

**Women in Mathematics:
Participating, Surviving, and Succeeding**

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A talk in honor of Audrey Terras

Introduction. Everyone in this room either has been or will be a target of abuse, or they know someone who has been or will be. If we as a community are to battle this effectively, then we need to admit the problem, understand how it manifests itself, know and employ strategies for survival and success, and be constantly pursuing activities to improve the climate and culture in mathematics.

In this talk I will be focussing on women in mathematics and their struggles. This is not to say that every woman in mathematics will face these struggles, or that these struggles are experienced only by women, or only in mathematics. However most, although not all, my information has been collected from women in mathematics. Much of what I will say is quite generic.

I know that some things I will say today are bound to make some people uncomfortable; this is not my intent. My intent is to inform and to educate. For our community to be effective in gaining the full participation of all mathematicians, we need to recognize barriers, ascertain means of getting around or under them, and ways to erode them. We need to be able to recognize abuse when it happens, and support its targets. We need to be constantly working toward changes that make abuse less frequent and less successful.

We need to fight, and we need to win.

Outline of talk:

- I) The general situation for women in mathematics.
- II) Harassment, discrimination, and abuse
 - a) Ways these are manifested
 - b) Emotions experienced by the target
 - c) Various survival strategies
- III) What we as a community can constantly be doing to improve the situation.

The general situation for women in mathematics. Each year in the US, women earn about 42about 25universities, only about 4women. At mathematics conferences, there are typically only a handful of women speakers, and sometimes there are none.

Clearly our community has not yet been successful in gaining the full participation of women mathematicians.

In high school and college, math skills are often judged, or misjudged, by students' performances in math contests, or by who most quickly answers questions posed in a lecture. Women, more often than men, are not eager to participate in contests. They are taught not to interrupt and stereotypically prefer to give some thought to an answer before stating it out loud; but often the lecturer does not allow time for such thought.

Often when professors recognize a talented female math student, they try to "help" her by coddling her, sheltering her, not letting her struggle with tough problems. This means she does not gain the confidence that comes through solving difficult problems on her own, and she may not learn the independence necessary to succeed in graduate school and in the profession. The experience of struggling and triumphing is powerful. Our students need to have this experience of triumph. It is particularly important that our female students, who typically underestimate their talent, have this experience. We need to challenge our students, making it clear we believe in their talent and expect them to excel.

For various reasons, many women mathematicians accept faculty positions at 4-year colleges and often do not pursue strong or lasting connections within the research community. Women do not volunteer often enough to be speakers at conferences. Hardly any women apply for NSF research grants. Women tend to downplay their accomplishments and their ideas, in conversation, in their talks, and in their grant proposals. Too often women become invisible in the research community. And too often women become the targets of harassment, discrimination, and abuse.

Harassment, discrimination, and abuse. I find I must now address my remarks to women who have been or will become the targets of abuse. However, it is important everyone hear these remarks because our community needs to be ready, willing, and equipped to support those being attacked and abused.

We are vulnerable, but we have unrealized strength. The horror stories we hear are true. What we don't hear enough about are the stories of surviving the horrors and subsequently thriving. We don't yet talk enough about what we as a community can do to remedy the situation and we don't yet, as a community, act enough on our ideas.

So far the burden of action has been taken on by a scarce few, but we all own this burden; we all have responsibility.

Ways harassment, discrimination, and abuse are manifested.

- Hostility: glares, sneers, nasty and malicious attitudes masqueraded as jokes, or comments reflecting an assumption that women don't belong in mathematics.
- Disparagement as a researcher: saying "She's a good teacher, but not really a re-

searcher,” or ”She doesn’t deserve her grant,” or ”She probably just typed that (coauthored) paper.” (This latter remark is so common that pre-tenure women are well advised to have some singly authored papers.)

- Prejudicial comments to students, faculty, staff and administrators: saying you are an uncooperative colleague or a bad influence on the graduate students, or telling the administration you are responsible for problems in the department.
- Rumors - within your department, your university, your research community: accusing you of having no standards in your classes, of being a slut, or of sexually harassing students.
- Isolation: being told that you are not allowed to talk to the staff or the graduate students, or that you need permission to enter the departmental mailroom.
- Intellectual isolation: not being invited to speak in seminars or conferences, or not getting departmental support available to others to pursue research opportunities.
- Deprivation of power and authority within the department and the university: making departmental decisions at the men’s urinal, or not allowing you to chair or even be on committees.
- Physical intimidation: bodily backing you up against a wall to disparage or attack your performance, or only approaching you in pairs, or leaving things in your locked office when you are away.
- Impeding professional development: damning you with weak praise, withholding tenure forms, or not moving forward necessary forms, discussions, or information to allow you to participate in research activities outside the department.
- Applying rules and standards unevenly: when deciding teaching loads, teaching assignments, merit raises, or promotions.
- Perpetual condescension. **THIS IS COMMON AND PERNICIOUS:** it can undermine your confidence and introduce strong self-doubt.

Together these have a powerful impact: obstacles are being hurled at you every week and every day, making it difficult to do your job, much less excel in it.

Just as with domestic abuse and incest, the abusers as well as other department (“family”) members typically expect the target to become a conspirator in her abuse by keeping it a department secret. (During my hell years I was told by department members, “Don’t hire a lawyer! Don’t talk about this outside the department - it will make us look bad.” Smartest thing I ever did was to hire a lawyer and to talk about my situation with friends and acquaintances in the research community.) Often the men in the department don’t notice when a woman is being abused - it is below their radar. Women in mathematics aren’t always supportive of other women, and in fact can be among those most harsh on

other women. These women are trying hard not to be associated with those they see as 2nd and 3rd class citizens - women. This is an understandable, although a destructive, reaction to their own fear or rage at the treatment of women.

Some people won't believe your horror stories until they witness the abuse. Many people, including women, will be very uncomfortable when you tell your stories. They may treat you as a leper, as if being a target of abuse is contagious. This does not necessarily mean they don't believe you, but they are weak and don't want to help fight for justice. Most people are weak. **FIND THE STRONG PEOPLE.**

Unabused women are often the ones most doubtful that a woman being abused didn't deserve it or bring it upon herself. This is true with rape as well, but it's understandable: they desperately want to believe that by doing the "right" things they are guaranteed safety. There is no guarantee. The best safety we have is in a strong and supportive community and in learning to be strong ourselves.

You also need to realize that your institution will protect itself. The mechanisms they have in place to deal with ugly situations are unlikely to bring you satisfaction; they are there to protect the institution, not you. Know this, and find a support network to protect you.

Emotions experienced when being abused.

- "I'm crazy." Everyone I interviewed identified this as their first reaction to their abuse. It is critical to realize you are NOT crazy, this IS happening to you, and it is as horrible as you think. Often it takes other people telling you that this is happening to you, that it is wrong and horrible, for you to realize you are not crazy. But you cannot battle an enemy you refuse to identify. Identify this enemy, and fight.
- Disappointment: you will find most people are weak, lazy, unwilling to fight for justice; you will find that some people you thought were your friends, people you've stood by during their dark times, turn their backs on you in your time of trouble. But you will find some people, including some you didn't expect, are strong, standing by you, helping you fight. **FIND THE STRONG PEOPLE.**
- Powerless - but you aren't! Learn how to fight back.
- Fear - don't let this immobilize you! You need to fight.
- Hopelessness and despair - but don't quit if you love math! Don't believe the people who say you don't belong in mathematics. Fight for yourself and for what you love.
- Amazement and horror: how can these people hate you so much? Why do they want to destroy you? They are afraid of you - use this to your own advantage.
- Anger - **USE THIS!** Anger is a powerful emotion; harness it and use it.

*I sing sometimes for the war that I fight
Cuz every tool is a weapon if you hold it right.*

– Ani di Franco

The anger does not go away. Use it well. Don't let it destroy you. Don't let it become a bitterness that erodes you and your credibility; rather use it for something productive. Use it as energy to prove more theorems, give more talks, make more research connections, fight to make things better, reach higher. You are a target; do not become a victim.

Various survival strategies.

- Hire a lawyer: they are trained to fight and can do so on your behalf. **HIRE MUSCLE.** You need to concentrate on your work and on being strong. It's scary to hire a lawyer, it's scary to tell her about what you've been experiencing, to reveal how vulnerable you are. Do it anyway. Choose your lawyer well; only accept one who believes you and will fight for you. You can, and may need to, fire the first lawyer you hire and employ another.
- Don't just focus on your own suffering and mistreatment: this can be debilitating; fight for a larger goal.
- Find a role model.
- Work as an activist for a few hours a week: you do not need to be associated with an organization to do this. Define for yourself what it means to be an activist.
- Educate students about the treatment of women in mathematics: but don't just talk about the horror, talk also about women surviving and succeeding.
- Actively support young women in mathematics.
- Listen to music by strong women: play it **LOUD.**
- Read books in which women struggle and triumph. Some women I know wrote a mystery book in which they kill off their evil chairs.
- Cut loose in the safety of friends: scream, laugh, cry, play, plot, fantasize.
- **LAUGH!** Laughter is powerful.
- Cut your ties with those content with women being promoted from 3rd class to 2nd class citizens: they will hold you down.
- Strengthen your ties to righteous people with strength.
- Make sure you know the number for campus police.
- Make your home feel very secure.
- Lift weights - **FEEL STRONG.**
- Buy a big truck - **FEEL STRONG.**
- Apply for grants!

- Go to more conferences and volunteer to speak.
- Make more research connections.
- Run conferences celebrating women mathematicians.
- Prove theorems! Never forget you ARE a mathematician.
- Do what the abusers tell you not to do: they tip their hands in this way and reveal what they're afraid of.

You may cry a lot - BUT DON'T LET YOUR ABUSERS SEE YOU CRY. Put up a strong front. This may begin as a bluff, but it's like a self-fulfilling prophecy - it becomes real.

Being brave doesn't mean you don't feel fear;

It means you feel the fear and you do it anyway.

– whoever first said this, I first heard it from
Rheta Baron King, my mom

You are in a war for your life, your health, and your identity; you must not forget this. You must fight, and you must win.

Sometimes, having been punished in the mathematics community for being female, women mathematicians suppress their femininity. This does not spare them from the punishment, and they suffer more, having killed part of who they are. Instead, we should be celebrating that we are women.

It is critical that you have a strong support network; people from this network can help you realize you are NOT crazy, what's happening to you is awful and wrong. They can help you stand up to the abusers and, eventually, survive and win.

I say eventually since typically abusers don't give up easily. When their target doesn't buckle under their abuse, this makes them mad.

I have earned my disillusionment

I have been working all of my life

I am a patriot

I have been fighting the good fight.

– Ani di Franco

Fight for what is right! Don't let the abusers win by destroying yourself with bitterness. Take your well-deserved anger and use it for something positive. Help others learn to be strong so these bastards and bastards like them cannot destroy others. A STRONG NETWORK IS CRITICAL. If you don't already have one, find one and tap into it.

It is extremely helpful to have a reputation for honesty and reliability within your department and within your research community before abuse begins. It is important to

have an advisor who will back you up: if you are fairly young when the abuse begins, people in the research community are apt to ask your advisor about the situation. You do not want your advisor telling people you are hysterical and overreacting.

You must recognize that there are some battles that cannot be won. It is critical to have a strong and righteous support network to help you recognize when this is the case and remove yourself; often this means finding new employment. This does not mean you are weak. This can be a way of fighting back. Remember Harriet Tubman's Underground Railroad.

*Girl, next time he wants to know what your problem is
Girl, next time he wants to know where the anger comes from
Just tell him this time the problem's his
Tell him the anger just comes.*

– Ani di Franco

You will be different afterwards: less naive, and with a strength and toughness that will make some people uncomfortable. You will have survived something you didn't think you could. This allows you to reassess just what your capabilities and limitations really are. You will find you are stronger than you ever thought: you had to be. THIS IS POWER - USE IT! Your newly revealed strength will allow you to see new opportunities; take advantage of this. Reach higher!

Next time you kill me make sure I'm dead.

– Deadbolt

What we as a community can constantly be doing to improve the situation.

- Create comfortable working environments: respect individuals' desires, needs, and requirements; accept that we cannot mandate a person's emotions, identity, or sexuality.
- Support people: begin by getting accurate information regarding their situations, and find out how best to support their choices.
- Encourage strong female undergraduates to participate in summer math programs: PROMYS, REUs, EDGE,...
- Encourage women to apply for grants and offer to proofread their proposals: advise them to replace "may" with "will".
- Know of research and speaking opportunities and encourage women to volunteer: for instance, The American Institute of Mathematics Research Conference Center has a firm commitment to identify and include many women in their focussed research workshops.

- Invite more women to speak at conferences, seminars, and colloquia.
- Identify role models as well as hotshots who are supportive of women and, when appropriate, encourage or create mentoring or research connections.
- Challenge, don't coddle, women students and researchers: make it clear you believe in their talent and expect them to excel.
- Run Research Experiences for Undergraduates.
- Run programs like the Carleton College's Summer Mathematics Program for Women: such programs give advanced college women experiences in mathematics that help prepare them to succeed in graduate school; they solve difficult problems, give presentations, read research papers. They struggle and triumph, and learn to believe more deeply in their talent.
- Get good NSF program officers, institute directors, and mathematics society officials. This is a community responsibility, and we are the community.

*I know the biggest crime
 Is just to throw up your hands
 Say this has nothing to do with me
 I just want to live as comfortably as I can
 ...
 You got your whole life to do something
 And that's not very long
 Why don't you give me a call
 When you decide you're willing to fight
 For what you think is real
 For what you think is right.*

– Ani di Franco

Acknowledgements and thanks. Bless you and thank you, Audrey, for being a role model, a crusader, and a friend. We would not be as far along as we are today if it were not for you. As Doug Grenier has claimed, you are the patron saint of women mathematicians. Let us keep crusading.

Deep and heartfelt thanks to my family and friends, who stood by me in the hell years, helped provide me with the material for this talk, and helped me find the courage to finally put this talk together.

And thank you Ani - your music has certainly helped me through many of my days.