Women were forbidden from seeking degrees in most universities in Europe only about a century ago.


Side note: The Ohio State University, first female graduate, recognized sooner (1879)
Social network analysis in Afghanistan
Joshua Blumenstock is studying the effect of unexpected shocks on network activity in Afghanistan with collaborators at Princeton, UW, UCLA, and UC Berkeley.
DATA-DRIVEN DISCOVERY

Data Science Environments
What We Do

Overview

Over the course of the last decade many disciplines have evolved from recording observations in laboratory notebooks to the use of instruments capable of digitally recording many gigabytes of data in a day. This abundance of data provides unprecedented opportunities for discovery. Tapping its potential requires the application of sophisticated new computational techniques operating on large scale storage, computational and network resources. Since its creation in 2008, the eScience Institute has worked to create the intellectual and physical infrastructure needed to meet this challenge.

At the core of the eScience Institute are individuals who have proven track records in developing and applying advanced computational methods and tools to real world problems. Their task is to seek out and engage researchers across disciplines where eScience approaches are likely to have the greatest impact. To ensure that researchers have access to the necessary physical infrastructure, the Institute has undertaken coordinated planning and support for advanced local and remote computational platforms. This includes developing relationships with commercial and non-commercial service providers as well as the development of shared facilities on campus. This support extends to assistance in the preparation of select proposals where we are able to focus resources, improving their chances for success.

Also in... What We Do

Appliance Gallery
Find and use the eScience Institute's virtual machines equipped with software useful for specific applications.

Campus Compute & Storage
Learn about what UW is doing to support scalable scientific computing on campus.

Consulting & Services
From algorithm development to database creation to cloud computing, we can help.

Projects
Explore some of our current collaborations with research scientists.

Relevant Courses
View a list of courses offered in eScience disciplines.

SQLShare Success Stories
Whether it's database management, visualization, or developer tools, learn about tools we can help you use.

Latest eScience News

Data Science Incubation Program - Winter 2016
2 hours 4 min ago

Ben Marwick On How Computers Broke Science
Science of Science
Tens of millions articles, patents, books

Billions of citation links

Years: 1600 - 2016
Figure-Centric Search Engine

viziometrics.org

A project of the eScience Institute at the University of Washington
Talk Outline

• Gender in Academic Authorship
• Self-citation Differences
• Patents and Inventorship
• Homophily versus Heterophily
• Recommendations
Abstract
Gender disparities appear to be decreasing in academia according to a number of metrics, such as grant funding priorities, acceptance at scholarly journals, and productivity, and it might be tempting to think that gender inequality will cease to be a problem of the past. However, a large analysis based on over eight million papers across the natural sciences, social sciences, and humanities reveals a number of underestimated and persistent ways in which gender inequities for women authors are maintained in the scholarly publication process. The field is dominated by co-authors, in particular male co-authors, with fewer women in top roles. Further, the factors that define successful mentors for women authors are not understood. The results reveal a need for greater understanding of the social and cultural processes shaping the gender disparities in scholarly authorship.

RESEARCH ARTICLE
The Academic Advantage: Gender Disparities in Patenting
Cassidy R. Sugimoto1, Chaekun Noh1, Jevin D. West3, Vincent Larivière2,4
1 School of Informatics and Computing, Indiana University Bloomington, Bloomington, Indiana, United States of America, 2 École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 3 Department of Sociology, University of California, Los Angeles, California, United States of America, 4 Cénage de la recherche sociale et des sciences de l'information, Université de Montréal, Montréal, Montréal, Québec, Canada, 5 Observatoire des Sciences et des Technologies (CNRS), Centre Interuniversitaire de Recherche sur les Sciences et la Technologie (CIRSET), Université de Montréal, Montréal, Montréal, Québec, Canada

Abstract
We analyzed gender disparities in patenting by country, technological area, and type of assignee using the 4.6 million utility patents issued between 1975 and 2013 by the United States Patent and Trademark Office (USPTO). Our analyses of fractionalized inventories demonstrate that women's rate of patenting has increased from 2.7% of total patenting activity to 10.9% over the nearly 40-year period. Our results show that, in every technological area, female patenting is proportionally more likely to occur in academic institutions than in corporate or governmental environments. However, women's patents have a lower technological impact than those of men, and that gap is wider in the case of academic patents. This evidence highlights the importance of understanding the role of women in the academic environment and the implications for future research.

Introduction
Innovation is critical to economic development [1] and depends upon the full participation of the scientific workforce [2]. Yet, the growing field of "innovation studies" [3] reveals that there are many disparities in the exploitation of human capacity for innovatively well-noted areas are the dearth of academic and female innovators [4, 5]. This lack of innovation in the academic sector has been to some extent associated with the gendered nature of the academic environment, which encourages the varied ways in which faculty at educational institutions work and high-risk activities which have the potential for financial rewards for the individual and for the institutions in which they are affiliated [6]. This is most typically operating in the commercialization of scientific activities such as patenting [7], which has been shown to vary among men and women in other countries [8].
Collaborators

J. Jacquet
NYU

C. Bergstrom
UW

S. Correll
Stanford

M. King
Stanford

What gender disparities still exist across academia?
The 'Brilliance' Effect

Reviewer’s conclusion: we should get a man’s name on MS to improve it (male colleagues had already read it) (2/4)

It would probably also be beneficial to find one or two male biologists to work with (or at least obtain internal peer review from, but better yet as active co-authors), in order to serve as a possible check against interpretations that may sometimes be drifting too far away from empirical evidence into ideologically biased assumptions.
Mathew Effect

Robert Merton
Matilda Effect
Denial of the contribution of women scientists in research first described by Matilda Joslyn Gage

Mary is a female researcher working in an interesting field. She has got relevant ideas and has obtained promising results.

but

It is Marc, male fellow researcher in the same field, who is going to get the credit for Mary’s work.

It happened to the work of such extraordinary female scientists as: Lise Meitner, Rosalind Franklin, Marietta Blau

Harriet Zuckerman

Margaret Rossiter (1993)
Visualizing Scholarly Influence Over Time

Influence of Pew Scholars

Roberta A. Gottlieb

Learn More

Papers in category "Medicine" (domain 6)
Papers in category "Biology" (domain 4)
Papers in category "Chemistry" (domain 5)
Papers in category "Unknown" (domain 0)
Papers in category "Agriculture Science" (domain 16)

Roberta A. Gottlieb

Pew Scholar 1997

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<th>1970s</th>
<th>1980s</th>
<th>1990s</th>
<th>2000s</th>
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<td>4–8</td>
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<td>27–35</td>
<td>33–42</td>
<td>43–46</td>
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<td>9–14</td>
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<td>9–14</td>
<td>16–19</td>
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<td>20.1</td>
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<td>17.6</td>
<td>20.1</td>
<td>22.8</td>
</tr>
</tbody>
</table>
What gender disparities still exist across academia?

Full text for 8.2 million articles over 345 Years

Names from over 300 million boys and girls from 1880 - 2010

West, JD et al. (2013) PLoS One
Data: “authorship” =

a person
+

a paper for which the person is designated as a sole or co-author

3.6 million authorships
<table>
<thead>
<tr>
<th>Field</th>
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<td>Probability and Statistics</td>
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<td>Political science - international</td>
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<td>Political science-US domestic</td>
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<td>15705</td>
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<td>Ecology and evolution</td>
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<td>Organizational and marketing</td>
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<td>Radiation damage</td>
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<tr>
<td>Education</td>
<td>46.35</td>
<td>28635</td>
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What gender disparities still exist across academia?
What gender disparities still exist across academia?

first author
What gender disparities still exist across academia?
Women as Academic Authors 1665-2010

Women's presence in higher education has increased, but as authors of scholarly papers—keys to career success—their publishing patterns differ from those of men. Explore nearly 1,800 fields and subfields, across four centuries, to see which areas have the most female authors and which have the fewest, in this exclusive Chronicle report. See how overall percentages differ from the important first-author position and—in two major bioscience fields—from the prestigious last-author position. See "About these data" for details.

Source: Gender analysis led by Jevin West and Jennifer Jacquet at the University of Washington’s Eigenfactor Project.

Choose a time period:
- 1665-1970: 321,368 authors
- 1971-1990: 609,635 authors
- 1991-2010: 1.1 million authors
- All years: 2.0 million authors

Sort by field name.

Percentage of female authors:
- Anthropology: 27.2% female authors (45,099 authors)
- Classical studies: 19.6% female authors (21,063 authors)
- Cognitive science: 30.2% female

Author position:
- All authors

http://www.chronicle.com/interactives/gender-gap
Talk Outline

• Gender in Academic Authorship
• Self-citation Differences
• Patents and Inventorship
• Homophily versus Heterophily
• Recommendations
Motivation: Why Study Self-Citation?

• Women authors: fewer cites
• Could be due partly to self-cites
  – +1 self-cite ➔ +3 cites from others over 5 years (Fowler & Aksnes 2007)
• Case of workplace self-promotion
Men set their own cites high: Gender and self-citation across fields and over time
Men set their own cites high: Gender and self-citation across fields and over time

Overview of attention for article published in arXiv

This research output has an Altmetric Attention Score of 795. This is our high-level measure of the quality and quantity of online attention that it has received. This Attention Score, as well as the ranking and number of research outputs shown below, was calculated when the research output was last mentioned on 01 November 2016.

https://www.altmetric.com/details/9231143?src=bookmarklet#score
Data: JSTOR “Network Dataset”

- Years 1950-2012
- 1.6 million papers
- 9.4% of references are self-citations
Methods: authorship-to-authorship citations

Pooja Gupta, Colin Jones, and John Williams (2010) cites the paper

9 authorship-to-authorship citations 39.4M
1 self-citations: Colin Jones to Colin Jones 1M
Self-citation rates

678,768 author self citations that are male-to-male
121,923 author self citations that are female-to-female
216,671 author self citations that I cannot tell the gender

Men self-citations represent 84.8% of the population
Women self-citations represent 15.2% of the population.

448,389 women
1,596,125 men

Men represent 78.1% of the population.
Women represent 21.9% of the population.
Self-citation by Field

- Classics: 5.6
- Law: 6.3
- History: 6.9
- Economics: 7.6
- Prob/Stat: 8.5
- Poli Sci USA: 9.0
- Polit Sci Intl: 9.0
- Sociocult Anthr: 9.6
- Sociology: 9.9
- Phys Anthr: 10.4
- Philosophy: 10.7
- Education: 11.7
- Eco/Evo: 11.7
- Math: 12.3
- Mol Bio: 17.6

Percentage of self citations per publication
Number of Self-citation by Gender

- Self-cites: 0
- Self-cites: 1
- Self-cites: 3
- Self-cites: 4
- Self-cites: 5
Self-citation over time

\[
\frac{a_m \times k}{a_w \times 1} = \frac{s_m}{s_w}
\]

Ratio of male:female self-citations per authorship

Year
Excessive Self Citation

Number of authorships with n self–citations

Women

Men
Potential Mechanisms

• Men may self-cite more because they evaluate their abilities more positively than women
• Men face fewer social penalties for self-promotion.
• Men specialize more in academic subfields, and specialization may encourage more self-citation
• Men publish more papers, particularly earlier in their careers, and therefore have more work to cite
• Men publish different types of papers; namely, the types of papers an academic may be more likely to self-cite
• Women switch fields more often so reduce their need for self-citation
• What else?
Talk Outline

• Gender in Academic Authorship
• Self-citation Differences
• Patents and Inventorship
• Homophily versus Heterophily
• Recommendations
University Tech Transfer

COMOTION

UNIVERSITY of WASHINGTON
Gender Disparities in Patents
University Patent Environments

Percentage of female inventorships

- Firm
- Individual
- University

Fields:
- Chemistry
- Electrical Engineering
- Instruments
- Mechanical Engineering
- Other Fields
‘Impact’ differences by gender

- **A**: Mean technological impact
  - University
  - Individual
  - Firm

- **B**: Mean N. of technological classes

- **C**: Mean N. of inventors

Legend:
- Male
- Female
Gender differences

Authorship

Inventorship

Self-citation

Assortativity
## Homophily vs Heterophily

**Time Period (1665 - 2009)**

<table>
<thead>
<tr>
<th>Ecology and evolution</th>
<th>Plant community ecology</th>
<th>Plant ecology</th>
<th>Tropical forests</th>
<th>Treefall gaps and recruitment</th>
<th>Life history evolution</th>
<th>Sexual selection</th>
<th>Trophic ecology</th>
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<th>Nutrient cycling 3</th>
<th>Avian evolutionary ecology</th>
<th>Avian reproductive allocation</th>
<th>Mammalian ecology</th>
</tr>
</thead>
</table>
Future Directions

- Full disambiguated author data set
- Paper and journal status effects
- Homophily versus Heterophily
- Patent acceptance rates
- What else?
What to do?
Avoiding gender bias in reference writing
Got a great student? Planning to write a super letter of reference? Don’t fall into these common traps based on unconscious gender bias.

Mention research & publications
Letters of reference for men are 4x more likely to mention publications and twice as likely to have multiple references to research. Make sure you put these critical accomplishments in every letter!

Don’t stop now!
On average, letters for men are 16% longer than letters for women and letters for women are 2.5x as likely to make a minimal assurance (‘she can do the job’) rather than a ringing endorsement (‘she is the best for the job’).

Emphasize accomplishments, not effort
Letters for reference for men are more likely to emphasize accomplishments (‘his research’, ‘his skills’, or ‘his career’) while letters for women are 50% more likely to include ‘grindstone’ adjectives that describe effort. ‘Hard-working’ associates with effort, but not ability.

We all share bias
It is important to remember that unconscious gender bias isn’t a male problem. Research shows that women are just as susceptible to these common pitfalls as men. This is a problem for all of us - let’s solve it together!

Keep it professional
Letters of reference for women are 7x more likely to mention personal life - something that is almost always irrelevant for the application. Also make sure you use formal titles and surnames for both men and women.

Stay away from stereotypes
Although they describe positive traits, adjectives like ‘caring’, ‘compassionate’, and ‘helpful’ are used more frequently in letters for women and can evoke gender stereotypes which can hurt a candidate. And be careful not to invoke these stereotypes directly (‘she is not emotional’).

Be careful raising doubt
We all want to write honest letters, but negative or irrelevant comments, such as ‘challenging personality’ or ‘I have confidence that she will become better than average’ are twice as common in letters for female applicants. Don’t add doubt unless it is strictly necessary!

Adjectives to avoid: Adjectives to include:
caring successful
compassionate excellent
hard-working accomplished
conscientious outstanding
dependable skilled
diligent knowledgeable
dedicated insightful
tactful resourceful
interpersonal confident
warm ambitious
helpful independent
intellectual

brought to you by:
The University of Arizona
Commission on the Status of Women


Follow us at: www.facebook.com/uacswcsw
For an electronic copy of this graphic, see: www.csw.arizona.edu/LORBias
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Carole Lee, Department of Philosophy, UW
Elena Erosheva, Department of Statistics, UW