



Sociology for scientists

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Status Interaction Effects

The Law of Proportions

Network Effects

Implications for scientists

The Matthew Effect – a status effect in science

For whomsoever hath, to him shall be given, and he shall have more abundance; but whomsoever hath not, from him shall be taken away even that he hath. (Matthew 13:12)

- **Matthew Effect** : the most famous “name” gets all the work attributed to them. Lower status scientists and engineers are overlooked and their work is attributed to their high status collaborators (Merton, 1968)

The Matthew Effect – and the Matilda Effect

For whomsoever hath, to him shall be given, and he shall have more abundance; but whomsoever hath not, from him shall be taken away even that he hath. (Matthew 13:12)

- **Matthew Effect** : the most famous “name” gets all the work attributed to them. Lower status scientists and engineers are overlooked and their work is attributed to their high status collaborators (Merton, 1968 & Harriet Zuckermann)
- **Matilda Effect**: Women in collaborations with men – whether married or unmarried – typically receive less credit and men profit more from their discoveries. (Rossiter, 1993)
 - “Well maybe they just aren’t as good!” doesn’t hold up when their co-authors received Nobel prizes for the work

Status Effects

“Status beliefs bias evaluations, competence and suitability for authority, bias associational preferences, and evoke resistance to status challenges from low-status group members. These effects accumulate to direct members of higher status groups toward positions of resources and power while holding back lower status groups.” Cecelia Ridgeway, 2013 Presidential Address to American Sociological Association

- Status beliefs and biases are a mechanism for the reproduction of social inequality
- Culture impacts cognition: we apply status beliefs as “implicit biases” assessed through resume studies (“audit studies”). Example: the “orchestra study” (Golden & Rouse, 2000)
- Social psychology experiments show many Americans do not recognize African American women’s faces; and forget or mis-attribute the contributions of African American women and Asian men (Sesko & Biarnat, 2010; Schug et al, 2015)
- Status can enforce silencing of conflict and conflicting voices in consensus contexts (Freeman 1972; Perlow & Repenning 2009; Shindell 2020)
- *“Constraints become preferences”* (Correll, 2004; or de-specialize: see Pager and Pedulla, 2015)
- Minorities incorporate these stereotypes or learn from others’ behavior and hold themselves back (i.e. *imposter syndrome*)

Status *Interaction* Effects

- When *multiple* stereotypes combine!
 - Backlash against “agentic women” who act domineering (Rudman and Glick, 2001): *role incongruity* with leadership qualities (Eagly and Karau 2002)
 - Sensitive men are considered weak leaders (Rudman and Fairchild 2004).
 - Sexual orientation and race: negative effects of LGBTQ status for white men, positive for African American men (Pedulla, 2014);
 - Social class markers: white upper class men and white lower class women do better in elite labor market (Rivera and Tilcsik, 2016)
 - Ideal types – “the computer bum” or “the physics career” – discourage those who don’t fit (Traweek, 1985; Ensmenger, 2015)
 - The “motherhood penalty” and the “fatherhood premium”: Men with children paid more; mothers’ salaries are penalized (Correll et al. 2011)

Measurable effects: motherhood/fatherhood

Figure 2. Women's Median Weekly Earnings as a Percentage of Men's by Selected Characteristics, 2012⁴

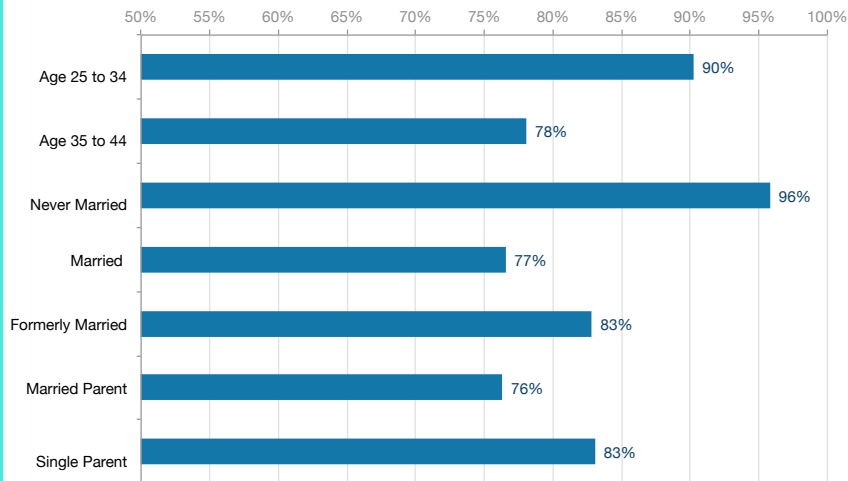
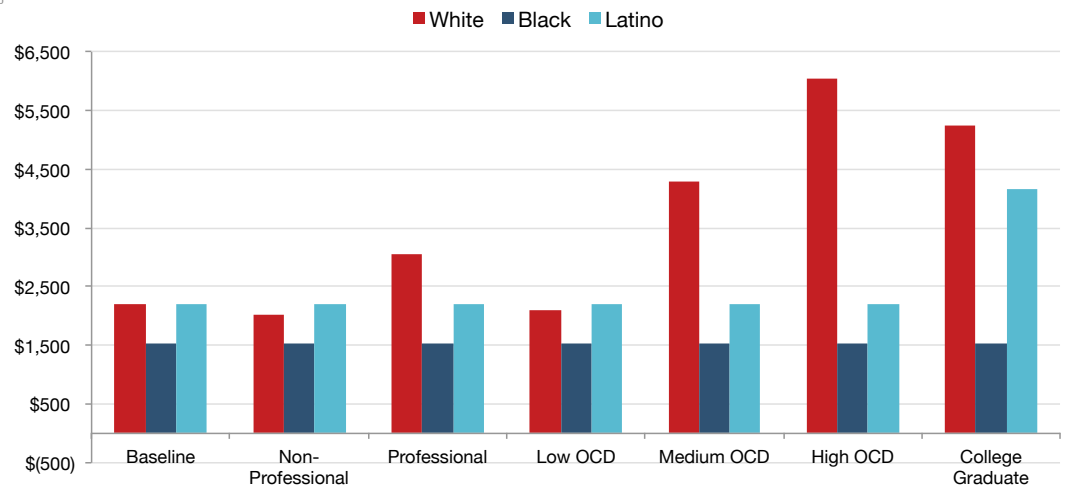


Figure 4. Fatherhood Bonus in Dollars, by Professional Status, Occupational Cognitive Demands Education (OCD), and Race/Ethnicity, Adjusted for Human Capital¹⁵



Sources: National Bureau of Labor Statistics
Graphs in [Budig report](#)

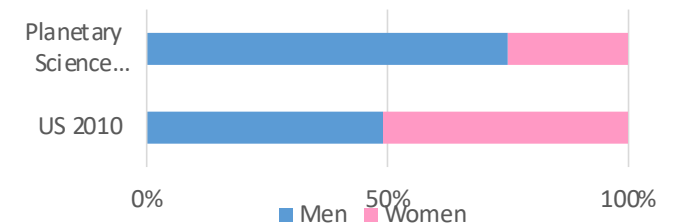


Solutions

- Try implicit bias training as a **calibration tool** to avoid status effects when evaluating candidates
- Recall the **Matthew/Matilda** effects when evaluating promotions
- **Stick to clear promotional criteria** (and require clear assignment criteria from projects) to avoid resorting to status effects
- **Double blind** review or selection processes wherever possible
- **Avoid requiring self-selection** or self-nomination for bonuses

The law of proportions

- “As proportions shift, so do social experiences.” (Kanter, 1977)
- Studies of groups with minorities indicate certain patterns persist:
 - **Uniform groups:** No minorities; no effects of diversity on team
 - **Skewed groups:** Minorities less than 15%: tokenist dynamics
 - **Tilted groups:** Minorities up to 30%: group reaps some benefits of diversity; backlash from majority
 - **Balanced groups:** 50-50: Traditional minorities contribute equally and at ease; no group minority or majority
- The THIRTY PERCENT RULE: aim to have minorities make up at least thirty percent at each rung of your organization

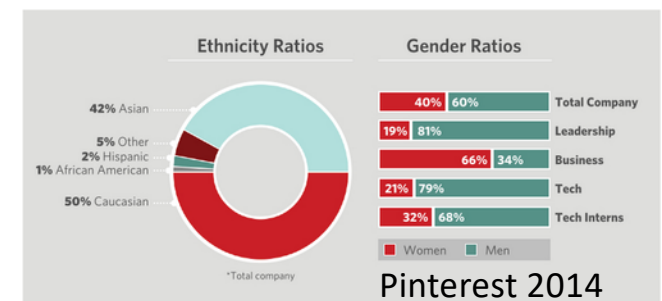


Gender: Tech

% of Global Employees (data from June 2014)



Facebook 2014



What happens in skewed groups?

- Not “she got this job because she’s a woman” or “he got the job because he’s African American”
- That’s the EFFECT, not the cause or definition, of tokenism.
- If you ever hear yourself or someone else saying this, it shows you have a skewed or tilted group
- Tokenism is a primary observed effect of skewed groups (under 15% representation)
- Backlash effects from majority groups up to 30%
- Devastating effects on individuals and groups include:



Kanter, [“A Tale of O”](#)

Tokenism (2)

- Stereotyping
- **Standing in for a group**
- **Publicity as double-edged sword**
- **Fear of visibility and retaliation**
- Unique performance pressures
- Role encapsulation
- **Informally isolated**
- Uncertainty about control or response
- **Tested for loyalty: which group do you belong to?**
- Reminders of difference
- **Boundary and status management** by majority (Pierce 1995)

With these workplace pressures, tokens frequently lash out, micromanage, become territorial, do not support subordinates – elements which are also counted against them

Top 50 Depts and NASA missions

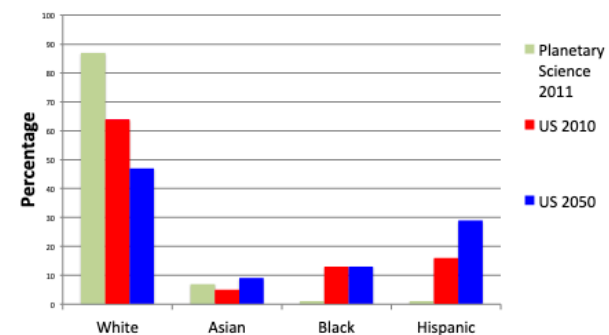
Table 12. Female Professors by Rank and Year at Top 50 Departments

Discipline	FY2002*				FY2007			
	Assistant	Associate	Full	All Ranks	Assistant	Associate	Full	All Ranks
Chemistry	21.5%	20.5%	7.6%	12.1%	21.7%	21.3%	9.7%	13.7%
Math	19.6%	13.2%	4.6%	8.3%	28.0%	15.5%	7.2%	12.1%
Computer Sci	10.8%	14.4%	8.3%	10.6%	19.5%	11.3%	11.5%	13.5%
Electrical Engr	10.9%	9.8%	3.8%	6.5%	14.5%	14.1%	6.2%	9.7%
Mechanical Engr	15.7%	8.9%	3.2%	6.7%	18.2%	12.0%	4.9%	9.0%
Physics	11.2%	9.4%	5.2%	6.6%	17.5%	12.6%	6.8%	9.5%
Civil Engr	22.3%	11.5%	3.5%	9.8%	25.3%	14.3%	7.1%	12.7%
Chemical Engr	21.4%	19.2%	4.4%	10.5%	23.7%	17.8%	8.3%	12.9%
Astronomy**	20.2%	15.7%	9.8%	12.4%	25.3%	21.6%	12.3%	15.8%
Economics	19.0%	16.3%	7.2%	11.5%	30.7%	16.0%	8.5%	15.1%
Political Science	36.5%	28.6%	13.9%	23.5%	35.9%	30.1%	17.4%	25.6%
Sociology	52.3%	42.7%	24.3%	35.8%	57.9%	45.6%	28.0%	39.7%
Psychology	45.4%	40.1%	26.7%	33.5%	44.8%	41.9%	29.9%	36.0%
Biological Sci	30.4%	24.7%	14.7%	20.1%	36.0%	30.9%	17.7%	24.8%
Earth Sciences	not available				28.6%	21.7%	10.6%	16.1%

*Chemistry and astronomy data are for FY2003. **Top 40 departments

Source: Donna Nelson, 2007,
http://cheminfo.chem.ou.edu/~djn/diversity/Faculty_Table_s_FY07/07Report.pdf

Demographics of the Planetary Science workforce do not match US demographics



Refs: 2011 Planetary Science Workforce Survey [1], 2010 US Census [2], US Population predictions [3]

Source: Rathbun, Quick and Diniega,
 "Women of color in the planetary science workforce"



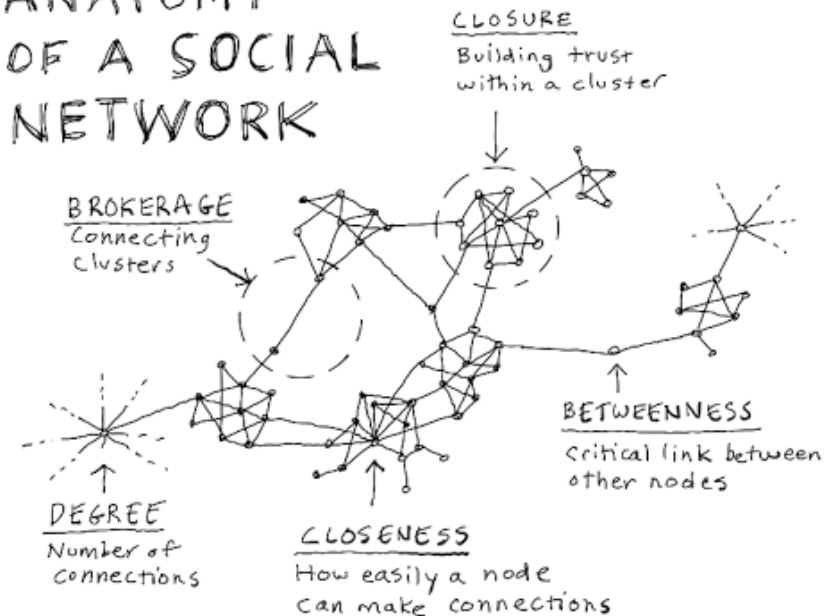
Solutions

- To benefit from diversity, aim to have *at least 30%* of minorities represented **at each level of your organization**
 - Gender, race, sexual orientation, age, national identity, etc...
- If you hover around or below 15% you will get devastating dynamics that will affect your whole team
- If you get stuck between 15-30% you will get backlash dynamics
- If you add just 1 person to a team to “increase diversity,” you might as well not have anyone there at all.
- It’s not about absolute numbers, **it’s about proportions.**
- If you can’t hit these numbers, act with empathy!

How networks work

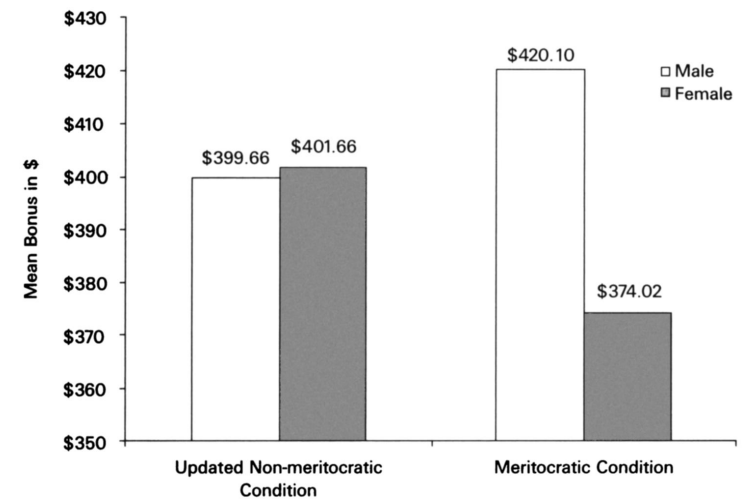
- **Homophily:** “birds of a feather flock together”
 - People forge network and social ties based on social similarities
 - Naturally occurring social networks display considerable homophily
- **Brokerage:** people who bridge networks
- **Strength of ties:** Strong ties (tightly connected) or weak ties (further removed) (Granovetter, 1973)
- **Social capital:** not human capital (e.g. how much skill you have) but how *socially connected* you are
 - Sociologists can measure networked relationships to see who is in (who has more social capital) and who is out (who has less social capital)

ANATOMY OF A SOCIAL NETWORK



The paradox of meritocracy

- “The Paradox of Meritocracy”: In organizations that determine advancement through criteria of “merit” alone, there is *increased* gender disparity between women and men in senior roles (Castilla and Bernard, 2010)
- Why? Because people use reputation and similarity to recruit and promote based on “fit”! (Rivera, 2015; Castilla 2008; Castilla et al 2013a & b)
- *The more informal the rules for advancement, the more people rely on **relationships, reputation, and social capital** to determine “merit”*
- Informal social relations dominate startup and VC culture and team assembly!



Castilla and Bernard, 2010

Gender and social networks

- *Gender matters for accrual of social capital in a network*
- Women's networks provide local advantages but does not translate to social capital more broadly, especially when their networks are closed (Lutter 2015; Burt 1998; Ibarra 1997; Brass 1985)
- The “boys’ club” effect: “people in white male networks* receive twice as many job leads as people in female/minority networks.” (MacDonald, 2011)
- Women do not benefit as much from positions of brokerage unless the network is already diversified (Burt 1998; Lutter 2015)
- Social capital can be “borrowed” if a woman is mentored by a man or in a subordinate hierarchical relation to a man (Burt, 1998) (“the work uncle”)
- Young men are also disadvantaged in networks of primarily senior men but unlike women, they make up the disadvantage as they age.



Solutions

- The best opportunities can come from tapping “weak ties”: tap people on the periphery of your network for a recommendation (Granovetter, 1973)
- Credit and support bridging points or overlaps between distinct networks as sites of innovation or creativity (Burt, 2004; Stark and Vedres 2011)
- Diverse networks and looser connections bolster minorities’ careers (Burt 1998; Lutter 2015)
 - Support women’s and minority networks and ask members for recommendations
- Reaching out through your networks and beyond, tapping other networks, and mixing networks together can actually get you diversity
- If you are senior and male, actively foster mentorship ties with minority candidates in your care, put them forward for positions, and stand up for them when tokenism strikes. *Be their work uncle!*



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Implications for scientists



“Personality”

“I have to act this way ...
You develop a reputation.”

(Merton 1968; Traweek 1988; Daston
1995; Lincoln et al. 2012)

To sum up

Type	Status Effects	Law of Proportions	Network Effects
Defined	Social status determined by interaction between stereotypes	Proportions of minorities/majorities determine social experiences	Who you know and how well connected you are generates opportunities
Problems	Matthew/Matilda Effect Backlash against people who don't conform to stereotypes Constraints become preferences	Low proportions = no advantages 15% groups experience tokenism Up to 30% experience backlash True advantages between 30-50%	Mens' networks tend to hold more advantages Women have less social capital Paradox of Meritocracy
Solutions	Calibrate using bias training Amplify minority voices Articulate procedures for advancement	Adopt and enforce the "thirty percent rule" ... At each level of your organization	Tap into "weak ties" Bridge between networks Diverse/open networks better for minorities and innovation

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