus on mentoring and other ways we might make our intellectual community more inclusive. The following are some examples of the steps members of the department have taken to help maintain a healthy climate for women.

The Philosophy Department's Committee on Women's Concerns was started in 1989. It was the University of Western Ontario's first departmental committee of this nature. The main purpose of the committee in its early days was to provide a point of contact for women students who was not the chair or the assistant chair. Today its purpose has broadened to ensure that there is a non-sexist environment for all

who work and study in our department. To that end, CWC performs the following functions:

- ▶ ensures that all in the department - Faculty, Students, Staff - are aware of the University's policies concerning women;
- ▶ provides an easy point of contact for anyone encountering sexual harassment or other forms of sex-related disadvantage, and (where appropriate) puts them in touch with the people who can do something about it;
- ▶ arranges events and programs to educate the department about the needs and problems of women in the academic setting;
- ▶ helps faculty members who wish to incorporate material relevant to women's issues in their courses;
- ▶ keeps in touch with many other groups working on these issues, in the University and outside, so that it will be able to supply up-to-date information; and
- ▶ acts as a liaison between the Department of Philosophy and the Canadian Society for Women in Philosophy.

The department also runs a mentoring program for students in the honours programs. All honours students are assigned a faculty mentor and although many students may never contact their mentor the program is warmly received by the philosophy undergraduates. The mentors and those mentored meet at an annual reception for the students, attendance at which is strongly encouraged. Some faculty mentors follow up and take their students to lunch, for example. Others are just available to answer questions and deal with the students' concerns. This ensures that all students, not just women, have a point of contact in the department who isn't necessarily their professor or a department member acting in an administrative capacity.

The department also has an elected social committee, which helps ensure that a wide range of activities are planned for

faculty, staff, and graduate students. Some of these activities are geared specifically to people with families and an attempt has been made in recent years to have some of the activities focus on healthy lifestyles and stress reduction. So, for example, we have organized family camping trips and taken part in charity runs as a team, in addition to the usual range of parties and dinners.

Several years ago we introduced a 200 level course in feminist philosophy and faced a challenge about staffing. What worked very well in the first few years was having three full-time faculty members team teach. We were surprised at first that many of the students had neither read the work of, nor met, a female philosopher. With three of us teaching the course, the students formed the view that there are many women in philosophy at Western and, given the range of views we hold, they also got to see that feminism is a diverse political movement and that there are serious philosophical disagreements between feminists.

We also introduced an Ontario Graduate Studies approved field in Feminist Philosophy, which allows us to advertise supervisory strength in that area. Most of the women in the department have some level of interest and expertise in feminist philosophy and again this cuts across the various other fields of research. There are philosophers of science and ethicists with research interests in feminist philosophy.

There are also some challenges specific to philosophy and to philosophy at Western. First, the student population at Western has more women than men overall and a disproportionate number of the women are in the Faculty of Arts and Humanities. Yet, Philosophy starts out with a 50-50 male-female ratio in first year and ends up, in upper years, with far more men than women. This is an issue both for those of us concerned with enrolments in philosophy and for those of us concerned with the situation of our female students. We've been able to address issues of inclusive curriculum partly from the perspective of concern for undergraduate enrolment. The issue of

research focus presents the cause of gender equality in philosophy at Western with some special challenges. Not all areas within philosophy are equally male-dominated but this department has a history of international strength in philosophy of science, an area of philosophy that is particularly male-dominated. But we reinforce ideas about what's "hard" and what's "soft" if we hire women in ethics to make up for the numbers of men in philosophy of science. Instead, the department has pursued hiring women in philosophy of science and has had some success in doing so.

The Situation of Women in Applied Mathematics

The multiple disciplines of Applied Mathematics are not so widely known as those of Philosophy. At UWO, our research areas include mathematical biology (theoretical evolution and disease dynamics, especially of HIV and its drug treatment), financial mathematics, computer algebra, theoretical physics (which has a heavy overlap with philosophy at UWO), computational materials science, and dynamical systems. There are many other areas in Applied Mathematics at other institutions, often with substantial overlap with Engineering.

The numbers of women in Applied Mathematics nation-wide are hard to count, because many do not self-identify as Applied Mathematicians. I believe the gender ratio to be similar to that of philosophy or perhaps somewhat worse. We begin with the blindingly elementary and obvious observation that women can be, and have been historically, brilliant applied mathematicians. It is important to tell their stories because women can be lost in the histories of our disciplines and students might mistakenly think that there have been no women with great achievements in mathematics. Perhaps the most famous of these women is Emmy Noether, but more recently we can point to Grete Henry-Hermann, Olga Ladyzhenskaya and Karin Gattermann as illustrative examples. Yet their stories are (unsurprisingly) little

known. If history had treated them fairly, Grete Henry-Hermann, Olga Ladyzhenskaya and Karin Gatermann would be (even) better known amongst applied mathematicians than they are.

The case of Olga Ladyzhenskaya is the best known. Towards the end of her life, she did begin to receive some of the attention she deserved, winning the Lomonosov Gold Medal in 2002. Moreover, she has had the ultimate accolade bestowed, in that a modified version of the Navier-Stokes equations of fluid flow (to the study of which she contributed greatly) is now known as the Ladyzhenskaya equations. These may yet prove to be just the right tool in, for example, climate modeling but at present it still seems to us that her contribution is undervalued.

Karin Gatermann (1961-2005) was my friend and perhaps the most under-rated computer algebraist in modern times. She won the prestigious Heisenberg stipend and a Tier II Canada Research Chair, yet no position in her native Germany. Again, if she had been fairly treated she would have been more greatly honoured.

Note that we are discussing cases where some honour and recognition were given; in the case of Ladyzhenskaya even great honour. It is our contention that even so, these people, and many others, are too little known. This supports our contention that an appropriate question to be asked in regard to the obvious imbalance in gender ratio in applied mathematics is not (as has been stated) "Why are there no great female applied mathematicians?" but rather, "Why are the great female applied mathematicians not better known?"

Barbara Lee Keytztz, in "Women (and Men) in Science: How to Ask the Wrong Questions," writes: "Some questions are more productive, more amenable to answers and more likely to move us in the right direction than others" (2005). One can see immediately that the first question, framing a false antecedent, would be difficult to answer well. The second, however, has a useful answer and points out a useful method for increasing the participation of women in applied

mathematics, namely, to include the stories of the great women in the curriculum.

We now want to briefly list the accomplishments of a selection of some recent female PhD graduates from Applied Math at Western, and some notable moments in our history. The Department was formed in 1967. The first (male) PhD graduated in 1972. The first female PhD, Serpil Kocabiyik, graduated in 1987. She is now a Professor at Memorial University of Newfoundland.

- ▶ 2006 Governor General's Gold Medal Winner: Jane M. Heffernan, PhD Applied Mathematics
- ▶ 2005 Canadian Applied and Industrial Mathematics Society (CAIMS) Doctoral Dissertation Award: Lindsay Anderson, PhD Applied Mathematics
- ▶ 2005 Silvana Ilie, PhD Applied Mathematics, nominated for the John Butcher Prize at the International Conference on Scientific Computation and Differential Equations (SciCADE), Nagoya
- ▶ 2006 Arthur Beaumont Distinguished Service Award (CAIMS), to Serpil Kocabiyik, PhD 1987 Applied Mathematics.

One cannot then ask, "Why are there no female PhDs in applied mathematics?" One might have to ask, "Why are none of them applying for the positions you are advertising?"

In 2004, the graduate student population ratio in Applied Mathematics at UWO reached balance - twelve men and twelve women. It has since receded but one expects future gains and eventually rough stabilization. Thus, the record in Applied Mathematics at Western shows evidence of some success in recruiting and training highly able women. How was this accomplished?

During the period 1996-1999, I was the CAIMS delegate to the Canadian Mathematical Society's committee for Women in Mathematics (CMSWIM). This came about because Anna Lawniczack, then president of CAIMS, saw me at the Celebration for

Women in Mathematics, an interdisciplinary conference at which I was one of only three or four men in attendance. In carrying out my duties as a CMSWIM member, I asked questions on my travels. The question I repeatedly asked whenever I saw a noticeable concentration of women in a mathematical science group was - "What is the local administration doing right?"

With one exception, the answer was "It's [so -and- so]; he [she] is a wonderful person, and it's really great to work with him [her]." This statement of personal warmth is in agreement with the work *Talking about Leaving* (1995), by Elaine Seymour and Nancy Hewitt, and with my own observations of the (to me, unprecedented) degrees of warmth used in introducing the speakers at the 1998 Celebration of Women in Mathematics. The exception: From a graduate student in algebra in European country X (in that country, to a first approximation, all algebra graduate students are women): "Well, it's not so much the University. It's industry. They are so chauvinistic [in this country]." Here, the reason for the presence of so many women in the academic program is not warmth but rather the relative coldness outside the academic environment.

But the useful lesson for Canadian academics is to try to be warmer and more personally welcoming. There is some academic research in favour of this approach documented by Seymour and Hewitt (1995): the single most common factor cited by students (especially women) for leaving science and engineering was the lack of personal contact. For those who remained, the lack of personal contact was the highest ranked factor of dissatisfaction.

Obviously, warm behaviors and personal attention need to be rule-governed. All reputable universities have well-developed equity policies and rules against harassment. Encouraging a friendlier attitude on the part of (often male, often divorced) faculty members towards female graduate students is absolutely not meant to encourage unwelcome attention - quite the opposite, as

a harassing environment is decidedly not a welcoming one. First, the students must feel secure. The second observation is that mathematicians are not widely known for their social skills. To be sure, there are many who are competent, and some who are not just competent but even charming. But we have to acknowledge that there are also many who are socially backward. Others are downright unpleasant and some may even be misogynistic. This is where explicit communication of rules comes in.

Assuming that rules have been communicated and are being followed, what then can faculty members do to make women feel more included? Among those men who are not welcoming to women but who are not misogynistic, one way to account for their cold or awkward behavior towards women is fear. Male academics, especially men in the sciences, may not have spent very much time around women and may not be that comfortable in their presence. To such men the best advice we can offer is to relax. However, there can be no set prescription as to how exactly to behave as people and their backgrounds vary a great deal. Some people may find a handshake off-putting and too much, while others may find a handshake too cold and too little. Probably the best advice is to take an interest in other people. We should all make it a practice to try to learn names of our students and the names of their family members, as well as paying attention to students' outside interests. This is all part of listening actively and attentively.

Paying attention to the wide variety of communication styles matters in other ways, as well. My first female PhD student once asked me, somewhat angrily, after a talk by a woman mathematician, "Why were they so aggressive towards her?" I was very surprised, because the level and intensity of the questions had indicated to me that the audience was extremely engaged with the topic. They weren't quite shouting in excitement but they were louder than normal. In applied mathematics there are many styles because it is inherently interdisciplinary. We have to be able to talk to lots of different

groups of people. Some groups' styles (for example, those in medicine and finance) might be more rough, or even hostile, while others (for example, in theoretical physics) might be supportive or even nurturing, and this needs to be taught explicitly. Students need to learn that not all apparent hostility is necessarily as nasty as it might first appear.

This paper reports on the apparent success of some informal steps taken in Applied Mathematics at Western. Specifically, the recruitment of graduate women students was increased when extra weight was given to some non-standard factors, for example, a profile of increasingly good undergraduate marks, with the trend indicating that perhaps the student does better with more "interesting," that is, challenging, material. Another student was recruited by special appeal (after having been turned down centrally) based on a separate investigation of the quality of her undergraduate institution. This student went on to complete her Masters in under a year, a record for the department, and now has published several papers. The bottom line is that by being more open in recruiting we attracted several excellent students we might not otherwise have. The steps taken to promote student retention, namely an explicitly greater degree of personal warmth than previously thought necessary, may also have contributed to this success. This is hard to say, definitively: it wasn't done scientifically. To make further improvements by policy, we will have to borrow from the successes of Philosophy. Most important of the missing features so far is a good feedback mechanism. In Philosophy the Committee on Women's Concerns provides material for a report on ongoing problems and itself gives an empowering voice to female students. Such initiatives are usually resisted passively in the sciences as being "just one more bureaucratic timewaster," but it seems clear the benefits outweigh the costs, as shown by the success in Philosophy. It also seems clear that at least some selected male faculty members must take a turn serving on this committee in order that our female faculty (present and future)

not be charged solely with the task. We believe that there are some faculty members in the department who would be able to serve conscientiously in this role. Trust is clearly essential, and one of the ways in which this person needs to be trusted is to pass the issues on to an appropriate senior administrator, if necessary.

Best Practices for Warming the Environment

Although our experiences in philosophy and applied mathematics are different in certain respects, there are, we believe, some common lessons to be drawn.

The first concerns the way we think about excellence. Put bluntly, we can't think about excellence and gender apart from one another. When we are asked as chairs to think about our departments' areas of research expertise it is tempting to look around and think about what it is that "we" do best. But if "we" is a group of mostly male, often older academics, then that process might miss out on both exciting new areas of research as well as those areas of research more likely to be pursued by women. We cannot assume that defining a research area and then looking for excellent women is a gender-neutral way forward. The very description of the research area may itself contain gender bias. To give an example from philosophy: we have recently taken to adding the phrase, "feminist and historical approaches are welcomed," when advertising tenure-track positions in the field of ethics and political philosophy because people working in the area of feminist ethics may not feel they ought to apply for positions in the general area of ethics. Whether this perception of ethics as meaning only mainstream ethical theory is correct doesn't really matter. What does matter is that we've received applications we wouldn't have otherwise received when we explicitly say we welcome feminist approaches in the field. Obviously this is more problematic in Applied Mathematics, though even here there are more women in some areas than in others. Mathematical biology is the easiest example

of an area that has attracted more women but it is not the only such field. In our opinion, Mathematical biology has more women than other fields do, not because women are more attracted to biological mathematics, but rather because it is a newer field.

The second is that female role models and mentoring really matter. Typically it is claimed that role models in non-traditional subjects matter for women but it is just as true, or more so, that having female role models and mentors matters for young men. Among the graduate students in philosophy, for example, it has made a tremendous difference that some of the very best students, in the sub-disciplines thought to be the toughest, have been women. This undermines any bias with which the students might begin their studies and over time the ability of women in the area comes to seem more natural. In our experience, it also matters having women in leadership roles at the level of the university's senior administration for many of the same reasons.

The third is that a warm, welcoming environment is more than one in which the rules are being followed. None of this is to say that following the rules is not of utmost importance. For a very helpful text on the need for administrators to pay attention to knowing and communicating an institution's rules, we recommend *The College Administrator's Survival Guide* (2006) by C.K. Gunsalus. But while following the rules is necessary for a warmer climate, it is clearly not sufficient. We need also to focus on creating inclusive intellectual communities that allow for research connections across fields and disciplines, and in which diverse people feel comfortable.

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