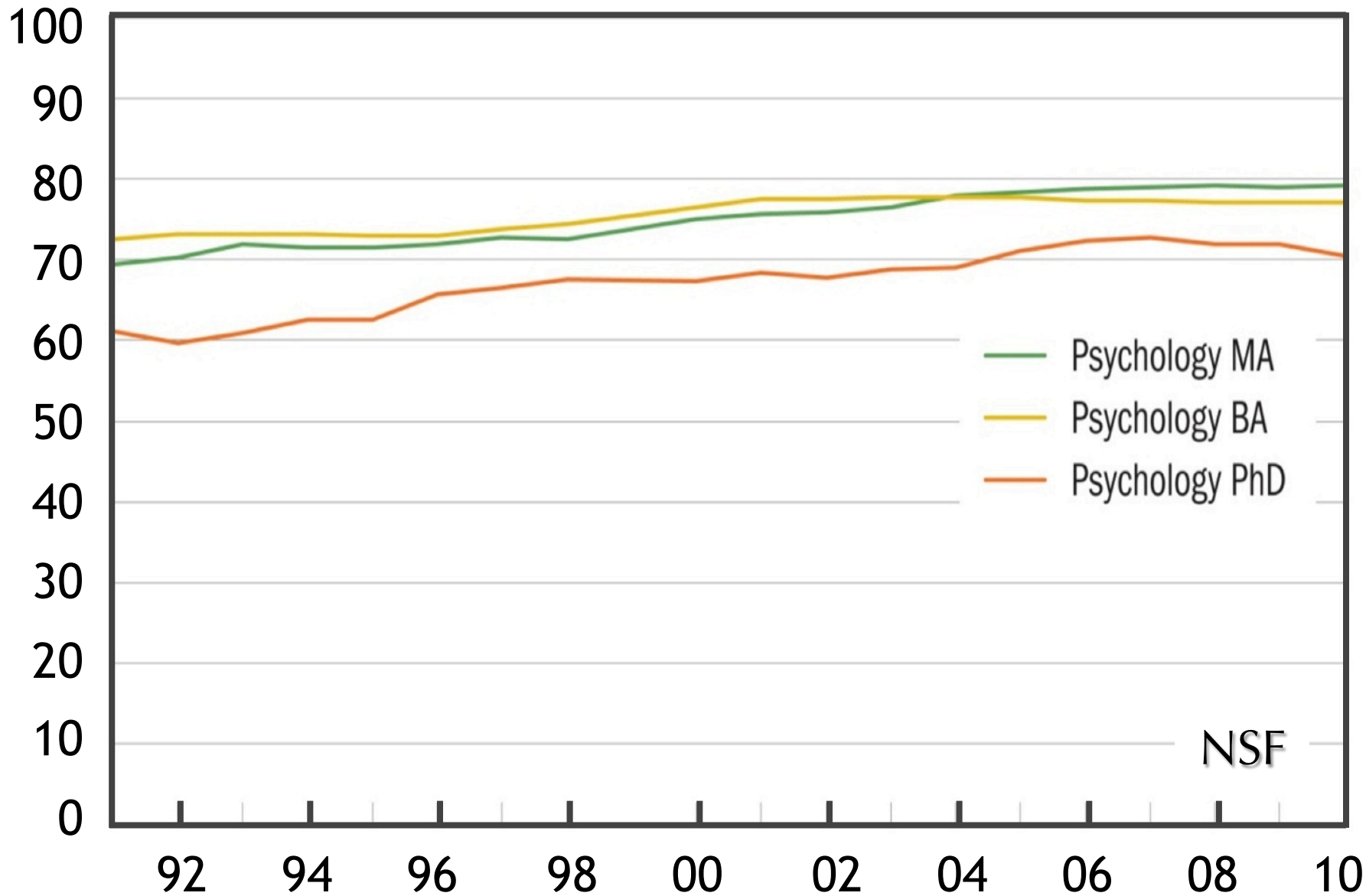


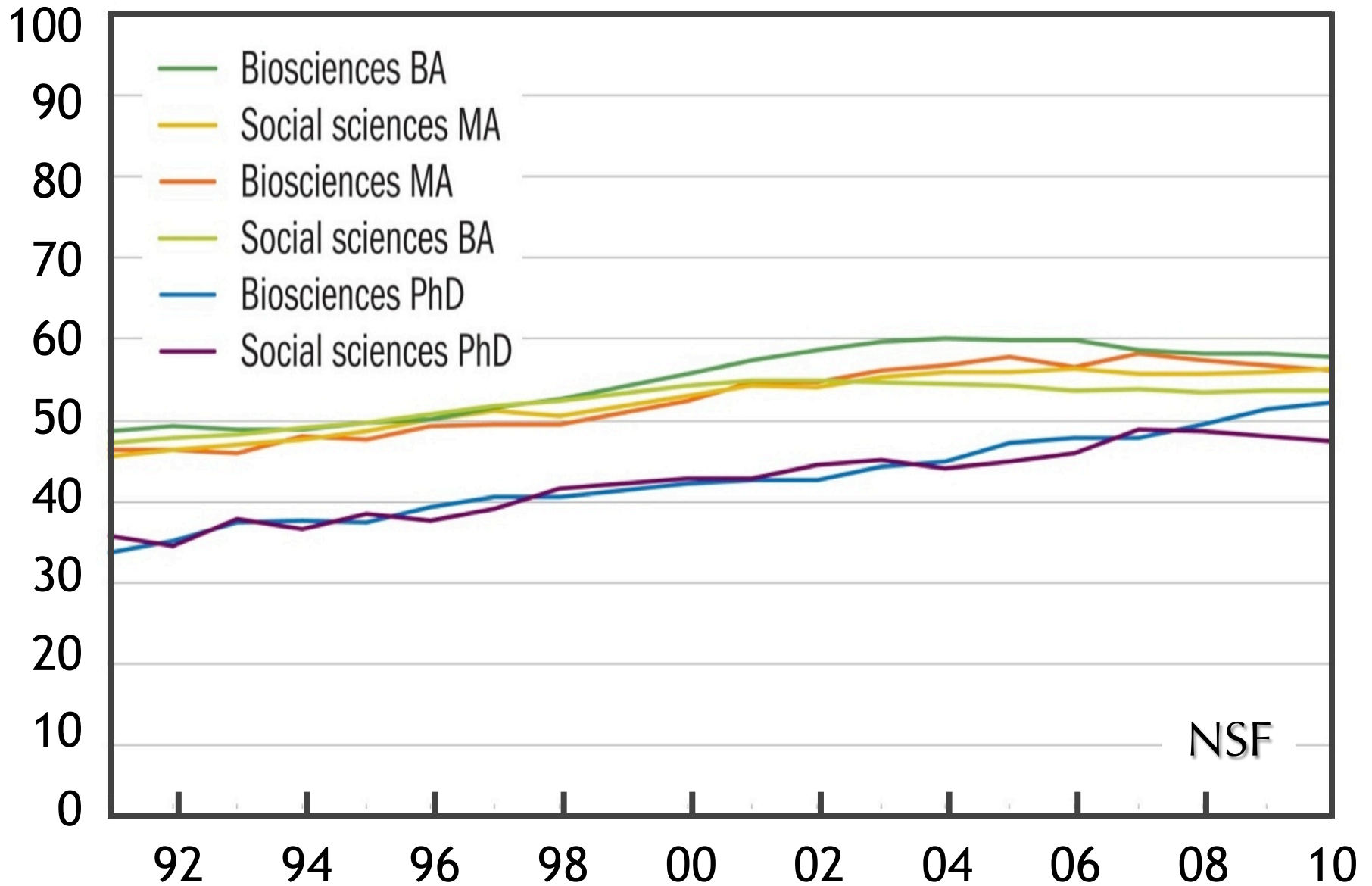
The background of the slide is a vast field of galaxies, likely from the Hubble Ultra-Deep Field. It features a wide variety of galaxy types, including spiral, elliptical, and irregular galaxies, in a range of colors from yellow and orange to blue and purple. The galaxies are scattered across the dark, black space, creating a rich, multi-colored cosmic landscape.

*Why So Few? Fixing the
Dearth of Women in Science*

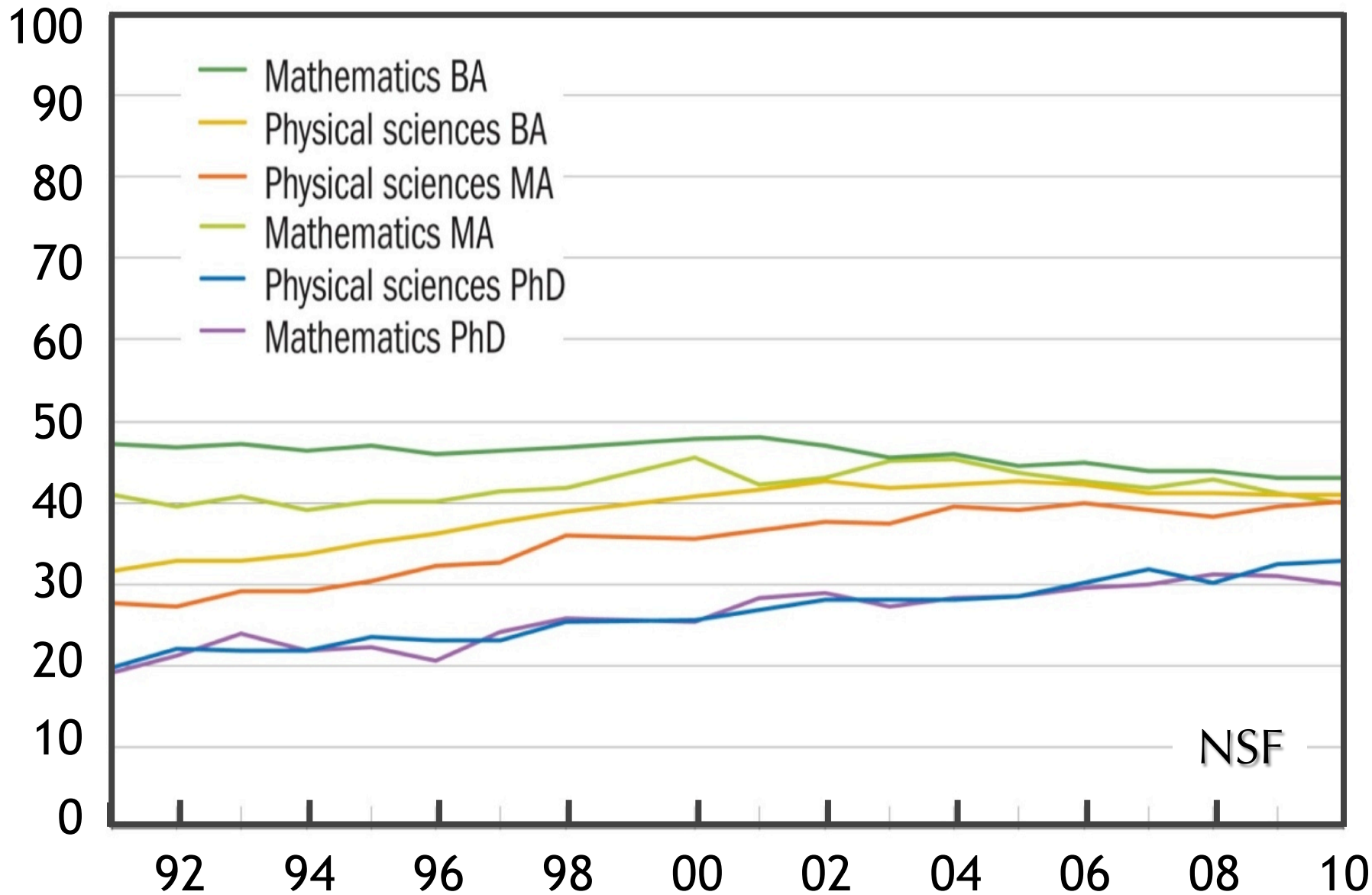
Percent degrees to Women 1991-2010



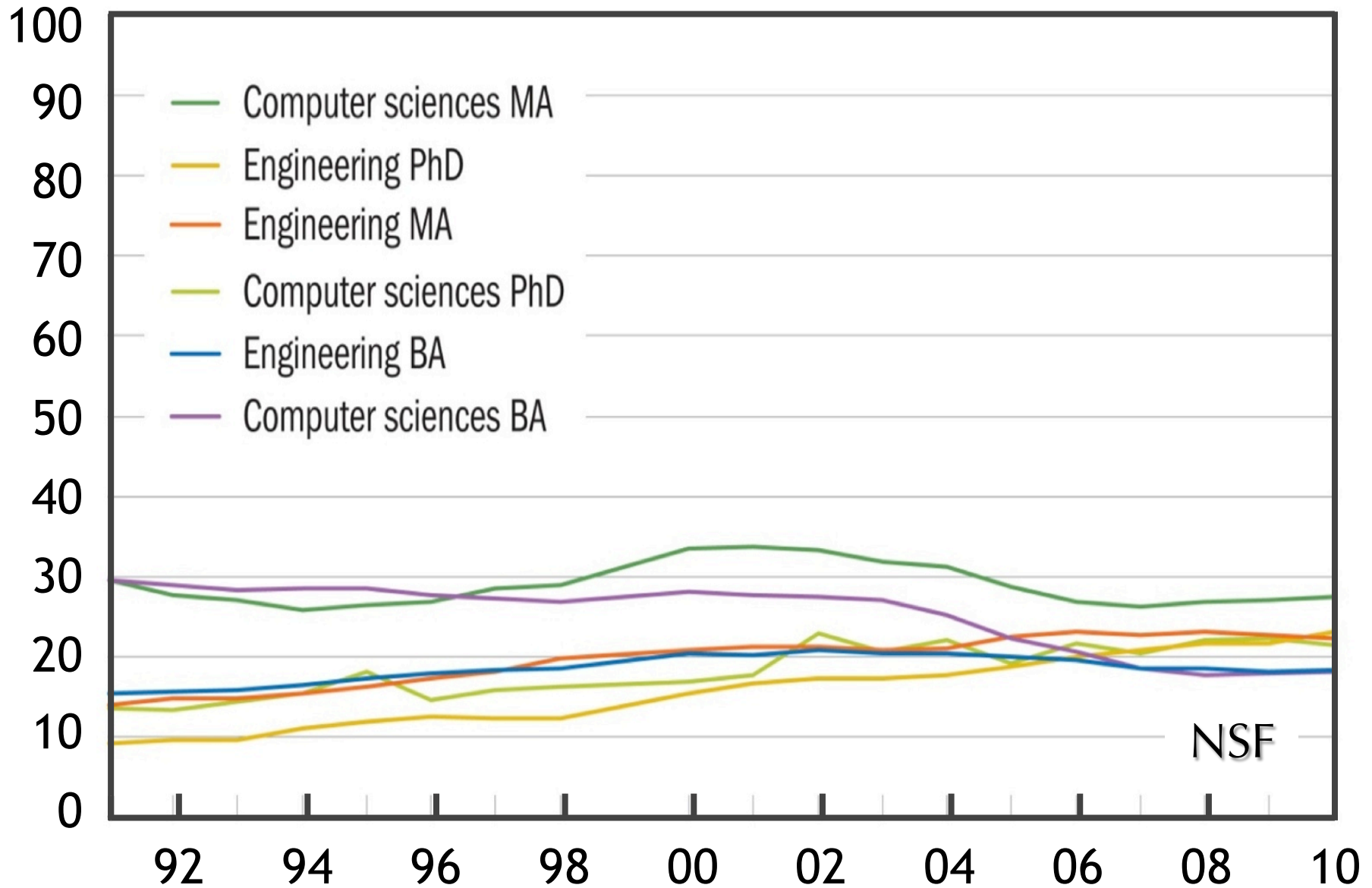
Percent degrees to Women 1991-2010



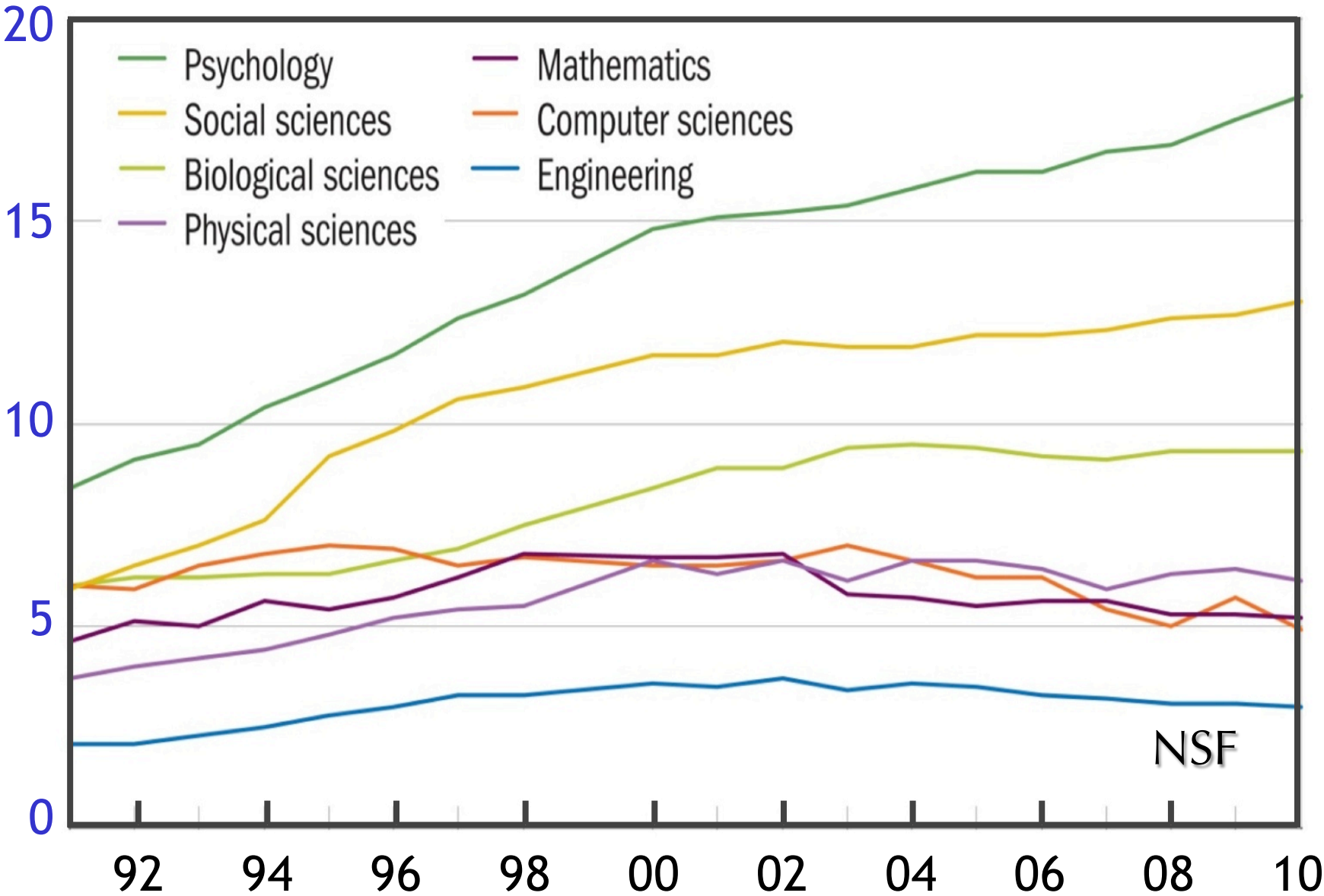
Percent degrees to Women 1991-2010



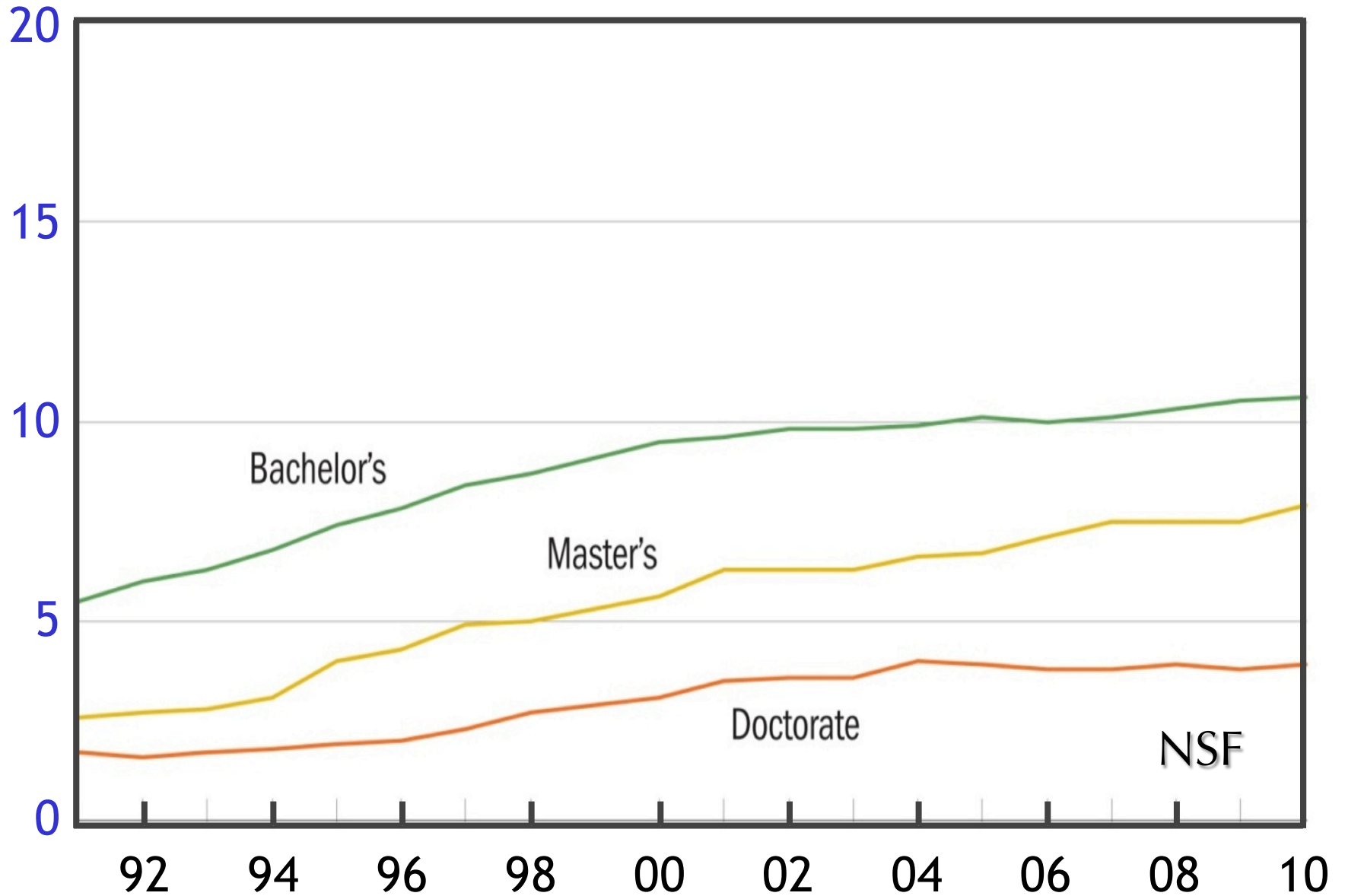
Percent degrees to Women 1991-2010



Percent Bachelor's degrees to URM Women 1991-2010



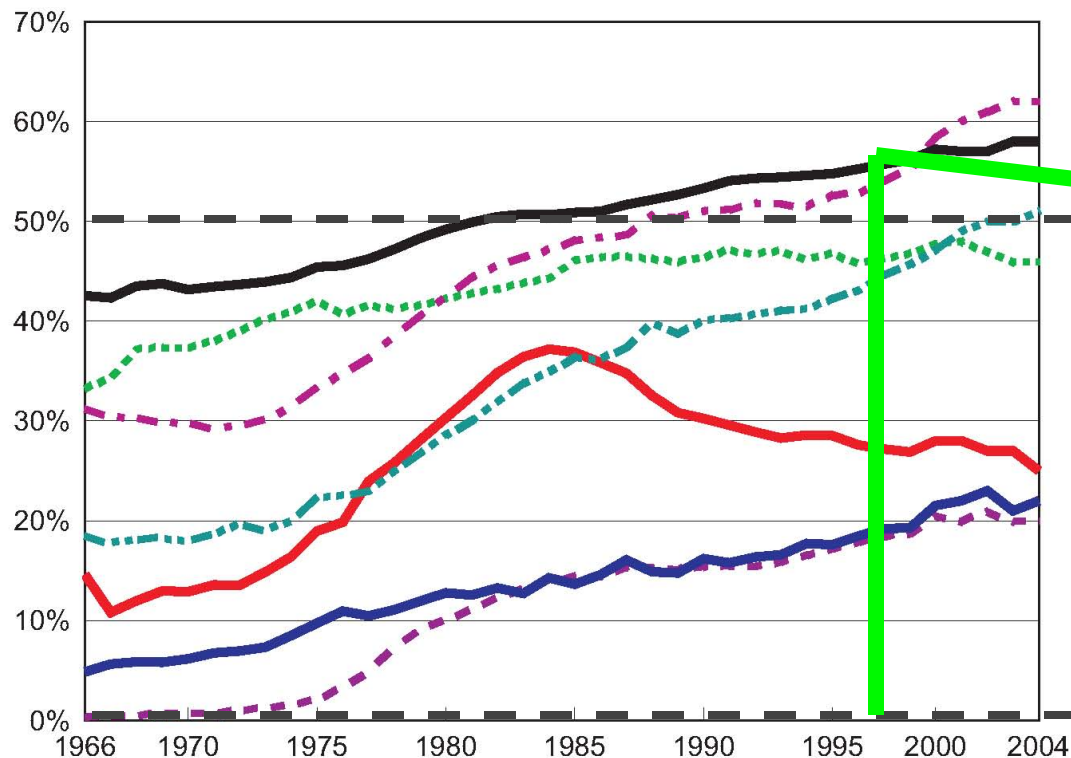
Percent STEM degrees to URM Women 1991-2010



Attrition between B.S. and Ph.D. degrees

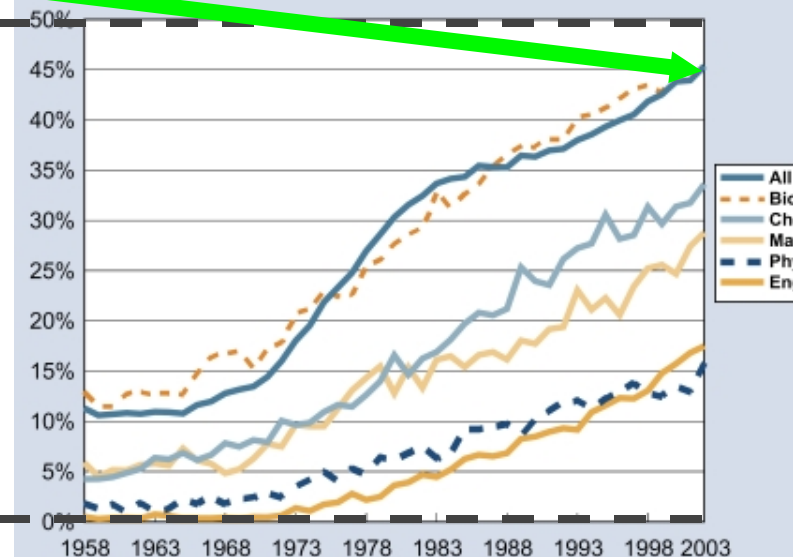
Bachelor's Degrees, 1966-2004

56% → 45% All fields



— ALL FIELDS
- - - BIOLOGICAL SCI
- · - CHEMISTRY
· · · MATHEMATICS
— COMPUTER SCI
— PHYSICS
- - - ENGINEERING

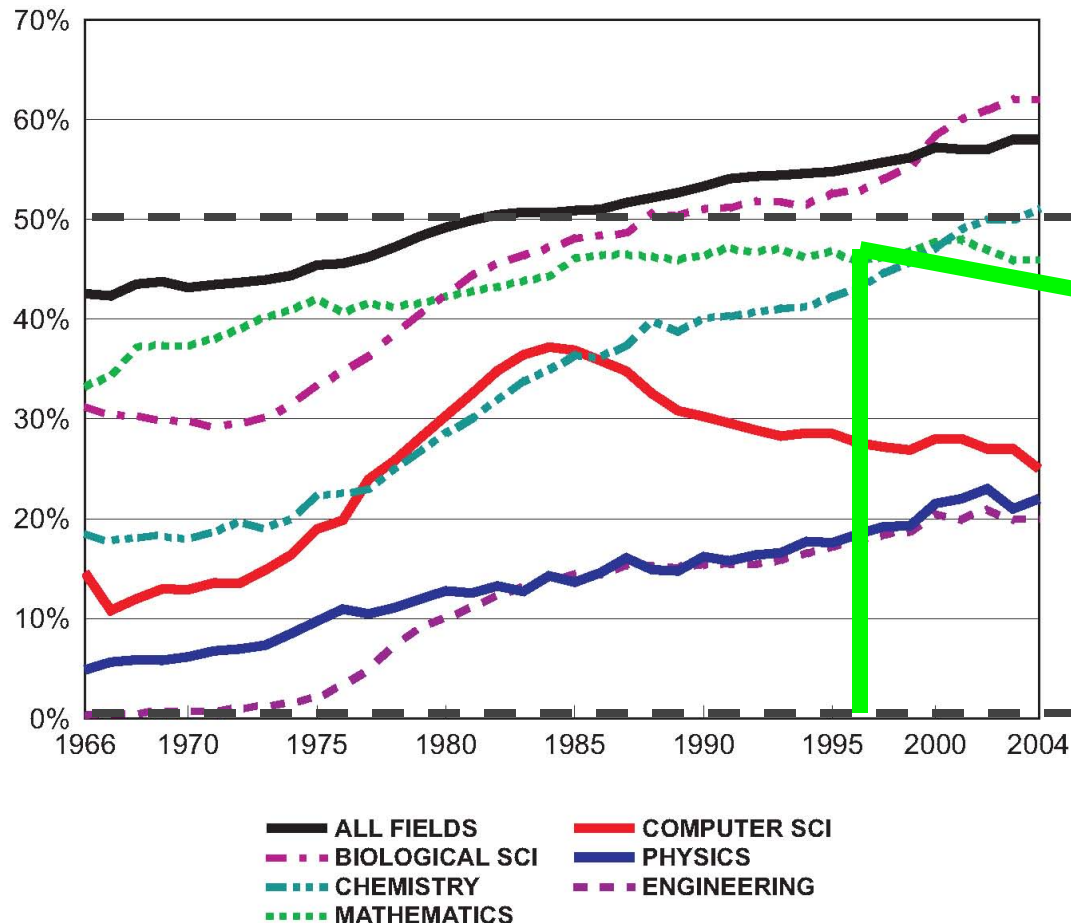
Figure 7. Percent of PhDs earned by women in selected fields



National Science Foundation. Compiled by AIP Statistical

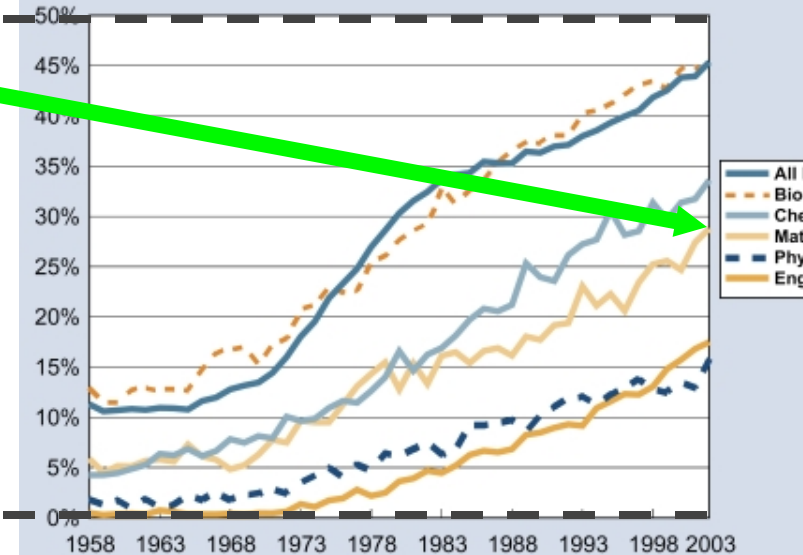
Attrition between B.S. and Ph.D. degrees

Bachelor's Degrees, 1966-2004



47% → 28% Math

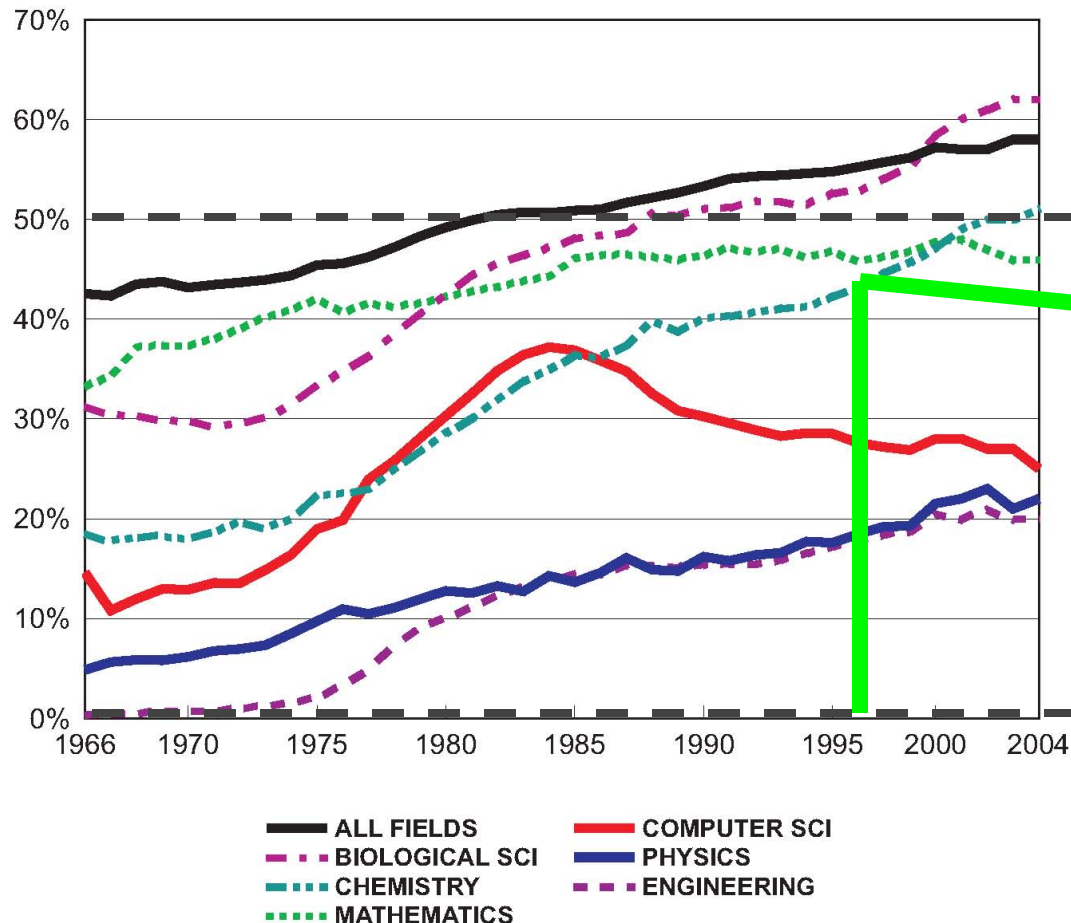
Figure 7. Percent of PhDs earned by women in selected fields



National Science Foundation. Compiled by AIP Statistical

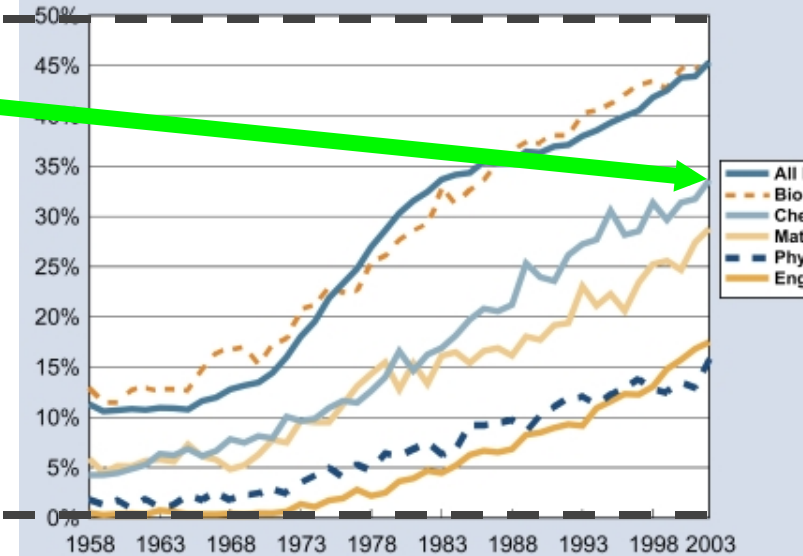
Attrition between B.S. and Ph.D. degrees

Bachelor's Degrees, 1966-2004



43% → 33% Chemistry

Figure 7. Percent of PhDs earned by women in selected fields



National Science Foundation. Compiled by AIP Statistical

Attrition between B.S. and Ph.D. degrees

Bachelor's Degrees, 1966-2004

19% → 15% Physics

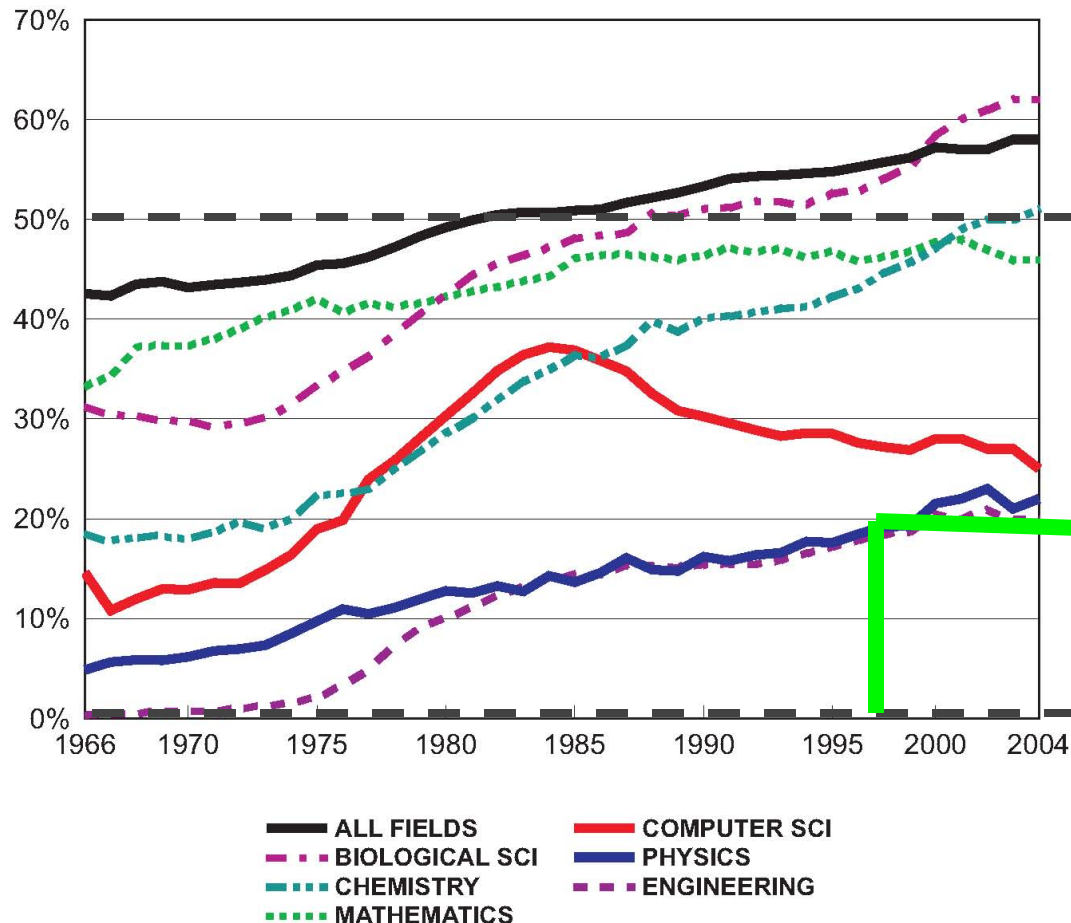
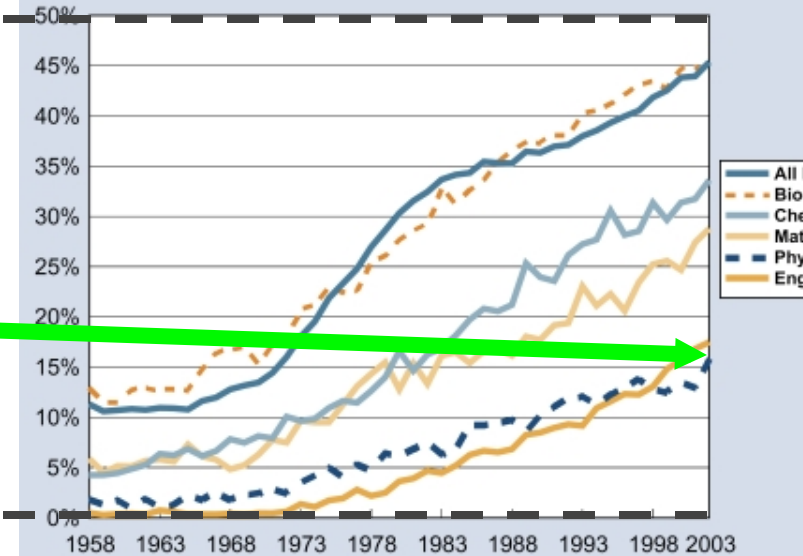


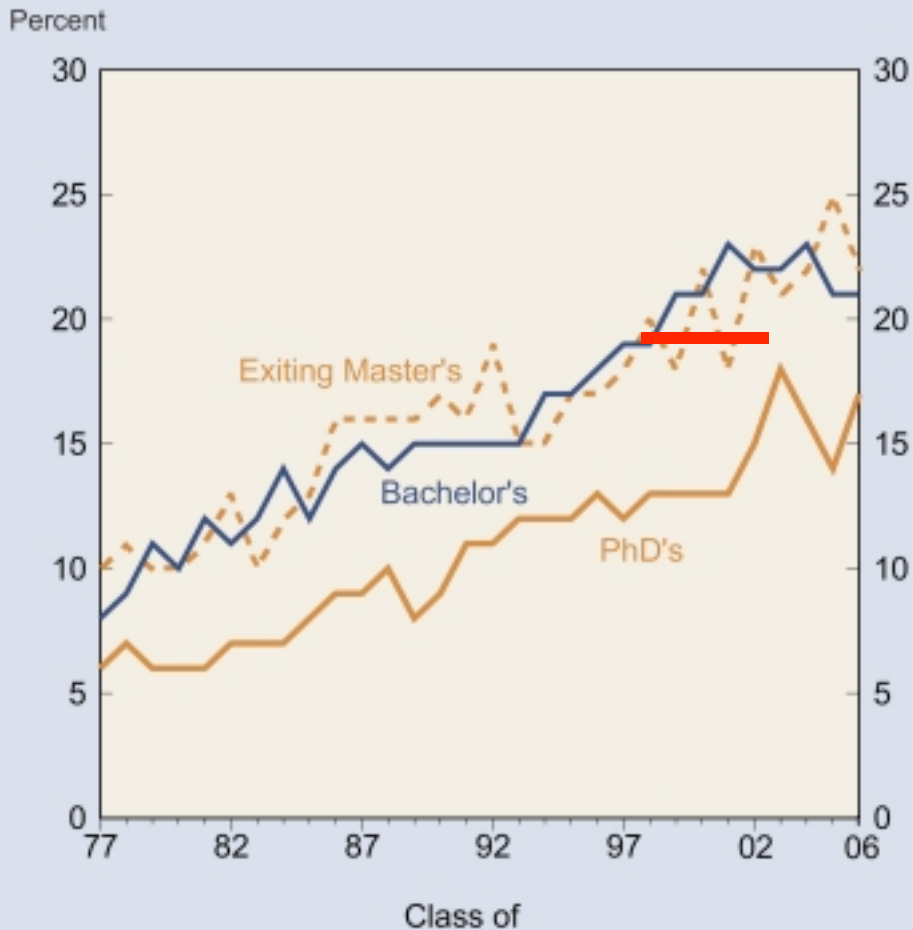
Figure 7. Percent of PhDs earned by women in selected fields



National Science Foundation. Compiled by AIP Statistical

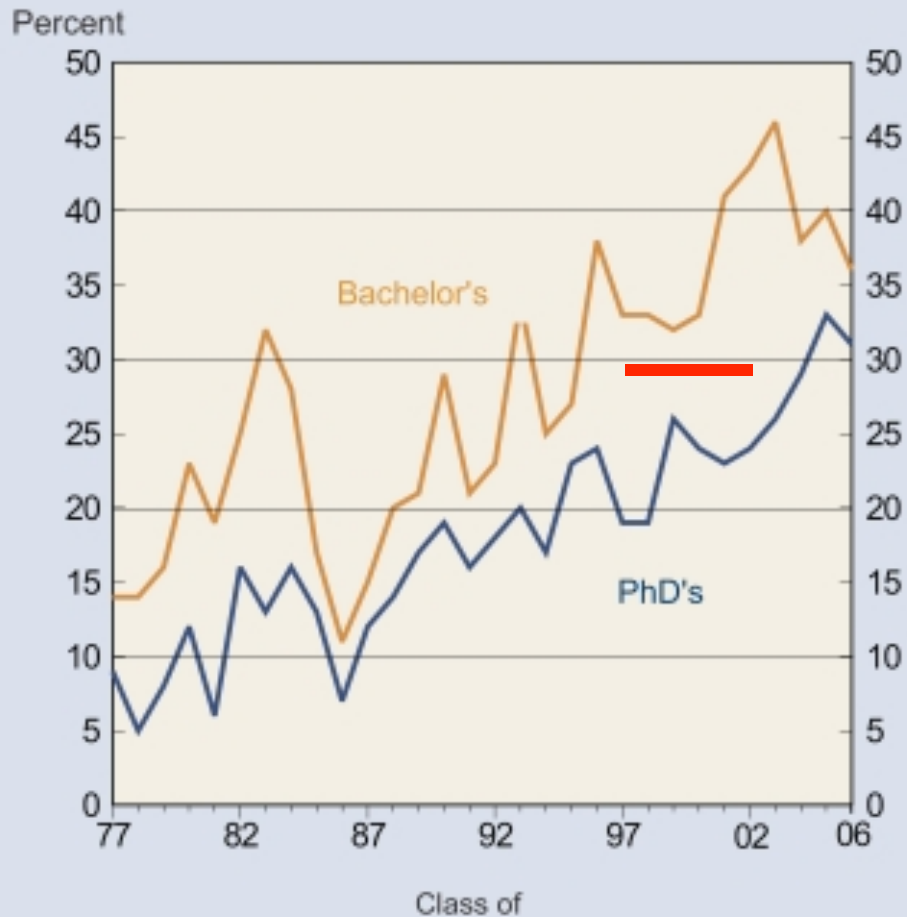
Differential Attrition

% Physicists
who are
women (U.S.)



Differential Attrition

%
Astronomers
who are
women (U.S.)



Why Diversity?

- Excellence of science
- Fairness/justice
- It's a great life!
 - Taxpayers support science, so should benefit equally
- Health of science profession
 - More scientifically literate (broad) public
 - \Rightarrow more public support of science
- Workforce needs

Why do Women and Under-represented Minorities lag behind parity?

- Statistical career disparities
 - *Long 2001, Sonnert & Holton 1996, Egan & Bendick 1994, Tesch et al. 1995, MIT Report+*
- *Not* ability, interest, effort
 - *Seymour & Hewitt 1990s, Xie & Shauman 2003, NRC's 2006 "Beyond Bias and Barriers" study*
- *Not* family issues
- *Not* conscious discrimination, overt prejudice

Why do Women and Under-represented Minorities lag behind parity?

- “Gender schemas” *Virginia Valian, Why So Slow? The Advancement of Women*
 - Lower expectations for women
 - Uneven evaluation (“unconscious bias”)
Wenneras & Wold 1997, Paludi & Bauer 1983, Budden+ 2008
 - Accumulation of disadvantage
- ➔ *Tilted playing field*

The Objectivity of Science ...



Biernat, Manis & Nelson 1991 – height

Porter & Geis 1981 – leaders at table

Butler & Geis 1990, Geis+ – speaker/leader evaluation

Dovidio et al. 1988 – eye gaze

Uneven Evaluation

- *Heilman et al. 2004* – rating asst. VPs
Women can be friendly or competent, not both
- *Norton, Vandello & Darley 2004* – rating resumes for construction job
- *Uhlman & Cohen 2005* – shifting criteria and (non)objectivity
- *Heilman 1980* – critical mass is ~30%

Valian annotated bibliography: <http://www.hunter.cuny.edu/genderequity/repository/files/equity-materials/annobib.pdf>

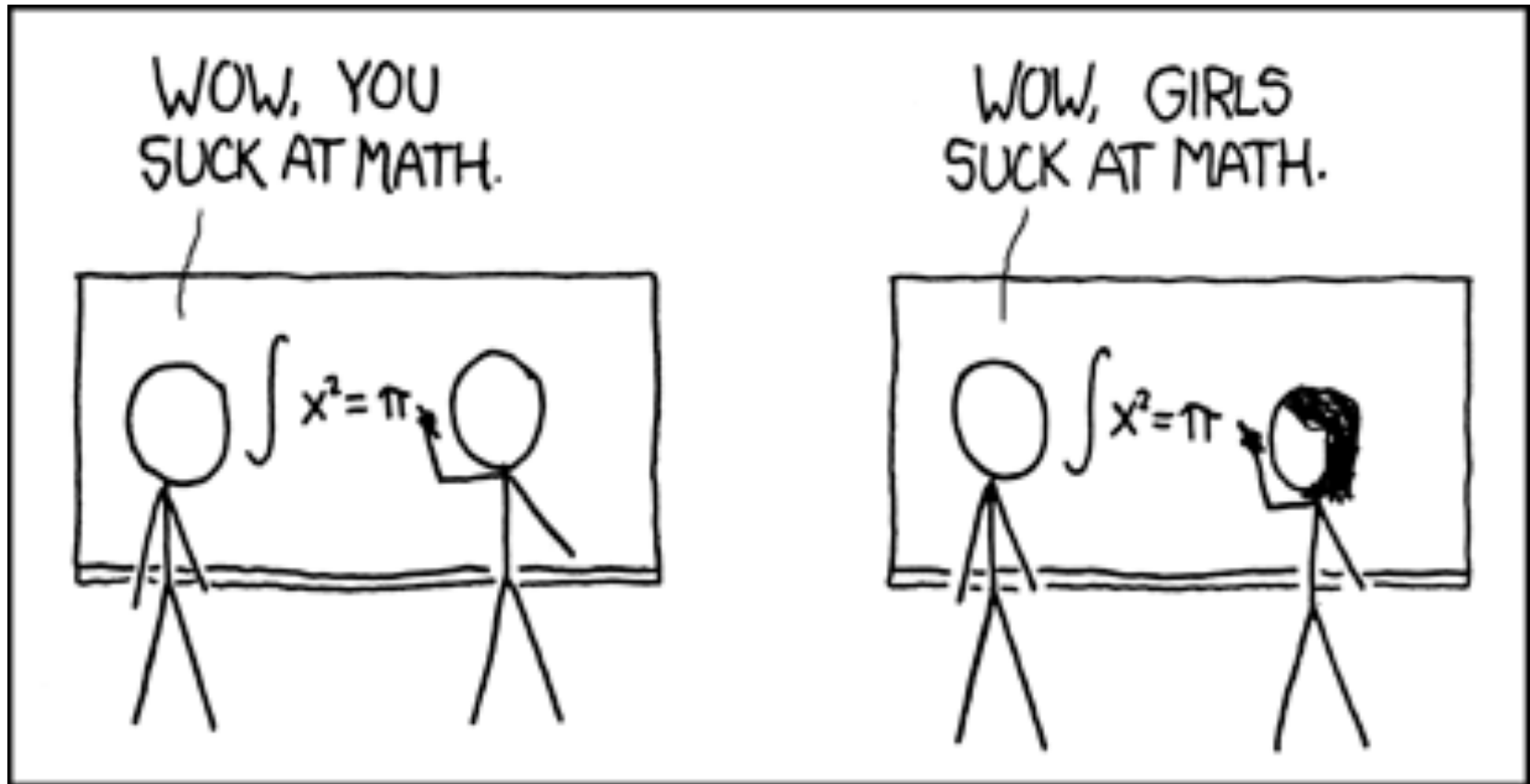
Moss-Raucusin, Handelsman, et al. 2012 PNAS

- 63 male, 64 female science faculty
 - physics, chemistry, biology
 - 6 research universities: 3 private, 3 public
- CV of graduating senior looking for job as lab manager – “John” or “Jennifer”
- Both men and women:
 - See the **male candidate as more competent**
 - Were **more likely to hire and mentor him**
 - Starting salaries ~ **\$30k for him, \$26k for her**

Are you objective?

Mahzarin Banaji: implicit.harvard.edu

Sanbonmatsu, Akimoto & Gibson 1994 (Evaluation of failing students)



Women lack math ability ...

- STEREOTYPE THREAT: performing below ability because of expectations
- Example: “hard” math test
 - Men: 25/100
 - Women: 10/100
 - *Gender gap in math?*
- “This test has been designed to be gender neutral”
 - Women: 20/100
 - Men: 20/100
- Important for minority students

11 Steps to Success for Young Women

1. Work hard (at something you love)
2. Do interesting, high impact work
3. (If) uneven playing field – don't be discouraged
4. Reject "lower standards"
5. Mentor up, down, and sideways
6. Network w WiS: find allies, take turns leading
7. Use your first & last names
8. Prepare an "elevator speech"
9. Practice confidence after brushing
10. Give great talks
11. Own your ambition

Conference for Undergraduate Women in Physics at Yale (CUWPY)



5 Steps for Leaders

1. Learn about bias www.hunter.cuny.edu/genderequity/equityMaterials/Feb2008/annobib.pdf implicit.harvard.edu
Beyond Bias and Barriers (NRC Study)
2. Do job **searches** *UW hiring kit*
3. Validate women speakers, job candidates, colleagues *Introductions, appointments*
4. Mentor
5. Equate diversity with excellence

Back-up slides

A light blue, brushstroke-style underline that spans across the width of the text above it.

Reasons for Disparities?

- **Not family** “Do Babies Matter?” *Mason & Goulden 2002*
 - Women w/o children not more successful
 - Many women in other demanding fields
 - Countries w strong support systems (e.g., Scandinavia) have few women in physics
 - Academic careers flexible: *become a professor, have a family!*
- *In Praise of Daycare, 2009 January STATUS newsletter*

2006 NAS Study: *Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering*

1. Statistics (U.S.)

2. Learning and performance

→ *No intrinsic difference could possibly lead to observed gender gap*

3. Persistence and Attrition

4. Evaluation of success *implicit bias*

5. Strategies that work

Undergraduate *Carnegie Mellon*

Hiring faculty *U. Washington toolkit*

Training women faculty *CoaCH*

ADVANCE *CRLT players*

6. Institutional structures, career paths

7. Recommendations

Letters of Recommendation

- *Trix & Penska 2003* – letters for a prestigious medical fellowship
 - Length
 - Specificity
 - Superlatives v. “grindstone” adjectives
 - Doubt
 - Explicit mention of gender, personality, family
 - (Tenure letters: women re women)

Coaching (Mentoring)



*Tony DeCicco, U.S. women's soccer coach
Boston Globe, June 18, 1999*

When job searches are gender-blind ...

blind audition...

...works for
orchestras,
writers, abstracts,
resumes ...

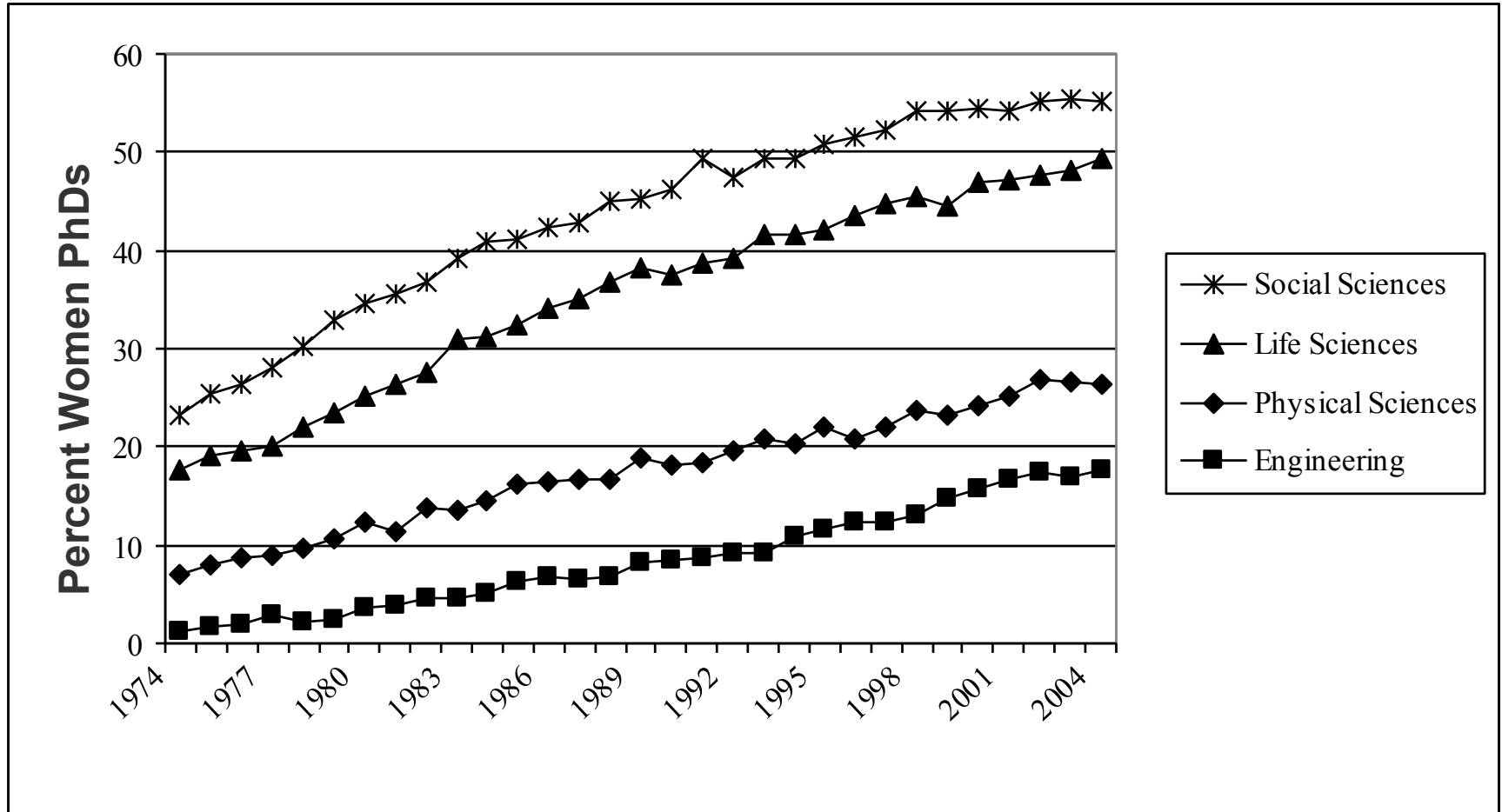
See story of Munich Philharmonic trombonist (Abby Conant)

There aren't any good women to hire?

- Jane Doe
- John Doe
- Keisha Doe
- Jamal Doe

(Research shows name strongly affects success of resume, even among psychologists who are well aware of gender schemas.)

More women are earning science and engineering PhDs



Career Disparities

- *Long 2001*
- *Sonnert & Holton 1996*
- Synthetic cohorts, e.g., NSF fellows – career advancement of women slower
- *Egan & Bendick 1994, Tesch et al. 1995, MIT Report, 1999*
 - *Salary and resource disparities*

Reasons for Disparities?

- *Xie & Shauman 2003* – interest not correlated with ability in science
- *Seymour & Hewitt studies 1990s* – persistence in science **not correlated with ability**



Amelia & Sophia

Women in Astronomy I Space Telescope Science Institute 1992



Baltimore Charter for Women in Astronomy