- Many behaviors are learned. So they can be unlearned.
- Perpetual learner, like a grad student in life.
- More when you are tired.
- ALSO: Add opposition between "lack of confidence" and "behaving like a man". Not to consider female characteristics as virtues. Learn to embrace them.

Disclaimers:

1. Math is my field.
2. There is emphasis in women because this is the group I know better. Many of the statements apply to other underrepresented groups (for instance, African American, LGTB, Latinos, …)

Some reasons why there is little diversity in math and some ideas to change this

- References to the articles mentioned here can be found at the end of these slides.
- This (always evolving) talk is posted in my website.
- Please send me any comment, suggestion, criticism, and relevant material, specially, anything that you found useful.

Undergraduate math majors: 43% are women

New PhDs in math: 28% are women

Postdocs in math: 21% are women

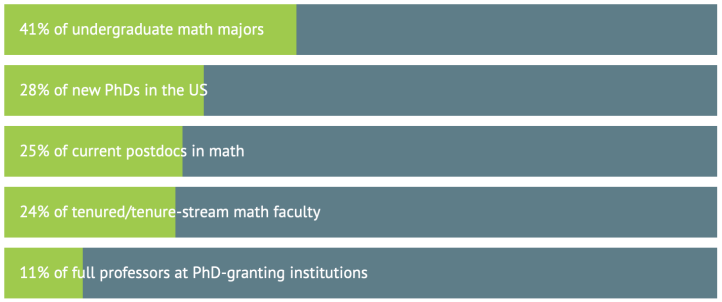
Tenured math faculty at PhD-granting universities: 12% are women

AMS prizes awarded at JMM 2014: 0% given to women

From AWM President Ruth Charney's column in the Sept-Oct 2014 AWM Newsletter.

https://www.womendomath.org/research/

As of 2015, women are…



Gender Breakdown of Mathematics Departments at Five Group I Private Institutions- 2015

Number						
	Bachelor's	PhD	Senior Faculty	Bachelor's	PhD	Senior Faculty
Harvard	20%	12%	4%	245	58	25
MIT	28%	20%	8%	663	139	51
Yale	26%	16%	6%	176	31	17
Princeton	15%	13%	7%	209	85	41
Brown	27%	21%	8%	113	42	24

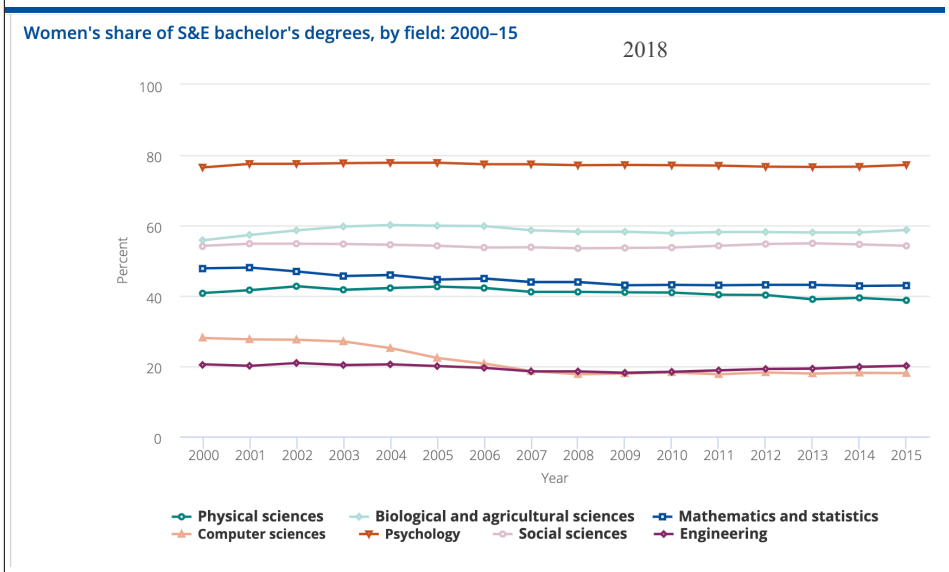
https://math.mit.edu/wim/2019/03/10/national-mathematics-survey/

Table 2: Profile of US math-related bachelors degree recipients as reported by the National Center for Education Statistics via its Integrated Postsecondary Education Data System (IPEDS).

	July to June Reporting Year		
	2002–2003	2007–2008	2012–2013
Domestic (US Citizen or Permanent Resident)			
Total Math-related Majors	15,183	18,298	23,505
Percent Female	46.4%	45.8%	44.0%
Percent Underrepresented Minority [1]	11.6%	11.4%	13.5%
Mathematics Education Majors	1,525	1,924	2,211
Percent Female	66.2%	67.3%	66.8%
Percent Underrepresented Minority [1]	7.4%	7.0%	9.8%
Foreign (Non-resident Alien)			
Total Math-related Majors	764	903	2,734
Percent Female	36.0%	39.8%	44.4%
Number of Math Education Majors	6	13	12
Domestic and Foreign majors combined	15,947	19,201	26,239

[1] Percent after deleting counts of individuals whose race/ethnicity was reported as *unknown* and, in 2012–2013, as *2 or more races. See* Data Source Notes on p. 661 of this report for further details on the data and the definition of underrepresented minorities.

https://www.ams.org/publications/journals/notices/201606/rnoti-p660.pdf



https://nsf.gov/statistics/2018/nsb20181/report/sections/higher-education-in-science-and-engineering/undergraduate-education-enrollment-and-degrees-in-the-united-states

	% of female grad students	% tenured women
Harvard	9.1	5.6
Brown	32.6	5.6
MIT	17.8	7.9
Yale	10.7	9.1
Chicago	27.8	9.4
Princeton	28.6	10.0
Cornell	28.1	10.3
Stony Brook	11.3	11.4
CalTech	12.5	11.8
UUIC	35.1	11.9
Texas-Austin	36.5	13.3
Michigan	29.4	16.9

Faculty and grad students body in some top math departments (Data from 2015 AMS website)

Why?

…and what can we do about it?

Why?

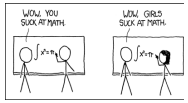
Why?

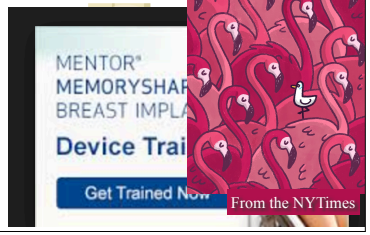
After her husband death, in **1710, Maria Winckelmann Kirch** asked the Royal Berlin Academy of Sciences if she could fill her husband's position as Royal Astronomer (she had been doing the job herself since her husband became ill). **The Academy refused.**

There were obvious obstacles in the past

In 1870, Sofia Kovalevskaya took private lessons with Karl Weierstrass, since the **university would not even allow her to audit classes.**

Why there is very little diversity in math ? Models, explanations, ideas.





- Gender schemas (Stereotypes)
- Implicit bias (self and from outside)
- Lack of role models (a vicious circle)
- Negative messages (expectations of brilliance..)
- Lack of mentors
- "Equal calls equal"
- Impostor feeling
- Isolation, feeling of not belonging.
- Accumulation of disadvantage.
- "Invisibility" of women
- Tendency to believe that "what it is is what ought to be.
- Variability hypothesis??????

THE NOT SO DISTANT PAST

SOJOURNER TRUTH

When did African-Americans get the right to vote in the US?

15th Amendment - **1870:** "The right of citizens of the United States to **vote shall not be denied** or abridged by the United States or by any State **on account of race, color, or previous condition of servitud**e."

The Voting Rights Act of **1965 prohibited** a range of **discriminatory state voting practices.**

The Supreme Court struck down part of the Voting Rights Act in Shelby County v. Holder (2013), holding that the racist practices which necessitated the law in 1965 no longer present a problem in 2013.

When did women get the right to vote in the US?

19th amendment, **1920** "The right of citizens of the United States to **vote shall not be denied** or abridged by the United States or by any State on **account of sex.**

Women and the right to vote

1893 New Zealand
1902 Australia (except aboriginal)
1906 Finland
1913 Norway
1915 Denmark
1917 Canada (except Indian)
1918 Austria, Germany, Poland, Russia
1919 Netherlands
1920 United States (with exceptions. Voting rights act in 1965)
1921 Sweden
1928 Britain, Ireland
1930 South Africa (except black people, until 1994)
1931 Spain
1934 Turkey
1944 France
1945 Italy
1947 Argentina, Japan, Mexico, Pakistan
1949 China
1950 India
1954 Colombia
1957 Malaysia, Zimbabwe
1962 Algeria

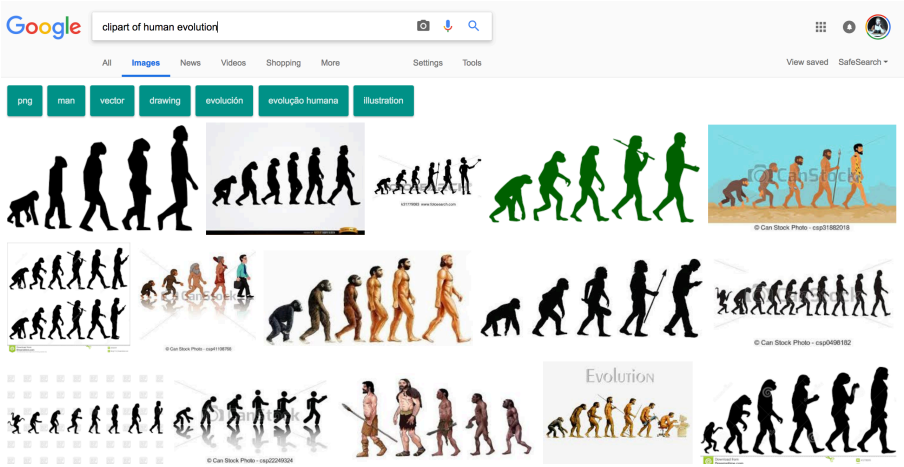
1963 Iran, Morocco
1964 Libya
1967 Ecuador
1971 Switzerland
1972 Bangladesh
1974 Jordan
1976 Portugal
1989 Namibia
1990 Western Samoa
1993 Kazakhstan, Moldova
2005 Kuwait
2006 United Arab Emirates
2011 Saudi Arabia

A (male) look a women's suffrage movement

Words, as time goes by

courtesan	**a woman who attends a royal court as a companion or adviser to the king or queen.**		**Courtier**
		a prostitute, especially one with wealthy or upper-class clients.	
Mistress	**a woman in a position of authority or control.**		**Master**
		a woman having an extramarital sexual relationship, especially with a married man.	
Governess	**a woman employed to teach children in a private household.**		**Governor**

Searching for an illustration that would help me put things in perspective, went to google images once more



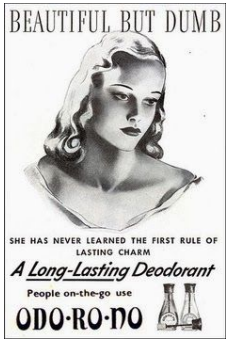
The conclusion seems to be the that humans evolved to be white and male… does this mean that some of us do not exist?….

Contributions to the accumulation of disadvantage.

1924 : Most men ask "Is she pretty?" not "Is she clever?"

Contributions to the accumulation of disadvantage.

1939



1952

We overheard that plaint … 'If my hair looks such a mess *one more* night, I'll kill myself!'"

Contributions to the accumulation of disadvantage.

1952

2011

THE STATUS QUO

This mother's day,
Get back to the job
that really matters

1965

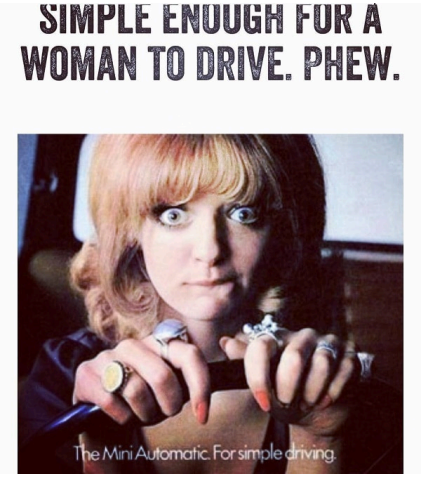
1934

Contributions to the accumulation of disadvantage.

2015

Contributions to the accumulation of disadvantage.

1970



2008

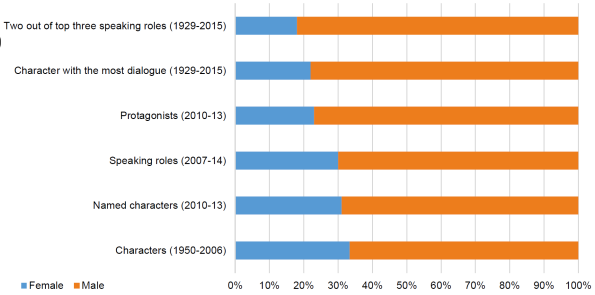
Used BMW's
You know you are not the first.
But do you really care?

Contributions to the accumulation of disadvantage.

Bechdel–Wallace test

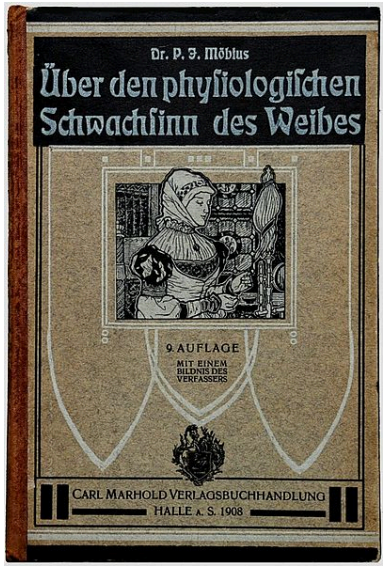
To pass the test, a movie, TV show (video game, comic..), must

1. have at least two women in it,
2. who talk to each other,
3. about something other than a man



Graph from Wikipedia

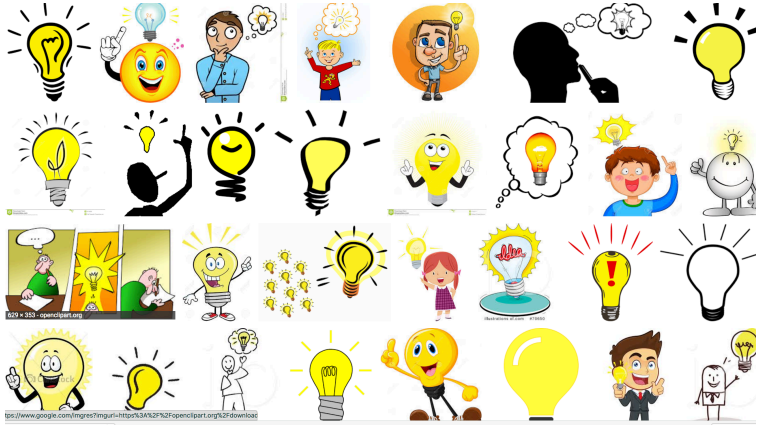
Variation: two ethnic minorities talk to each other for more than five minutes about something other than race



Contributions to the accumulation of disadvantage.

- On the Physiological Feeble-Mindedness of Woman, P.J. Möbius Published in 1900, by 1906, eight editions had appeared.
- (Irrelevant Coincidence: P.J. Möbius was the grandson of Augustus Möbius Band.)

While preparing a talk, I wanted to emphasize an idea. I searched in Google for the classical cartoon with a person and floating lightbulb



Human beings in"idea clipart" are male with one exception and white, with no exceptions.

In the last 12 years,

- **women** made up, on average, **24% of the bench**,
- **32% of interruptions** were **of the female justices,**
- **4%** were **by the female justices**.

	% Women	%interrup. to all women	%interrup. to each woman
1990	11.11%	35.70%	35.70%
2002	22.22%	45.30%	22.65%
2015	33.33%	65.90%	21.97%

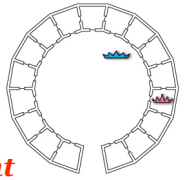
Jacobi and Schweers, 2017

..don't forget that Ginger Rogers did everything Fred Astaire did, ...backwards and in high heels."

THE STATUS QUO IN MATH

NUMBERPLAY

The Princess Problem



BY GARY ANTONICK JANUARY 27, 2014 12:00 PM

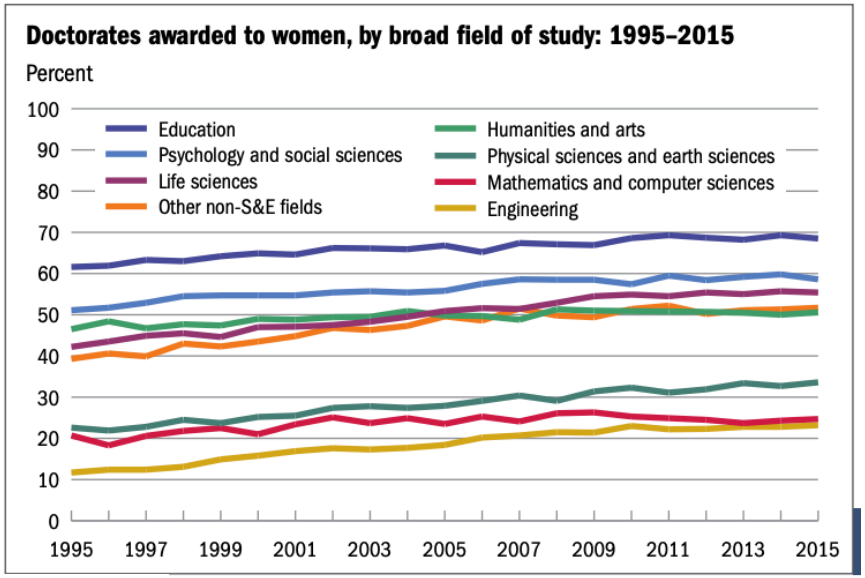
*A **princess lives in a row of seventeen adjacent rooms,** each connected by a door to each room next to it. Each room also has a door to the outside. The princess enjoys the rooms but never stays in the same room two days in a row: at the end of each day she moves from the room she occupied to one of the rooms next to it (she chooses randomly).*

*On the first of June a **prince arrives from a faraway kingdom to woo the princess**. The princess's guardian explains the habits of the princess and the rules he must follow: Each day he may knock on a single outside door. If the princess is behind it she will open it and meet the prince. If not, the prince gets another chance the next day. Unfortunately the prince must return to his kingdom on July 1. Can he devise a strategy to make sure he meets the princess before then?*

Issues that contribute to the accumulation of disadvantage.

G. H. Hardy,1940 , A Mathematician's Apology,

No mathematician should ever allow himself to forget that **mathematics**, more than any other art or science, is a young **man's** game**.**



2015
DOCTORATE RECIPIENTS
FROM U.S. UNIVERSITIES

Applicants to SB Math Dept. 2015

Applicant Race (for 5 jobs out 5 posted)	Total Appl		Asian or Pacific Islander		Black		Hispanic		Other		White		Unknown		Int'l Appl	
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Male	1008	80.51%	329	79.66%	10	100%	33	86.84%	27	81.82%	602	83.03%	7	21.21%	302	82.74%
Female	216	17.25%	83	20.10%			5	13.16%	6	18.18%	121	16.69%	1	3.03%	54	14.79%
Unknown	28	2.24%	1	0.24%							2	0.28%	25	75.76%	9	2.47%
Total Appl	1252	100%	413	32.99%	10	0.80%	38	3.04%	33	2.64%	725	57.91%	33	2.64%	365	29.15%

17%

- In 2014-2015, 1214 Ph.D.s in pure math were granted in the US
- 26% of those were granted to women.

Women disqualify themselves

Imposter Syndrome or Feeling

Two American psychologists, Pauline Clance and Suzanne Imes, coined the term in 1978

They described it as a **feeling of "phoniness in people who believe that they are not intelligent, capable or creative despite evidence of high achievement."** While these people "are highly motivated to achieve," they also "**live in fear of being 'found out'** or exposed as frauds."

Two issues are sometimes merged under the impostor feeling umbrella: "feeling like a fraud" and "being treated like a fraud". Implicit bias refers to the former.
The latter is discuss in the following slides.

Implicit bias

- **Implicit bias manifests in expectations or assumptions about physical or social characteristics dictated by stereotypes that are based on a person's race, gender, age, or ethnicity.**
- Many experiment suggest that people who intend to be fair, and believe they are egalitarian, **apply biases unintentionally.**
- Some behaviors that result from implicit bias (…) can either can reduce the quality of the workforce or create an unfair and destructive environment.

Jo Handelsman and Natasha Sakraney
(President Obama's)White House Office of Science and Technology Policy

Ranks of men and women in academia

- (…) men and women [in academia] start out on roughly equal footing.
- (…) several years down the line, the men are earning more, and they are being promoted at a faster rate than the women are.
- (…) in a group of people with outstanding early promise, will the men and women advance equally in academia? (..) After 10 to 12 years, the men were almost a full rank ahead of the women.

Virginia Valian, 1998

Publishing in academia

- (…) men in academia publish more than women do,
  - Even when you control for productivity, men still advance more rapidly than women do.
  - Although **men publish comparatively more papers, women's papers have a higher citation rate**

Virginia Valian, 1998

SEXUAL HARASSMENT

Is it sexual harassment? How would you proceed?

- You (a grad student) are in a in conference. A senior person approaches you and starts talking about the talk you both just attended. You listen attentively, asking an occasional question. The senior person looks at you in the eyes and caresses your shoulder.
- You (a grad student) are in a in conference. Along the whole weekend, a senior person sits at at your side in *every* talk and constantly fixates eyes on you.
- You (a grad student) receive insistent offers of intimate nature from a senior person.

Sexual harassment

sexist hostility:

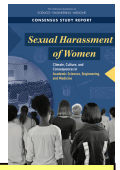
gender harassment: "put-downs"

crude harassment

Unwanted sexual attention "come-ons"

Impact ≠ Intent

Sexual coercion



Both women and men can and do experience all three forms of sexual harassment, but some subgroups face higher rates than others (e.g. LGTB, POC)

Sexual Harassment of Women, Nac. Acad. Science, Med, and Eng., 2018

Sexual harassment in academia

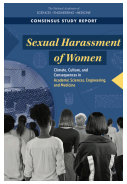
Academic workplaces are second only to the military in the rate of sexual harassment, with 58 percent of academic employees indicating they had such experiences, according to one study cited in the report.

"There is no evidence to suggest that current policies, procedures, and approaches have resulted in a significant reduction in sexual harassment,"

NYTimes-June 12 ,2018 about
Nacional Academies for Sciences, Engineering and Medicine

Sexual harassment undermines women's professional and educational attainment and mental and physical health.

"The **cumulative** effect of sexual harassment is significant damage to research integrity and a costly loss of talent in academic sciences, engineering, and medicine."



2018 Report by Nacional Academies for Sciences, Enginering and Medicine

Create Diverse, Inclusive, and Respectful Environments

Hiring and Promotion: Take explicit steps to achieve greater gender and racial equity in hiring and promotions, and improve the representation of women at every level.

- The University of Michigan Committee on Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) offers Faculty Recruitment Workshops for faculty members with an important role in faculty recruitment.

Civility Promotion: Combine anti-harassment efforts with programs to promote civility.

- The 2016 EEOC Task Force on the Study of Harassment in the Workplace recommends workplace training focused on respect and civility.
- The Civility, Respect, and Engagement at Work (CREW) program is an intensive 6-month intervention geared to enhance employees' interpersonal awareness and communication skills.

Interrupt and Intervene in Inappropriate Behavior: Utilize training approaches that develop skills among participants to interrupt and intervene when inappropriate behavior occurs.

- Bystander intervention training such as Confronting Prejudiced Responses (CPR) and Behavior Modeling Training (BMT) is designed to train participants to recognize and report problematic behavior.

Training that Aims to Change Behavior: Training should focus on changing behavior, not on changing beliefs.

- Programs should clearly communicate behavioral expectations and specify consequences for failing to meet those expectations. Training programs should not be based on the avoidance of legal liability.

Improve Transparency and Accountability

Clear Policies: Develop and share clear, accessible, and consistent policies on sexual harassment and standards of behavior. Make clear that people will be held accountable for violating the policies.

- Include a range of clear disciplinary actions that correspond with the severity of the harassment.
- Engage the academic community in policy and practice reviews. Some institutions have created student advisory boards and forums for students to meet with the Title IX Steering Committee.

Transparency about Handling Reports: Be as transparent as possible about how the institution is handling reports of sexual harassment.

- Yale University publishes a semiannual Report of Complaints of Sexual Misconduct and an annual campus safety report to inform the campus community.

Assess Climate: Utilize climate surveys to further investigate and address systemic sexual harassment.

- The results of climate surveys should be shared publicly to demonstrate to the campus community that the institution takes the issue seriously. The Administrator-Researcher Campus Climate Collaborative (ARC3) survey has been used by more than 150 higher education institutions.

Research Integrity: Consider sexual harassment equally important as research misconduct in terms of its effect on the integrity of research.

- The U.S. Geological Survey and the Department of the Interior have broad scientific integrity policies that apply to employees, appointees, volunteers, grantees, and contractors. Some scientific societies such as the American Geophysical Union have developed new ethics policies that explicitly call out sexual harassment and discrimination.

Diffuse the Hierarchical and Dependent Relationship Between Trainees and Faculty

Mentoring Networks: Adopt mentoring networks or committee-based advising that allows for a diversity of potential pathways for advice, funding, support, and informal reporting of harassment.

Independent Research Funding: Develop ways research funding can be provided to the trainee rather than just the principal investigator.

Provide Support for the Target

Access to Support Services: Provide means for the target of harassment to access support services (social services, health care, legal, career/professional).

Informal Reporting: Provide alternative and less formal means of recording information about the experience and reporting the experience.

- Provide anonymous, confidential reporting systems. Callisto is an online system that allows targets to control the disclosure of information, access supportive services, and share information on alleged perpetrators.
- Provide confidential reporting channels outside of the faculty or usual workplace hierarchy, such as an ombudsperson.
- Explore the use of restorative justice processes. The Campus PRISM (Promoting Restorative Initiatives for Sexual Misconduct) Project calls for accountability through collaboration and prevention through education.

Prevent Retaliation: Develop approaches to prevent the target from experiencing or fearing retaliation in academic settings.

- Be prepared to take action to ensure the target of the harassment is able to continue his/her academic work. This could include using mutual no contact orders between the accused and accuser, changing class schedules, changing the locks at the housing facility or workplace, rescinding building access for the accused, and reassigning advisors, mentees, and supervisors.

Strive for Strong and Diverse Leadership

Make it an Explicit Goal: College and university presidents, provosts, deans, department chairs, and program directors must make the reduction and prevention of sexual harassment an explicit goal of their tenure.

Develop Leadership Skills: Support and facilitate leaders at every level (university, school/college, department, lab) in developing skills in leadership, conflict resolution, mediation, negotiation, and de-escalation, and ensure a clear understanding of policies and procedures for handling sexual harassment issues.

Move Beyond Legal Liability: Leadership training programs should include training on how to recognize and handle sexual harassment issues, and how to take explicit steps to create a culture and climate to reduce and prevent sexual harassment—and not just protect the institution against liability.

The National Academies of SCIENCES ENGINEERING MEDICINE

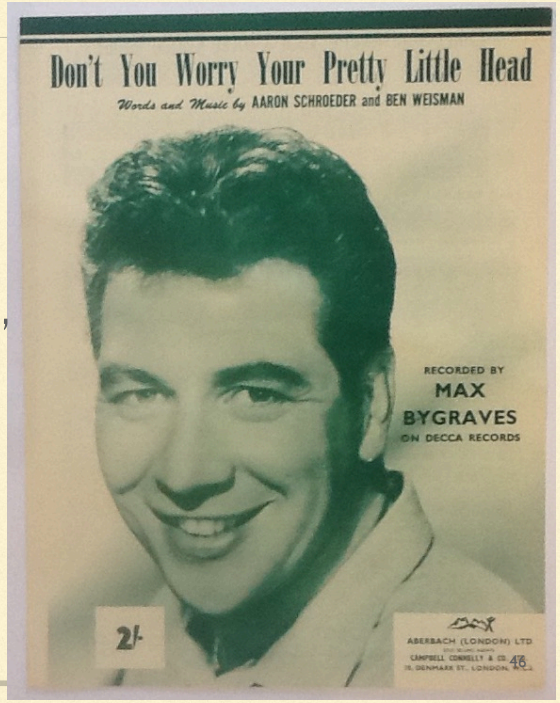
This brief is based on the findings and recommendations in *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine* (2018). Copies of the Report are available from the National Academies Press, (800) 624-6242; http://www.nap.edu or at www.nationalacademies.org/sexualharassment.

Sexual harassment in academia: Suggestions of what to do/advice

- Read the Callisto Survivor's Guide. https://www.projectcallisto.org/survivors-guide.pdf
- Document as much as possible: Write it down with details, take pictures, save messages, emails.. If possible, document before talking to anybody, and with a time stamp.
- Try to find people who went through the same situation.
- Report when and if you are ready.
- Tell a friend.
- Talk to a therapist
- Have an answer prepared

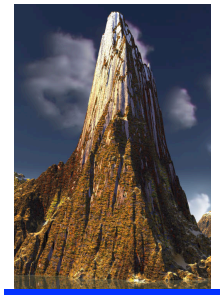
Inspired on Sexual Harassment of Women Report, Nac. Acad. Science, Med, and Eng., 2018

POSSIBLE EXPLANATIONS, MODELS



Accumulation of disadvantage

- **nothing seems overtly wrong** in most work situations, especially in academia and science, where the **meritocratic ethos** is so prominent.
- People are often unable to perceive or assess **how small imbalances can really add up.**
- Any single instance of bias is likely to be tiny, and someone might say, **you're making a mountain out of a molehill.**



Mountains are molehills piled one on top of the other

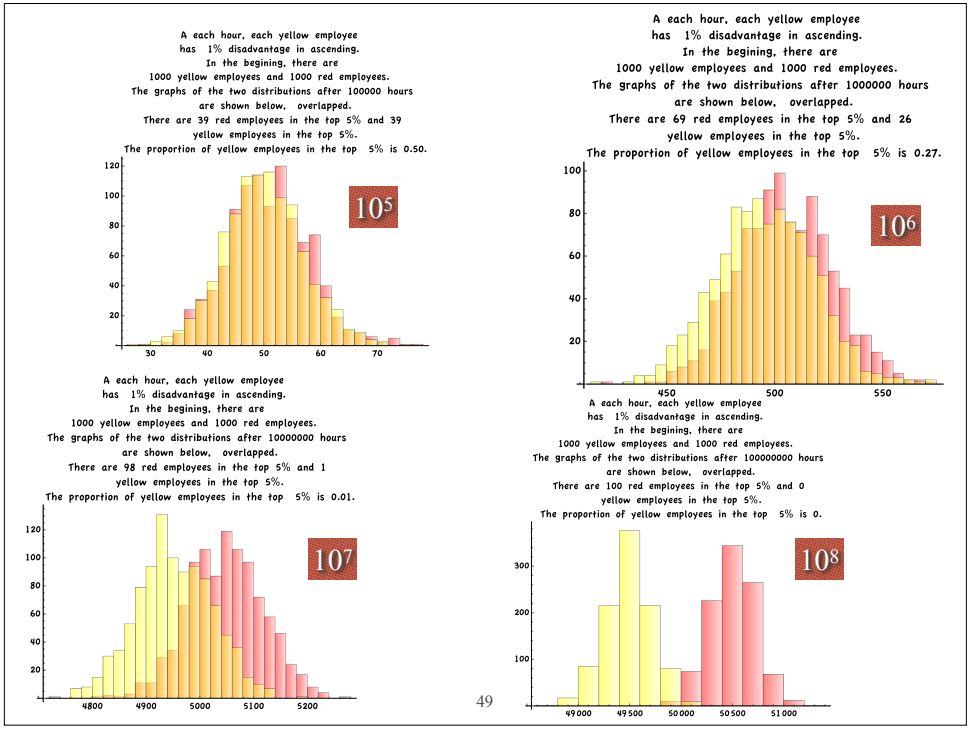
Virginia Valian, 1998

Accumulation of disadvantage

- Members of a simulated organization were assigned a score with a normal distribution.
- 1% of bias points were added to men.
- At the lowest level of the pyramid there were as many women as there were men.
- At the end of the simulation, top of the pyramid, the highest career level, the distribution was 65% men, 35% women.

The cause for such distribution is the repeated disadvantage of 1%.

Martell, David, Emrich, 1996



We tend to believe,

What is, is what ought to be…

(Naturalization of the status quo)

A typical math department from a research university

…nothing seems overtly wrong in most work situations, especially in academia and science, where the meritocratic ethos is so prominent. (Valian, 1998)

Lack of self-confidence

…**students who were not going on to Calculus II** choose from a list of potential **reasons,**

'I do not believe I understand the ideas of Calculus I well enough to take Calculus II.'

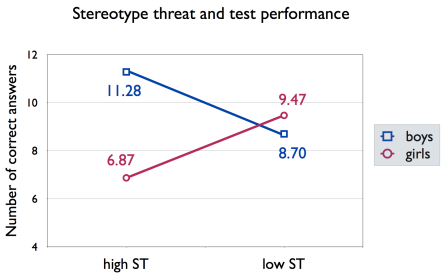
- Roughly **twice as many women as men chose this as one of their reasons.**
- Previous research suggests that the perceived lack of understanding by women is not because women do not actually understand the material as well as men;

Ellis, Fosdick, and Rasmussen, 2016

Stereotype Threat

An instance: Women taking a math test will perform less well when told that women aren't expected to do well in math than when they are told that they can do well.

Stereotype threat refers to a situation in which people are or feel themselves to be at risk of conforming to stereotypes about their social group..
If negative stereotypes are presented regarding a specific group, group members are likely to become anxious about their performance, which may hinder their ability to perform at their maximum level"



The effect of stereotype threat (ST) on math test scores for girls and boys. Data from Osborne (2007)

Steele, Aronson, Quinn, 1999

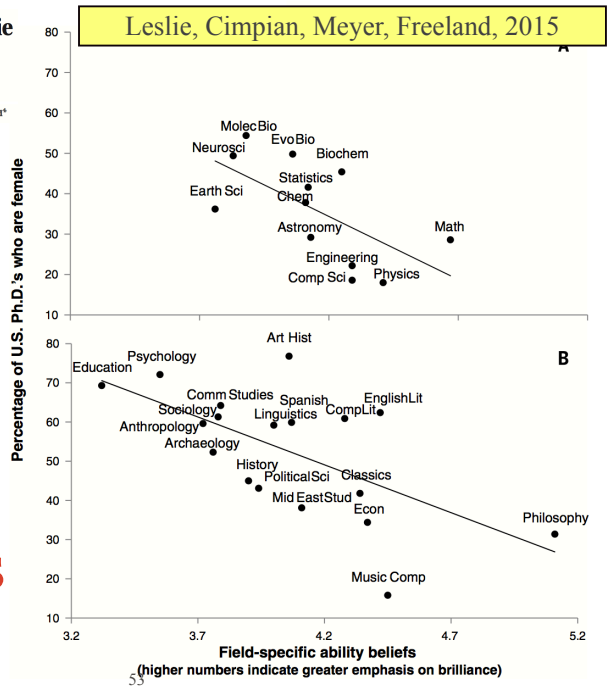
Expectations of brilliance underlie gender distributions across academic disciplines

Sarah-Jane Leslie,[1]*† Andrei Cimpian,[2]*† Meredith Meyer,[2] Edward Freeland[3]

We hypothesize that, across the academic spectrum, **women are underrepresented in fields whose practitioners believe that raw, innate talent is the main requirement for success, because women are stereotyped as not possessing such talent.** This hypothesis extends to **African Americans'** underrepresentation as well, as this group is subject to similar stereotypes.

Expectations of Brilliance

Leslie, Cimpian, Meyer, Freeland, 2015



Lack of role models

Role models

One of the initial difficulties I faced as a woman in math was the **lack of a role model**. Despite having kind and encouraging professors here at Stony Brook, **(often) being the only woman in the class, and not having a single female math professor resulted in self doubt. I found it hard to believe that women are good enough for math, or that I am good enough for math**. I blamed all my accomplishments on affirmative action. **This all changed once I met Professor Moira Chas.** Her passion for the subject, the vividness and enthusiasm with which she taught, dispelled every doubt I had with regard to the competence of women in math. Not only that, Moira helped, supported, and encouraged me through difficult times. I don't think I would have been where I am if not for Moira, and I want to pay forward what she has given me.

Apologies for the praise to Moira Chas, which is not the point of this slide.

Lea Kenigsberg (extract from her essay for an NSF grant proposal)

Thao Do (who scored highest from the SB team on the Putnam the year we finished 4th in the country)

An excerpt from an email she sent me when she was a Freshman at Stony Brook

"Interestingly, when I searched your email on gmail, I found out that you are the person who takes care of math club in our school, which I attend every week. Also, I think I met you once in the talk of Prof John Milnor. **I admire you a lot because I want to become a female math professor and I know that it is not easy."**

Role models (my personal experience)

Apologies for the praise to Moira Chas. It is not the point of this paragraph

Thao Do (who scored highest from the SB team on the Putnam the year we finished 4th in the country)

An excerpt from a recent email.

I find it very important to have women mathematicians around. At MIT we have a strong female community; each year there's a nice party, and several talks per semester where we invite successful female mathematicians come to share about their career path. Most of my friends at MIT now are female; **I live with 2 other female grad students which is great because we often share our insecurities,** how we feel stupid in math, how uncertain the future is and how hard it must be to find a tenure job nowadays.

Having a community

Gender schemas

- **Women may fear or suspect that their work will not be evaluated in same way a man's is**, so they need more documentation to back up what they are saying. **Men may be more willing to take a flier**, to come up with some intriguing hypothesis for which they have relatively meager data and just put it out there to be proven true or false. Women may believe, perhaps correctly, that they are less likely to be given the benefit of the doubt, and that their off-the-cuff ideas will be dismissed as foolish. **We associate risk-taking behavior with men, and we may be less tolerant of intellectual risk-taking in women.**
- In many professional situations, **our gender schemas have the effect of making a man seem slightly more qualified and competent than he is, and a woman slightly less**

Valian, 1998

Remember the words of former Harvard president Larry Summers?

There are three broad hypotheses about the sources of the very substantial disparities with respect to the presence of women in high-end scientific professions

- the first is what I call the high-powered job hypothesis… what fraction of young women in their mid-twenties make a decision that they don't want to have a job that they think about eighty hours a week.
- The second is what I would call different availability of aptitude at the high end, and
- The third is what I would call different socialization and patterns of discrimination in a search.

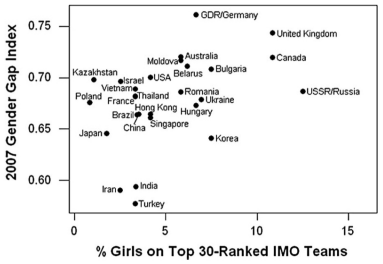


Fig. 3. Presence of females on top 30-ranked IMO teams strongly correlates ($r = 0.44$, $P < 0.05$) with measures of gender equity within countries. The IMO data for percentage of girls on countries' teams from 1989 to 2008 were taken from Table 4. The GGIs were taken from ref. 30.

Variability Hypothesis? Hill recent paper

Side note: tests developed in the US (…) include almost no questions requiring complex problem solving.

- US girls perform as well as boys on standardized math tests at all grade levels.
- Among the mathematically gifted, there may be as many as 2-to 4-fold more boys than girls.
- **This gender gap has been closing over time at all levels.**

Hyde and Mertz, 2009

WHY DIVERSITY?

Why diversity? (my take on it)

- We do not want to lose good mathematicians (by being biased)
- We should be fair, as fair as we can.
- Diversity helps to achieve excellence (by studying problems from different points of view)
- We want to attract and retain a diverse body of (grad and undergraduate) students, and a diverse faculty.
- To make High Authorities happy

IDEAS FOR INDIVIDUAL SURVIVAL AND CHANGE

Ideas for Individual Survival and change

- **Offer support** to someone else who feels insecure.
- **Find a community.** If you cannot find members of a community locally, follow a Twitter feed (#BLACKandSTEM or #womenandSTEM can serve as reassurance that they really do belong in science.)

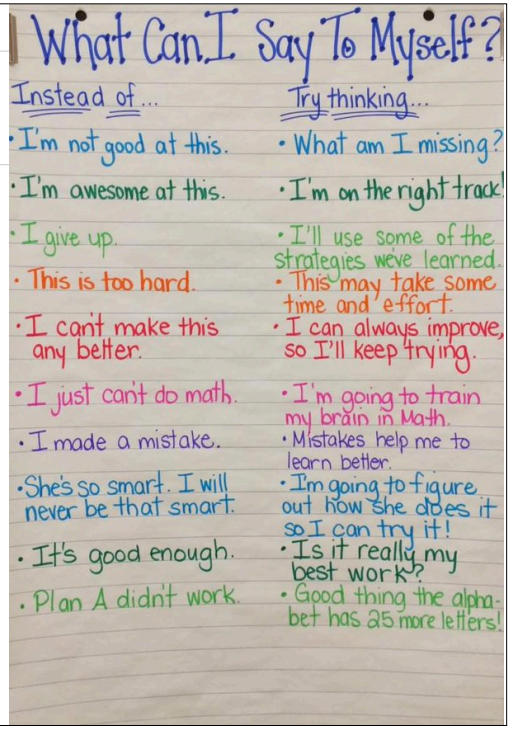
Ideas for Individual Survival and change

- Remember and remind people that **mistakes are valuable (if you learn from them)**. They help in the learning process and produce brain growth. (Jo Boaler)
- Do not interpret a failure as "I am not good enough at this".

Ideas for Individual Survival and change

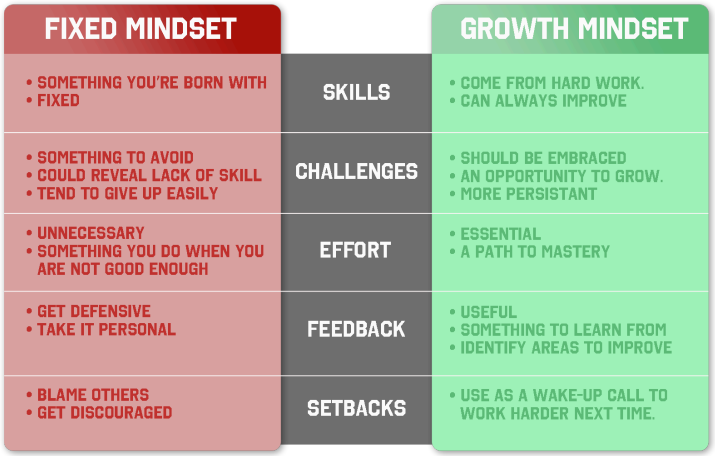
Emphasize the **"growth mindset"** as opposed to the "**fixed mindset**".

Possibles strategies for individual change: A list found in internet (unidentified source)



Ideas for Individual Survival and change

Emphasize the **"growth mindset"** as opposed to the "**fixed mindset**".



Ideas for Individual Survival and change

Advocate for yourself. This includes

- avoiding words such as 'just' and 'only' when describing your work,
- use the 'elevator talk' to talk to your colleagues about your math interests and achievements.

Ideas for Individual Survival and change

- My own private mantra: "It's not about me, **it is about math"**
- **Understand something really well** and share it with others.

Ideas for Individual Survival and change

Learn about gender schemas.

- Gender schemas are largely non conscious hypothesis we all have about the different characteristics of males and females.
- We see females as nurturing, as communal, and as doing things out of concern for other people.
- We see males as capable of independent action, doing things for a reason, and getting down to the business at hand.

Ideas for Individual Survival and change

- Do not apologize for every mistake, whether real or perceived.
- Consider using a more assertive language.

"I noticed the female justices say things like,

'**May I ask,' or, 'Excuse me**,'

before they actually get to the substance of their question, and **that's where they're most commonly interrupted…**"

Jacobi, 2017

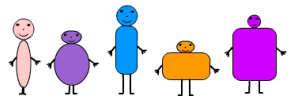
Ideas for Individual Survival and change

Imagine, in detail, people who violate expected stereotypes in a positive way and practice thinking about these positive examples.

Ideas for Individual Survival and change

Fake it until you make it?

This discussion is about a issues affecting certain groups of people,



- Not all members of these groups will be affected in the same way.
- Non-members of these groups might be affected by the same or similar issues.
- Outliers exists.
- Problematic situations occur with certain frequency but not all the time, and affect not only members of underrepresented groups.

In short, mathematics only exists in a living community of mathematicians that spreads understanding and breaths life into ideas both old and new.

The question of who is the first person to ever set foot on some square meter of land is really secondary.

Revolutionary change does matter, but revolutions are few, and they are not self-sustaining --- they depend very heavily on the community of mathematicians.
Bill Thurston

THANKS

Thanks

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- The section about mentoring owes a great deal to a talk by Abigail Stewart. https://www.drp-network.org/workshop-2018.html

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IDEAS FOR CHANGE IN HIRING PRACTICES

Ideas for change in hiring practices

- **Pause and question our schemas regularly**
- **Implicit bias makes us forget people who belong to certain groups.** Thus, it may be useful to make a conscious effort to bring those people "to the table" when organizing lists (of conferences, of candidates for a position…)

Ideas for change in hiring practices

- In fact, **widening the pool of female candidates does help**. Women progress faster through the ranks in those law schools with a high percentage of female faculty members than they do in schools where there are few female professors.
- **Studies have shown that when people are asked to rate a female candidate for a managerial job, they rate her more positively if she is one of several women in the candidate pool than if she is the only woman.**

Valian, 1998

Ideas for change in hiring practices

When assessing the behavior or performance of someone from a stigmatized group, try t**o focus on concrete positive and negative factors** and your memory of what actually happened, **rather than relying on overall "gut" feelings.**

Ideas for change in hiring practices

Instead of

"We particularly encourage applications from minorities and under-represented groups." write

"We aim to be a diverse and inclusive department."

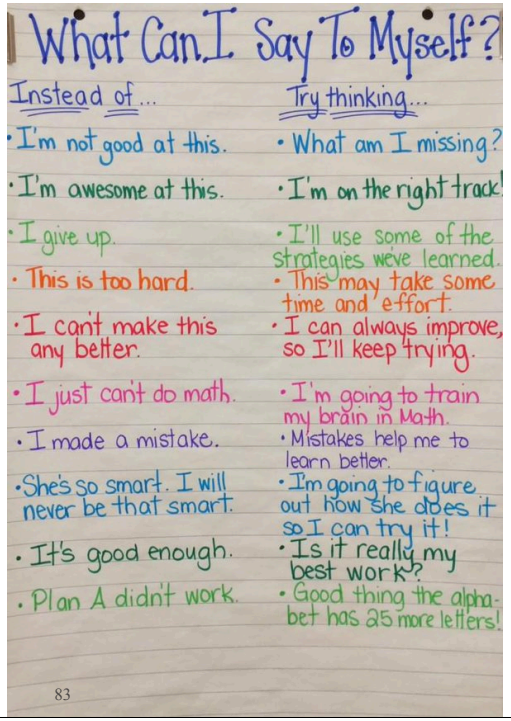
(unless you really have a diverse and inclusive department)

- Consider placing this sentence right after the sentence near the top, to make clear that it is not a pro forma interest.

Virginia Valian

ADVISING

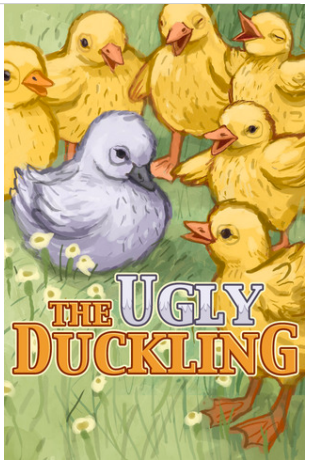
Ideas for advising: A list found in internet (unidentified source)



Advising students

The mentee/student's expectations:

- I don't belong
- I'm not good at this
- People like me can't do this
- You aren't like me
- You can't help me/you won't help me



Based on a talk by Abigail Stewart

Advising students

- **Surface-level differences** (like gender, race, age…) will **decrease "interpersonal comfort".**
- **Find deep level similarities (like values, tastes, experiences). Interpersonal comfort decreases anxiety and improves performance**.
- Seek out ways to collaborate or be on the same footing
- Consider creating interdependent "jigsaw" conditions, team projects where every member of the team has an individual task.
- Be aware that most likely, **you will have a certain degree of anxiety** in presence of a member of an underrepresented group.

Based on a talk by Abigail Stewart

Advising students

A mentor gives students access to an interpersonal relationship with a "role model" in an area where they are **trying out a "possible self"**.

This identification becomes more **difficult if you seem impossibly skilled.**

Based on a talk by Abigail Stewart

Advising students

How can implicit biases to affect the mentor-mentee relationship? The mentor might

- have lower expectations than the student can meet
- give overly positive feedback (because of low expectations)
- create a patronizing environment

It is important to be aware of our own implicit biases and how these biases might enter mentoring experiences

Based on a talk by Abigail Stewart

Advising students

Good mentoring practices

- Communicate high and reasonable expectations. Express confidence student can meet them
- Provide accurate and fair feedback
- Provide encouragement

Based on a talk by Abigail Stewart