The Evidence for Discrimination: A Review of Concepts

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We argue for change...

- Be fair, let everyone play
- Get more people in S&E and be more competitive
- Be smart and use untapped talent

- BUT many believe:
  - We are fair
  - Everybody who wants to get in, can get in
  - Our systems for recruitment get the best & the willing
A Perfect World

We recognize differences in appearance, personal style, life experience

We respect difference in preferences that are not destructive to us and are not relevant to the job

We do not reduce an individual to his or her group

We do not project negative assumptions about the group onto the individual
“... all men are created equal.”

- Declaration of Independence, 1776
Laws that elaborate:

- **Equal Pay Act of 1963** – abolishes differential pay based on sex

- **Civil Rights Act of 1964** – outlaws racial segregation in schools & discrimination in employment; est. EEOC

- **Title IX 1972** – any educational program receiving Federal funds may not discriminate based on sex

- **Americans With Disabilities Act of 1990** – bars discrimination in employment based on disability

- **Civil Rights Act of 1991** – strengthens 1964; Glass Ceiling Commission
Re: Science and Engineering

- The Perkins Act of 1978 – to open vocational training

- Equal Opportunities for Women and Minorities in Science and Technology Act of 1981 – NSF should encourage all groups and report statistics

- Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology Development 1998 – how are we doing?

- U.S. Government Accountability Office Report on Gender Issues 2004 – Title IX applies to science and engineering in higher education & we need more compliance review
Traditionally, women and people of color were excluded from higher education and jobs in the US.

LAWS were introduced as social values and practice changed (e.g., slavery, right to vote).

Tradition is deep; laws and behavior may be inconsistent.

Illegal = pattern of exclusion adding up to measureable discrimination.
WHAT HAPPENS?!
Gender Schema Theory

- Everyone has unconscious beliefs about girls and boys, men and women
- We over-rate men, under-rate women
- Men are taller, more capable, more independent, more rational, leaders
- Women (regardless) are shorter, less capable, followers, nurturing, expressive, caring
- = “Our schema for males is a better fit for professional success”

Gender schema theory


Female applicants for post-doctoral fellowships needed more credentials than males for the same rating
Accumulation of Advantage

• Small advantages or disadvantages cumulate over time and add up to larger advantage/disadvantage

• Small disadvantages are important
  (assignments, attention, encouragement, financial support, evaluations, promotion, advancement, recognition, skills training, peer network, mentoring, salary, status)

• “The rich get richer, and the poor get poorer”

In a hypothetical organization of 8 levels, a 1% advantage for men yields 65% men at top
Stereotype Threat

- An individual who is negatively stereotyped for an activity is likely to perform worse than they are capable, for that activity

- Examples:
  - Women or men and mathematics test
  - African Americans and IQ test
  - Elderly and memory test

- The effect can be reduced:
  - Strong optimistic & non-judgmental relationship with teacher
  - Awareness of positive (high performing) role models
  - Self-affirmation and sense of adequacy
  - Awareness of the threat => inoculation
Stereotype Threat


Glass Ceiling

- Bias results in artificial barriers that prevent qualified individuals from advancement esp. into management-level positions
  - The inequality at higher levels cannot be explained by job-related characteristics such as unequal educational qualifications, training, field, location
  - Inequality is greater at higher levels
  - The inequality is due to unequal opportunity

- Case studies:
  - Asian Americans and women in science and engineering
  - Women in corporate management
Glass Ceiling


Mommy Track

• Working women who bear children experience *lower* expectations at work, *lower* opportunity, and *lower* pay than those who do not have children

• THIS IS A **COLLISION** of:
  • Traditions that treasure a woman’s total dedication to the home
  • Work structures that expect total and long commitment to the job
Mommy Track – why?

- Family = an additional full time job for parent(s)
- “Care-giving is woman’s work” thus 2/3 falls on women
- We expect even greater enrichment of children in the home now; early stimulation is prized & proven
- In professions like S&E, total, intensive, long early career engagement is expected; little accommodation for family
- Women are interested in careers (huge rise in participation in the workforce, advanced degrees)
- Career options, and advancement, have opened up
- Women “opt out” of family, or “opt out” of career, to resolve the conflict
- Employers may push women out to avoid “wasting” investment
- Myths about mommies and low productivity
Mommy Track


Rutgers University Center for Women and Work (2002). *Fact Sheet #1 Facts About Working Women*. 
http://www.cww.rutgers.edu/dataPages/FactSheet1.pdf
**Occupational Segregation**

- Certain groups are concentrated in certain jobs/occupations
  - E.g. “traditional occupations” for certain immigrants (Irish cop, Chinese laundry, etc.)

- Both individual choice and societal expectation are in play

- = “unconscious social engineering” and discrimination

- It is **NON-TRADITIONAL** for women to WORK in some societies

- It is **NON-TRADITIONAL** for women to work in CERTAIN JOBS outside the “pink” jobs

- The “gender” of jobs varies by society/culture ➔ **It is CULTURAL**, not based on innate ability
Occupational Segregation

• In 1997, 75% of women were in 11/449 jobs:
  • These jobs are LOW-PAYING
  • They provide services to others

• Before Title IX, women’s access to vocational training was restricted (= no manual labor, mechanical or technical skills, abstract analysis)

• Before affirmative action, professional and advanced study were relatively closed to women
Female-dominant Occupations in 1997 – 75% or more
(about 11)

99%  Secretary
97%  Receptionist
94%  Registered nurse
92%  Bookkeepers, accounting & auditing clerks
90%  Hairdressers & cosmetologist
89%  Nursing aide, orderly, attendant
84%  Elementary school teacher
78%  Cashier
78%  Waiter & waitress
77%  Admin support
75%  Investigator & adjuster, not insurance

Source: Jim Fain, Occupational Segregation Home Page, using Women's Bureau statistics from Feb 1998
Male-dominant Occupations in 1997 – 75% or more
(about 66)

99% Airplane pilot or navigator
99% Tool & die maker
99% Extractive jobs
98% Pest control
97% Construction trades
97% Supervisor, farm workers
97% Supervisor, related agriculture
97% Firefighting & fire prevention
97% Transportation, except motor vehicle
96% Mechanics & repair
96% Fisher, hunter, trapper
96% Material moving equipment op
95% Forestry & logging
95% Water, sewage, power & system op
95% Machinist
95% Precision woodwork
94% Welder & cutter
94% Truck driver
93% Grounds keep & gardener, not farm
92% Taxicab driver, chauffeur
91% Parking lot attendant
91% Sales worker, parts

91% Construction inspector
91% Sheet metal worker
91% Misc precision worker
90% Engineer
90% Podiatrist
90% Mechanical engineering technician
90% Sales worker, motor vehicle & boat
90% Surveying & mapping technician
89% Baggage porter, bellhop
89% Driver, sales worker
89% Hand molder & shaper, not jewelry
88% Police & detective, public
88% Adjuster & calibrator
88% Funeral director
87% Supervisor, protective services
87% Printing press operator
87% Shoe repair
86% Meter reader
86% Clergy
86% Electrical & electronic technician
86% Metal work & plastics op
85% Announcer

83% Draftsperson
83% Dentist
82% Architect
82% Guard & police
81% Farm worker
81% Supervisor, motor vehicle op
81% Butcher & meat cutter
80% Upholsterer
80% Handler, equip cleaning, helper
78% Sheriff, bailiff, other law enforcement
78% Fabricating machine operator
78% Hand cutting & trimming operator
78% Chemical technician
78% Sales worker, hardware & building supply
77% Barber
77% Correctional institution officer
77% Messenger
77% Farm operator & manager
77% Metal & plastic processing machine op
75% Operator, fabricator, laborer
75% Sales rep, commodities, not retail
75% Industrial engineering technician
Occupational Segregation


An individual is expected, based on statistical probabilities, to behave according to a “profile”

Made possible by huge banks of electronic data (e.g. census) and computing power

Acceptable practice in marketing and consumer analysis, polling, business planning

The “PROFILE” becomes a surrogate stereotype or a “pseudo truth” about the group:
  • “Soccer moms care about education.”
  • “People who barbecue will buy lawn care products.”
  • “Women don’t want demanding jobs.”
Climate Study

- Study of the “culture” of a university or a department, or a profession

- Little consensus on definition of “culture”
  - “atmosphere and environment as experienced”
  - “intellectual and social”
  - “style of interactions”

- Signs of “negative” or “hostile” climate, for all or for some:
  - alienation/isolation, indifference, exclusion, disrespect, spite, harassment, bullying, sabotage
Climate Study

- Studies of student, faculty, and professional experience have led to development of “good programs and practices”

- A campus climate study can suggest high priority “interventions”
  - E.g. over 30 ways “good” physics departments recruit and retain female majors
  - E.g. workshops for Department Chairs to improve faculty experience
Climate Study


http://www.grginc.com/WECE_FINAL_REPORT.pdf


Value of Diversity in Learning & Work

- Do diverse views/experience in a group contribute value?
  - Or “Is it all about political correctness?”

- Study body diversity is linked to learning outcomes:
  - Better thinking skills, self-confidence, interpersonal communication skills, leadership, ability to consider alternative viewpoints, tolerance for differences, interest in civic engagement, sophistication of opinions

- Team diversity is linked to better team performance
Value of Diversity in Learning & Work


Who's Counting?

- United Nations – Gender Empowerment Measure
- National Science Foundation – Science and Engineering Indicators (esp. Women, Minorities and Persons with Disabilities)
- National Center for Education Statistics – Trends in Educational Equity for Girls & Women
- Commission on Professionals in Science and Engineering – Professional Women and Minorities
- American Association of University Professors – AAUP Faculty Gender Equity Indicators
- Special studies of faculty: Donna Nelson & Diana C. Rogers
- NSF ADVANCE program evaluations
Who Are the Agents for Change?

A long list ...

Another talk ...
Committee on Maximizing the Potential of Women in Academic Science and Engineering (2007).

**Beyond Bias and Barriers:**
Fulfilling the potential of women in academic science and engineering. Committee on Science, Engineering, and Public Policy.

[www.nationalacademies.org/cosepup](http://www.nationalacademies.org/cosepup)

(the inspiration for this talk)