The Science of Diversity and the Impact of Unconscious Bias

H. Anna Han, Ph.D. (anna.han@nih.gov)

NIH / Scientific Workforce Diversity
Symposium for Advocates of Women Physician Scientists
♦ May 11th, 2016
Today’s Agenda

• Why diversity matters
  – Why & How

• Unconscious bias as hurdle
  – Judgment and Decision-making
  – Everyday Interaction

• Strategies to mitigate influence of unconscious bias

• NIH/Scientific Workforce Diversity
  – Our approach
Shining a Light on the Problem: Racial Disparity in NIH R01s

Race, Ethnicity, and NIH Research Awards

Donna K. Ginther, Walter T. Schaffer, Joshua Schnell, Beth Masimore, Faye Liu, Laurel L. Haak, Raynard Kington

The initial surprise was that R01 proposals from black Ph.D. scientists (including 45% non-U.S. citizens) were extremely rare. They totaled only 1.4% of all applications, compared with 3.2% for Hispanics and 16% for Asian scientists. (By contrast, African Americans make up about 13% of the U.S. population.) About 60% of all proposals

<table>
<thead>
<tr>
<th>STUDY AT A GLANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>83,188 R01 applications from Ph.D.s analyzed</td>
</tr>
<tr>
<td>40,069 Unique Ph.D. investigators</td>
</tr>
<tr>
<td>1149 R01 applications from black Ph.D.s</td>
</tr>
<tr>
<td>337 Expected awards to black applicants if same success chance as whites</td>
</tr>
<tr>
<td>185 Actual awards to black applicants</td>
</tr>
</tbody>
</table>
The Biomedical Career Path Is Really a Funnel

Underrepresented Groups (%)
Gender Gap in Academic Medicine 2013 – 2014

At the current rate of improvement, attaining gender parity will take a very long time (48 years nationwide)

<table>
<thead>
<tr>
<th>Position</th>
<th>Men (%)</th>
<th>Women (%)</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Student</td>
<td>53%</td>
<td>47%</td>
<td>237</td>
</tr>
<tr>
<td>Assistant Prof.</td>
<td>55%</td>
<td>45%</td>
<td>222</td>
</tr>
<tr>
<td>Assoc. Prof.</td>
<td>61%</td>
<td>39%</td>
<td>188</td>
</tr>
<tr>
<td>Full Prof.</td>
<td>39%</td>
<td>22%</td>
<td>135</td>
</tr>
<tr>
<td>Chairs/Chiefs</td>
<td>12%</td>
<td>12%</td>
<td>82</td>
</tr>
</tbody>
</table>

Adapted from: The state of women in academic medicine 2013-14: AAMC Report
Diana M. Lautenberger, et. al.
Why Diversity Matters
Capitalizing on the Opportunity

- Excellence, creativity, innovation
- Broadening scope of inquiry - solutions to complex problems in increasingly complex world
- Impact of workforce diversity on health disparities
- Ensuring fairness
  - Changing demographics
  - Leveraging the U.S. intellectual capital
Impact of Workforce Diversity on Health Disparities: The Evidence

- Underrepresented racial, ethnic minority health professionals disproportionately serve racial, ethnic minority and other underserved populations (Cantor 1996; Komaromay et al. 1996)

- Racial, ethnic minorities more likely to receive better interpersonal care from practitioners of their own race or ethnicity (Chen 2005; Garcia et al. 2003)
Approximately 50% white medical students and residents falsely believe that:

- Black (vs. white) patients feel less pain
- More likely to suggest inappropriate treatments for black (vs. white) patients
Diversity of Thought: Driving Force of Innovation

• Cognitive Diversity increases:
  – Creativity
  – Search for novel information
  – Search for novel perspective
  – Better decision making
Diversity and Performance


Representation of females at top management → increase of $42 million in firm values on average.

Firms that value innovation saw even greater gains – $44 million.

Diversity and Quality Science

- 2.57 million scientific papers between 1985-2008 (only authors with U.S. addresses).
- Surnames of co-authors

Papers written by a diverse groups:
- Receive more citations
- Published in journals with higher impact factor

Diversity and Financial Decision Making

Ethnically homogenous financial traders vs. Ethnically heterogeneous financial traders

Less able to accurately predict stock prices (33% decline)

More likely to accept inflated prices (contributes to financial bubble) and when bubbles burst, crashed more severely.

“Diversity facilitates friction that enhances deliberation and upends conformity.”

## Diversity and Jury Decision Making

<table>
<thead>
<tr>
<th>Measure</th>
<th>All-White Group</th>
<th>Diverse Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deliberation Length, in mins</td>
<td>38.49</td>
<td>50.67</td>
</tr>
<tr>
<td># of case facts discussed</td>
<td>25.93</td>
<td>30.48</td>
</tr>
<tr>
<td># of factual inaccuracies</td>
<td>7.28</td>
<td>4.14</td>
</tr>
<tr>
<td># of uncorrected inaccurate statements</td>
<td>2.49</td>
<td>1.36</td>
</tr>
</tbody>
</table>

Why?

• Simply being exposed to diversity can change the way you think:
  
  • Anticipate differences
  
  • Encourage consideration of alternatives
  
  • Dissent provokes more thought when it comes from someone who is different from us.
  
  • Opinion dissent in diverse groups contribute to novelty and integrative complexity
  
• Diversity can be a catalyst for change, growth, and innovation.
Hurdles to Diversity

• Easy answers have not been sufficient.

• Implicit or unconscious processes can be a hurdle to reaping the benefits of diversity.

• We are exposed to approximately 11 million pieces of information at any moment.
  • We process about 40 every moment.

• Nobel prizing winning neuroscientist, Eric Kandel, estimates that 80-90% of our mind works unconsciously.
  • Must use shortcuts and past knowledge to make assumptions, aka “Mind Habits”
  • These habits influence our thoughts, judgment, and interpretations

Meanwhile, we believe...

“I am able to assess others in a fair and accurate way.”

“I am objective.”

Fact: Ingrained mind habits often produce errors in how we perceive, judge, and make decisions.

Unconscious Bias
“We see what we look for, and look for what we know” - Goethe
DEMO 2
DEMO 3
Categorization

- We ALL innately and automatically categorize (e.g., stereotype).

- And these categorizations alter and impact our perceptions and judgments without awareness.

Fact: We activate stereotypes without awareness.

Fact: We are all biased

“A photograph is shaped more by the person behind the camera than what is in front of it.”
Who is a “Scientist”?

Draw-A-Scientist Test: Percent of Students Who Drew A Male Scientist
(N=1504)

- K-2nd grade (n=235): 58%
- 3-5th grade (n=649): 73%
- 6-8th grade (n=620): 75%

But You Don’t Look Like Scientist!

- Feminine women are deemed less likely to be a scientist.

Both *male and female* faculty members:

Rated female student as less competent, less hireable, and offered less salary ($3.7K) and mentoring.

Even though the female was rated more likeable.

All ps<.05

50% difference in callback rates. White applicant can expect 1 callback for every 10 jobs and 15 for black applicants.

Black applicants do not see increase in callbacks with improvement in their credentials. (ps<.0001)

This study has just been replicated (2015) – with similar findings and show that education level (college education) does not seem to matter for Black applicants!

Motherhood Penalty / Fatherhood benefit

Four Identical applications:

Nonmother

Mother

“Active in PTA”

Nonfather

Father

“Active in PTA”

Compared to nonmothers, mothers were:

- Received about 50% of call backs
- Rated less competent
- Less likely to be recommended for hire
- Offered less pay (11k)
- Lower likelihood of promotion
- Seen as less committed
- Less days allowed late
- Required higher score on exams (4.5 pts higher)

Motherhood Penalty / Fatherhood benefit

Compared to nonfather, fathers were:

• Offered more pay (6k)
• Higher likelihood of promotion
• Seen as more committed
• Allowed more days late

Recommendation Letters for Medical Faculty

312 letters
103 positions
Women = 84%
length of the men’s.

WHAT CAN WE DO?

How can we control what we are not consciously aware of?

Strategies to Mitigate the Influence of Unconscious Bias
What Does Not Work

Thought/Stereotype Suppression
("Color blind" - race or gender)

Trying not to think about stereotypes often backfires - "Suppression rebound"

Belief in Personal Objectivity
Belief in your ability to be objective.

“When people feel that they are objective, rational actors, they act on their group-based biases more rather than less”

It’s not whether you have biases. It’s about which one is your bias?

Macrae et al. (1994)
Monteith et al. (1998)

Uhlman & Cohen (2007)
Managing the Unconscious

• We can learn to adapt and correct for our unconscious biases.

Motivation/Intention

Awareness

Efficacy & Opportunity

Accountability
Educational Intervention Works!

- 92 departments, matched by school/college
- Randomized controlled intervention vs. not

Intervention group reported:
- Greater personal bias awareness
- More motivation to promote gender equity
- More confidence in being able to enact gender equity
- Feel that it would be personally beneficial to promote gender equity in one’s department

- Persisted 3 months later

What’s Your Motivation?

Start by reminding yourself of your intrinsic motivations.

- I enjoy relating to people of different groups.
- I value diversity.
- I can freely decide to be a nonprejudiced person.

Use Habit Breaking Routine

Plan out in advance when, where, and how to act on one’s goal in an if-then format:

“If I encounter a member __________ group, Then I will think __________.”

- Interrupts routine behavior
- Uses situational cues
- Serve as subtle reminder

“If I am the most senior person in the room, then I will share my ideas last.”

Have Some Imagination

Imagining an ideal candidate can *limit diversity* because people are more likely to imagine a prototypical candidate.

Taking 30 seconds to imagine a broad scope of candidates (different ways people can imagine and assess science) can change who you consider.

Mental image matters because likelihood of performing that behaviors increases with mental representations.

“Ideal may render minorities invisible to mind’s eye.”

---

Imagine Counter-Stereotypical Individuals

Think of individuals who do not fit stereotypes
• Reduces stereotypes
• Increases creativity and cognitive flexibility

Sylvester James Gates (physicist famous for super string theory)
Mae Jemison (astronaut, first black woman in space)
Jane Goodall (primatologist, famous for her work on chimp social interactions)
Neil deGrasse Tyson (astrophysicist, director of the Hayden Planetarium)

Walk a Mile in Their Shoes

Try to walk a mile in someone’s shoes – adopt his/her perspective and imagine what it’s like to be a member of stigmatized group.

Imagine:
- What would it be like to get a job callback for every 15 jobs when your friend gets one for every 10?

Take Your Time

- More likely to fall for cognitive errors (unconscious bias) when distracted, under time pressure, or tired.

- If possible, be rested:
  - Morning people are more likely to rely on stereotypes at night vs. night people are more likely to rely on stereotypes in the morning.
  - Sleep deprived individuals are less cognitively flexible

Creating Opportunity for Positive Interaction

• Cooperative vs. competitive
• Common identity or goals
• Norms of egalitarian beliefs
  – Expression of egalitarian goals and beliefs
  – Norms of overcoming bias
If We Do Nothing... The Cycle Reproduces Itself

Lowered Success Rate
Slow Innovation & Discovery

Accumulation of disadvantage

Performance is underestimated

Unconscious Bias
Evaluation bias

Solo status/Lack of critical mass

Adapted from ADVANCE – University of Michigan
Cross-Cutting Challenges

• Science of diversity: what is the impact of diversity on the quality and outputs of research?
• Identifying psychological and social factors that mitigate individual and institutional barriers to workforce diversity
• Which evidence-based approaches to training and persistence in biomedical research work? And in which contexts?
• Develop a scalable strategy to effectively disseminate and sustain diversity within the nationwide scientific workforce
Cross-Cutting Challenges

- Science of diversity: what is the impact of diversity on the quality and outputs of research?
- Identifying psychological and social factors that mitigate individual and institutional barriers to workforce diversity
- Which evidence-based approaches to training and persistence in biomedical research work? And in which contexts?
- Develop a scalable strategy to effectively disseminate and sustain diversity within the nationwide scientific workforce
What are the *psychosocial factors* that affect workforce diversity and how can they be mitigated?

**Evidence**
- Effects of bias on hiring
- Social science interventions are effective for mitigating bias, stereotype threat

**Question**
- Effects of bias on review?

**Actions**
- Implicit bias interventions in NIH search committees
- Measuring hallmarks of success and their impact on career progression
- Testing anonymized review to detect potential bias
NIH IRP Stadtman Search Implicit Bias Intervention Pilot

Experimental Intervention Group

Control-Matched No Intervention Group

Pre-IAT (Gender & Science) → unconscious Awareness/Habit breaking Intervention → Post-IAT (Gender & Science)

Range of diversity in candidate selection (behavioral measure)

Should see more diverse group of candidates in the intervention group vs. no intervention group

Should see lower IAT scores (reduced implicit bias)

Pre-IAT (Gender & Science) →

Range of diversity in candidate selection (behavioral measure)
Cross-Cutting Challenges

- Science of diversity: what is the impact of diversity on the quality and outputs of research?
- Identifying psychological and social factors that mitigate individual and institutional barriers to workforce diversity
- Which evidence-based approaches to training and persistence in biomedical research work? And in which contexts?
- Develop a scalable strategy to effectively disseminate and sustain diversity within the nationwide scientific workforce
Which *evidence-based approaches* to training and persistence in biomedical research work?

**Evidence**
- Research experience, mentoring important for career success
- Gender/racial representation in science leadership low

**Actions**
- Funding research on recruitment/retention in science careers
  - Experimental training awards (BUILD)
  - National mentoring network (NRMN)
Implementation of a Major ACD WG Recommendation
NIH Diversity Program Consortium

*Pipeline, Mentoring, Evaluation*

**Awards made October 2014**

**BUILD**: 10 sites

**NRMN**

**CEC**

**Total**: $250 million (5 yrs)

**BUILD**
- California State University Long Beach
- California State University Northridge
- Morgan State University
- Portland State University
- San Francisco State University
- University of Alaska Fairbanks
- University of Detroit Mercy
- University of Maryland Baltimore County
- University of Texas El Paso
- Xavier University of Louisiana

**NRMN**
- Boston College
  - Morehouse SM; U. Min.; U. North Texas; U. Wisconsin

**CEC**
- University of California Los Angeles
NRMN Innovation — [http://nrmnet.net/](http://nrmnet.net/)

- **Diverse leadership** across race, ethnicity, gender, geography
  - Mentoring, networking, mentor training, professional development

- **Regional hubs** (5) – building capacity
  - Partnership (majority, HBCUs, HSIs, and TCUs), BUILD recipients, societies
  - Via a proven online web portal

- **URM postdocs and junior faculty** – focus on grantsmanship
  - Proven track record in mentoring trainees to successfully prepare fundable NIH grants

- **“Train-the-trainer”** – large-scale implementation of mentoring
  - Include cultural responsiveness and competency
How can we **sustain diversity** within the nationwide scientific workforce?

**Issues**
- Scientific workforce diversity is a shared responsibility with shared benefit
- Many programs are “islands” of success
- Unlinked programs create, sustain career transition gaps

**Actions**
- Evaluating, inventorying existing diversity programs
- Shaping public-private partnership for joint-sector involvement (Hubs of Innovation) to seal gaps in career progression
Retiring the Pipeline ...

... and thinking about a system
**Integrated National Strategy for Scientific Workforce Diversity**

- **Overarching Goal:** To eliminate transition barriers and achieve sustainable transformation in scientific workforce diversity
- Identify gaps (postdoc -> faculty/other research careers)
- Draw evidence from existing regional programs
- Focus on transition to independent careers
- Needed: Program linkages across career stages
CONNECT WITH SCIENTIFIC WORKFORCE DIVERSITY

NIH Scientific Workforce Diversity, led by Dr. Hannah Valantine, harnesses the power of a diverse scientific workforce to illuminate discoveries for human health.

@NIH_COSWD
Facebook.com/NIHCOSWD

GREAT MINDS THINK DIFFERENTLY...

Anna Han
Anna.han@nih.gov