

Structural causes of inequities in STEM hiring and promising strategies for increasing diversity

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“Using Research and Data to Improve the Faculty Search Process in STEM Disciplines”

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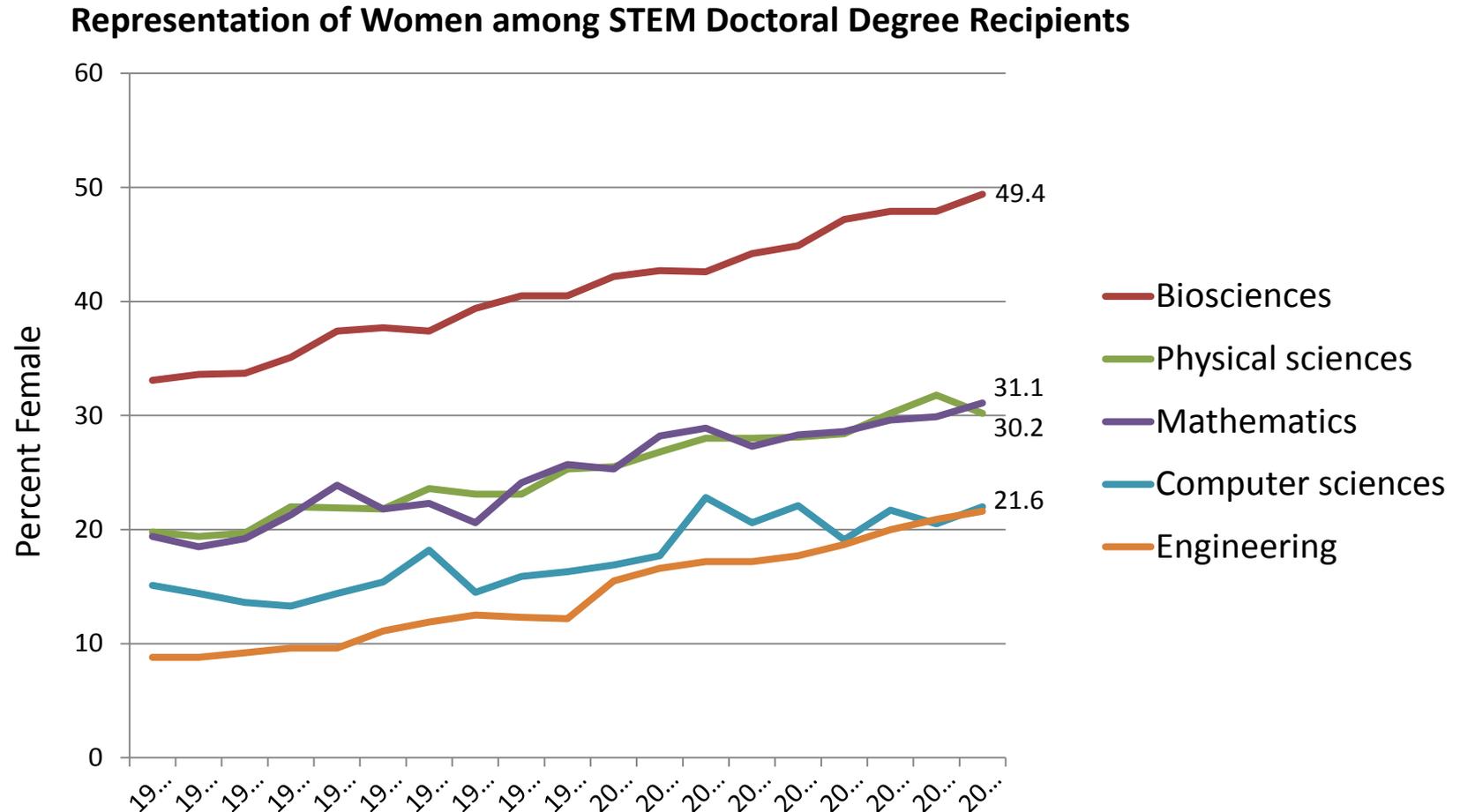
Structural influences defined

- “Structure” refers to the recurrent patterned arrangements which influence the choices and opportunities available.
 - Social, organizational, institutional
 - Cultural, e.g. related to norms, customs, traditions and ideologies
- Structural influences that help explain low levels of diversity in STEM faculty recruitment
 - Diversity in the pipeline and in the pool of applicants
 - Geographic and family constraints
 - Network position & connections

Supply of diversity in the pipeline and recruitment pools

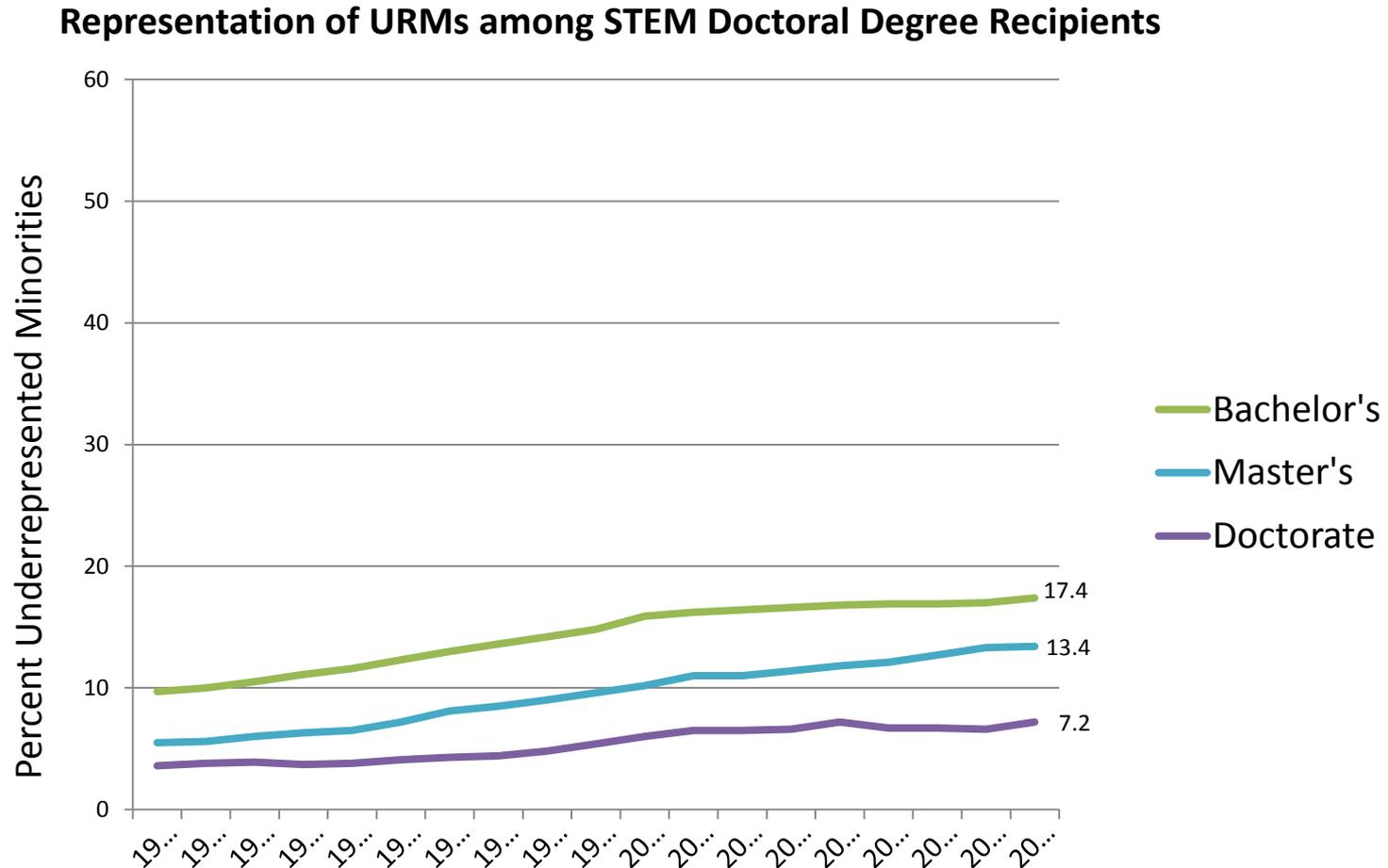
- Supply of diversity in the pipeline
 - Representation of women among STEM Ph.D.s has increased steadily, but women are still underrepresented
 - Representation of underrepresented minorities has increased but is still low

Supply of diversity in the pipeline and recruitment pools



SOURCE: National Science Foundation, Division of Science Resources Statistics, special tabulations of U.S. Department of Education, National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey, 1989–2008.

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 - Representation of women among STEM Ph.D.s has increased steadily, but women are still underrepresented
 - Representation of underrepresented minorities has increased but is still low
- Supply of diversity in applicant pools
 - Increased diversity in the pipeline has not translated into increased diversity in applicant pools

Supply of diversity in the pipeline and recruitment pools

TABLE S-2 Transitions from Ph.D. to Tenure-Track Positions by Field at the Research I Institutions Surveyed (percent)

| | Doctoral Pool | Pools for Tenure-Track Positions | | |
|---------------------------|--|--|--|--|
| | Percent women Ph.D.s (1999-2003) | Mean percent of applicants who are women | Mean percent of applicants invited to interview who are women | Mean percent of first offers that go to women |
| Biology | 45 | 26 | 28 | 34 |
| Chemistry | 32 | 18 | 25 | 29 |
| Civil Engineering | 18 | 16 | 30 | 32 |
| Electrical Engineering | 12 | 11 | 19 | 32 |
| Mathematics | 25 | 20 | 28 | 32 |
| Physics | 14 | 12 | 19 | 20 |

SOURCE: Survey of departments carried out by the Committee on Gender Differences in Careers of Science, Engineering, and Mathematics Faculty; Ph.D. data is from NSF, WebCASPAR.

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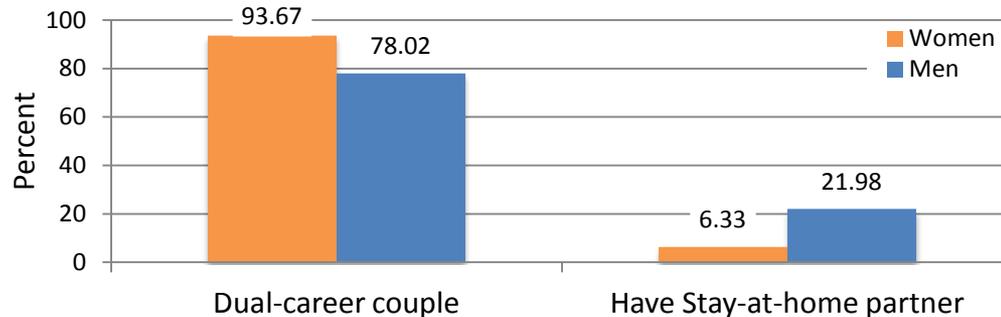
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Explanations for Lagging Diversity of Applicant Pools

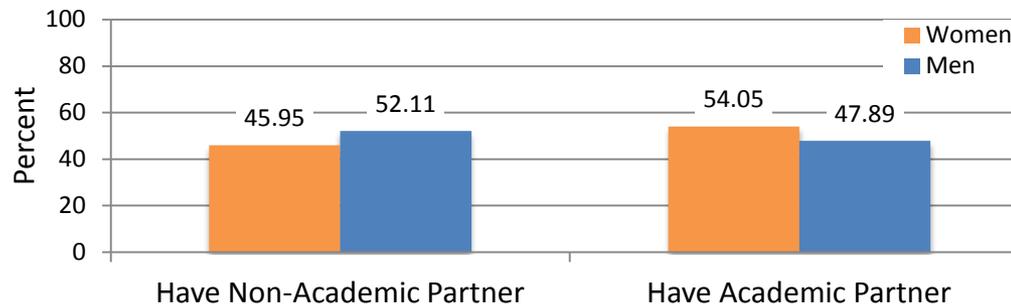
- “Image problem” of academic science (e.g., Sears 2003)
 - Women more likely to shift orientation away from academic research careers during graduate school
 - Perceived as incompatible with family life/roles
 - Long work hours
 - Tenure clock inflexibility
 - Competitive, chilly climate of academic departments (Ong et al. 2011)
- Geographic constraints
 - Dual-career couple conflicts for women
 - Time schedule of tenure track coincides with childbearing years
 - Regional preferences for underrepresented minorities
- Reliance on traditional “pool-building” strategies (NAS 2010)
 - Traditional advertisement text, traditional advertisement outlets
 - Personal networks are insufficient and tend to reinforce homogeneity
- Relative attractiveness of non-academic sector
 - Career track flexibility, competitive pay, team-oriented collaborative work, consistency of resources and support

Geographic and Family Constraints

- Women are more likely than men to be in dual-career couples



- Among dual-career couples, women are more likely than men to be in dual-academic couples



- Women tend to be younger than their partners

Geographic and family constraints

- Implications for applicant pool:
 - Women may limit their employment search to specific regions
 - Women are more likely to have a series of post-doctoral positions (used to coordinate two careers) or other non-traditional trajectories
 - Increased likelihood of considering non-academic careers
- Implications for hiring:
 - Hiring women more often entails dual-career hires
 - Negotiations may be more complicated, require more resources, represent a larger investment
 - Women scholars requiring dual-career accommodations are more likely to be pre-tenure

Social networks, hiring, and inequality

- Social networks tend to be segregated by gender and race/ethnicity
 - Occupational and field of study segregation
 - Homophily – “birds of a feather....” (McPherson, Smith-Lovin and Cook 2001)

Homophily in social networks



Figure 3.1 Cohort 1 sociograph

From: *Gender Stratification in the IT Industry: Sex, Status and Social Capital* by Kenneth W. Koput and Barbara A. Gutek (Edward Elgar, 2010)

Homophily in social networks

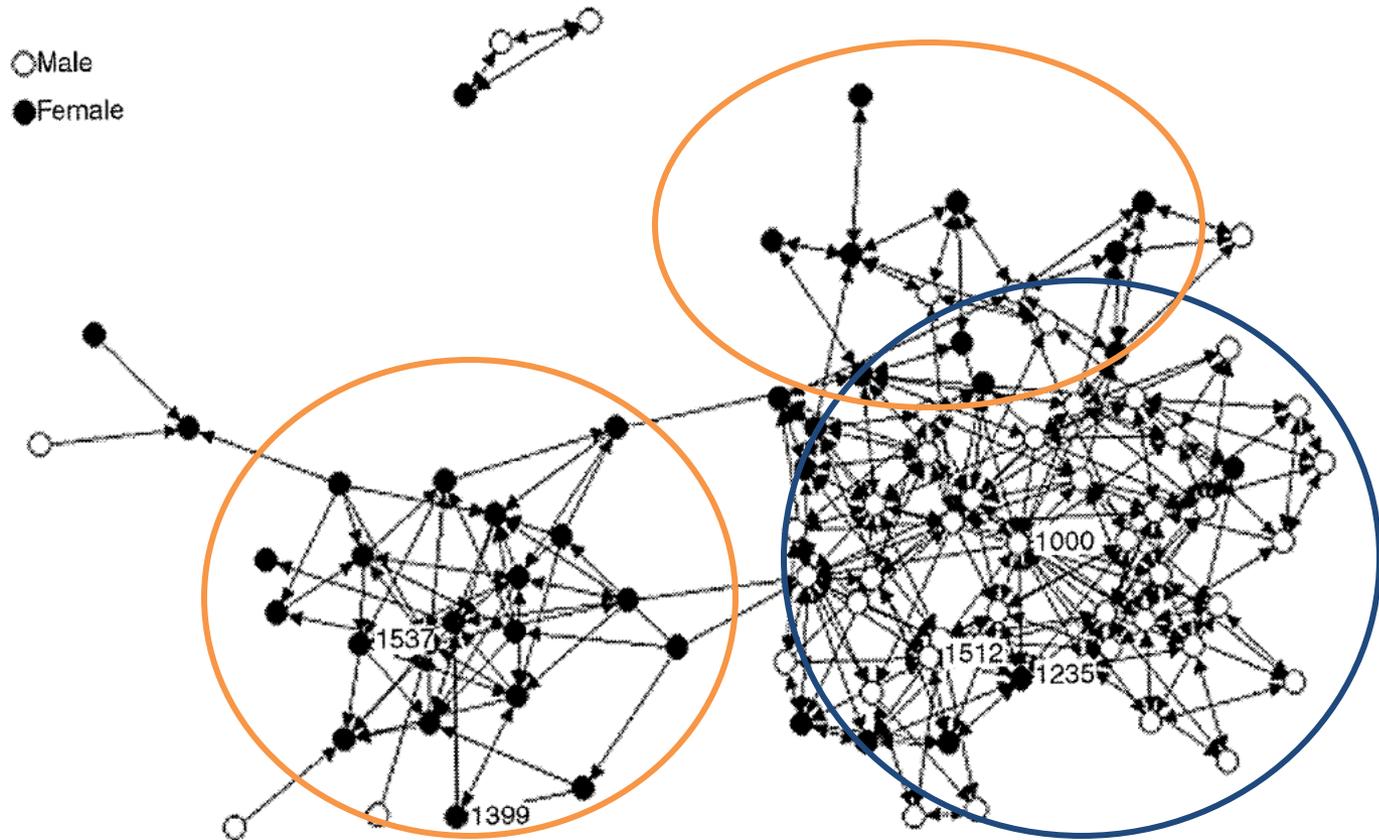


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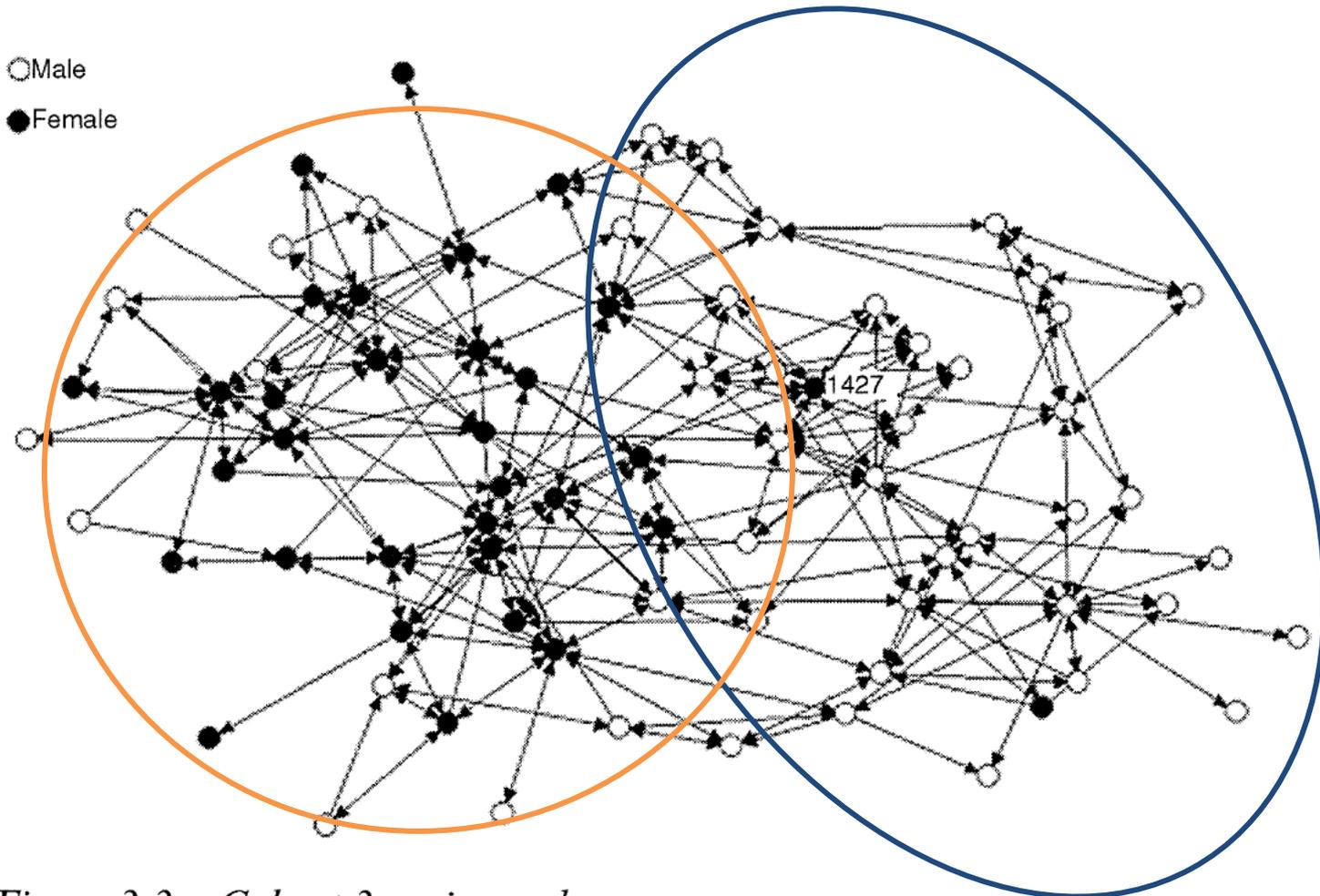


Figure 3.3 Cohort 3 sociograph

From: *Gender Stratification in the IT Industry: Sex, Status and Social Capital* by Kenneth W. Koput and Barbara A. Gutek (Edward Elgar, 2010)

Social networks, hiring, and inequality

- Social networks tend to be segregated by gender and race/ethnicity
 - Occupational and field of study segregation
 - Homophily – “birds of a feather....” (McPherson, Smith-Lovin and Cook 2001)
- Networks of women and racial minorities (McDonald 2011)
 - Are smaller
 - Have fewer connections to high-status individuals
 - Have fewer connections to individuals who are centrally-located in the network
- Networks of white men
 - Are more homophilous than networks of women and minorities
 - Provide preferential access to information and high-status individuals
 - Provide access to employment references that are well-connected

Social networks, hiring, and inequality

- Implications for applicant pool:
 - Women and minorities may have limited access to relevant information (e.g., how to tailor an application, to present a good “fit” with the position and/or department)
 - References for women and minorities may be less well-known than references for white male applicants
- Implications for recruitment:
 - Reliance on established networks is not sufficient
 - Valuation of recommendation based on the “reputation” of the referee may reproduce inequities

Strategies for hiring diverse faculty

- Employ innovative approaches to building applicant pools
 - Extend beyond existing networks, tap networks of women and minorities
- Successful hires of underrepresented minorities are positively associated with (Smith et al. 2004)
 - Job descriptions that includes a scholarly link to the study of race or ethnicity and/or success in working with diverse groups of students
 - An institutional intervention strategy that bypasses or enhances the traditional search process
 - Searching in a subfield known to include a more diverse population of potential applicants
- Institutionalize and continually promote policies that facilitate work-life balance (Schiebinger et al. 2008)
 - Dual-career hiring programs
 - Supportive family leave programs

Strategies for hiring diverse faculty

- Foster and support “institutional mindfulness”
 - Climate of self-consciousness about processes, criteria, and justifications for hiring decisions
 - Involve administrators in maintaining a strong institutional commitment to diversity (Smith et al. 2004)
 - Involve centrally-located and respected STEM scholars in the process – “organizational catalysts” (Sturm 2007)
 - “Individuals with knowledge, influence, and credibility in positions where they can mobilize institutional change
 - Institutionalize the capacity to examine processes, identify problems and successful strategies for solving them
 - Collect relevant data!

Implications of low levels of diversity in STEM faculty hiring

- Failure to attract talent
 - Many talented scientists are leaving academia
 - Direct loss of talent + indirect loss of potential educators and mentors
 - The presence and activity of diverse faculty in STEM departments would likely increase the retention of women and underrepresented minorities in STEM majors (Page & Carrell 2010)
- Reduced innovative potential (Page 2007)
 - “...groups that display a range of perspectives outperform groups of like-minded experts”
 - Diversity yields innovative approaches and superior outcomes