

Men set their own cites high: Gender and self-citation across fields and over time

Jevin West¹, Molly King², Carl Bergstrom³,
Shelley Correll², Jennifer Jacque⁴

¹Information School, UW

²Sociology, Stanford University

³Biology Department, UW

⁴Environmental Studies, NYU

	1960s	1970s	1980s	1990s	2000s
% PhDs overall	7–9	9–22	23–30	29–37	38–40
Computer sciences	n/a	n/a	9–18	14–19	16–21
Engineering	0–1	1–3	4–8	9–15	16–20
Life Sciences	8–14	13–25	26–39	38–46	47–52
Mathematics	5–7	6–16	13–18	18–24	25–30
Physical Sciences	3–5	5–11	11–19	19–24	25–29
Psychology	18–24	24–41	42–56	58–67	67–71
Social Sciences	8–12	11–26	27–35	33–42	43–46
% Tenure track faculty	n/a	n/a	10–15	16–22	24–28
Full Professors	n/a	5	5–8	9–14	16–19

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% Tenure track faculty	n/a	n/a	10–15	16–22	24–28
Full Professors	n/a	5	5–8	9–14	16–19
% Authors overall	10.6	14.2	20.1	25.3	29.2
Single author	8.7	12.5	18.7	24.5	28.5
1st author	9.2	12.9	19.3	25.3	30.9
2nd author	14.8	16.2	20.8	25.0	28.8
Last author	15.0	15.2	17.6	20.1	22.8



Fiona Ingleby
@FionaIngleby



Follow

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.

The Role of Gender in Scholarly Authorship

Jevin D. West^{1*}, Jennifer Jacquet², Molly M. King³, Shelley J. Correll³, Carl T. Bergstrom^{4,5}

1 Department of Biology, University of Washington, Seattle, Washington, United States of America, 2 Environmental Studies, New York University, New York, New York, United States of America, 3 Department of Sociology, Stanford University, Stanford, California, United States of America, 4 Santa Fe Institute, Santa Fe, New Mexico, United States of America

Abstract

Gender disparities appear to be decreasing in academia according to a number of metrics, such as grant funding, hiring, acceptance at scholarly journals, and productivity. Yet it might be tempting to think that gender inequality will soon be a thing of the past. However, a large-scale analysis by 10 authors on eight disciplines in the natural sciences, social sciences, and humanities finds a number of understated and persistent ways in which gender inequities remain. For instance, even where raw publication counts seem to be equal between genders, close inspection reveals that fields, men predominate in the prestigious first and last author positions. Moreover, women are underrepresented as authors of single-authored papers. Academics should be aware of the subtle ways disparities can occur in scholarly authorship.

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* E-mail: jevin@u.washington.edu

Introduction

Gender inequities and gender biases persist in higher education. After decades of high female enrollment in most PhD fields, women represent one-quarter of full professors and earn on average 80% of the salary of men in comparable positions [1]. A recent report [2] surveyed 1800 faculty across six science and engineering disciplines and found that women publish significantly more in chemistry and mathematics, while women publish less in electrical engineering (there were no significant differences found in biology, civil engineering, and physics). A recent experiment tested the role of gender in hiring by asking 127 science faculty to evaluate the resumes of two equally qualified candidates who gave identical applications; higher scores if the applicant had a female name [3]. Another recent analysis of commissioned articles in two prestigious journals published in 2010 and 2011 showed that women scientists are underrepresented; for instance, women wrote just 15% of editorials and 10% of the articles in *Nature* and *Science & Nature*, although they represent 20% of the scientists in this discipline [4]. With the use of alphabetical authorship listings declining over time [5], and given the complexity of evaluating intellectual contributions [6] in increasingly collaborative efforts, understanding patterns of authorship order becomes increasingly important.

Here we use the JSTOR corpus—a body of academic papers from a range of scholarly disciplines spanning five centuries—to examine trends in the gender composition of academic authorship through 2013. We pay particular attention to the first and last authors, given that first and last author publications are at least as important as raw publication counts for hiring, promotion, and tenure, particularly in scientific fields [7]. Studies of authorship in the medical literature reveal, for instance, that women have historically been underrepresented in the prestige positions of first and

last author, and that while discrepancies have reduced over time, women remain underrepresented in the first author position [8,9,10,11]. To view authorship patterns more broadly, we must move beyond the binary categories approach to categorize hierarchically our study corpus. This yields a hierarchical classification of papers in our study and allows us to study and compare gender representation in individual fields of any

Methods

The JSTOR corpus

The JSTOR corpus (<http://www.jstor.org>) is a publicly available scholarly research dataset that spans the humanities from 1545 to the present day. At the time of this analysis, the JSTOR corpus comprised 8.3 million articles. Approximately 1.8 million of these documents are research articles, cite or are cited by other documents in the corpus. We refer to these articles as *research articles*. We call this group the JSTOR network dataset. These 1.8 million articles are part of a single global citation network, such that any of these articles from any other may follow citation trails to later articles. We refer to this dataset as a network dataset because this is the pattern of the JSTOR network. The citation information of the main fields available in JSTOR dataset, gender composition of the identified authors dataset (21.9% female) is close to that of the entire corpus (20.8% percent).



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RESEARCH ARTICLE

The Academic Advantage: Gender Disparities in Patenting

Cassidy R. Sugimoto¹, Chaoqun Ni², Jevin D. West³, Vincent Larivière^{4,5*}

1 School of Informatics and Computing, Indiana University Bloomington, Bloomington, Indiana, United States of America, 2 School of Library and Information Science, Simmons College, Boston, Massachusetts, United States of America, 3 University of Information Information School, Seattle, Washington, United States of America, 4 École de bibliothéconomie et des sciences de l'information, Université de Montréal, Pavillon Lionel-Groulx, C.P. Centre-ville, Montréal, Québec, Canada, 5 Observatoire des Sciences et des Technologies (OST), Centre Interuniversitaire de Recherche sur la Science et la Technologie (CIRST), Université du Québec à Montréal, Succ. Centre-Ville, Montréal, Québec, Canada

* vincent.lariviere@umontreal.ca

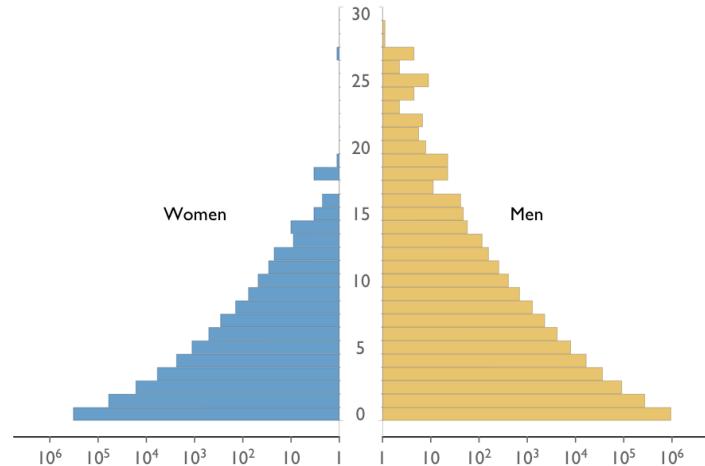
Abstract

We analyzed gender disparities in patenting by country, technological area, and type of assignee using the 4.6 million utility patents issued between 1976 and 2013 by the United States Patent and Trade Office (USPTO). Our analyses of fractionalized inventorships demonstrate that women's rate of patenting has increased from 2.7% of total patenting activity to 10.6% 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 government environments. However, women's patents have a lower technological impact than that of men, and that gap is wider in the case of academic patents. We evidence that patents to which women—and in particular academic women—are associated with a higher number of International Patent Classification (IPC) and co-inventors than men. The policy implications of these disparities and accompanying advantages are discussed.

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] demonstrates that there are many disparities in the exploitation of human capacity for innovation. Particularly well-noted areas are the dearth of academic and female innovators [4, 5], to this lack of innovation in the academic sector has been to stress academic entrepreneurship which encompasses the varied ways in which faculty at educational institutions engage in innovative and high risk activities which have the potential for financial rewards for them or the institution with which they are affiliated [6]. This is most typically operationalized through commercialization of science activities such as patenting [2], which was heavily promoted following the enactment of the Bayh-Dole Act in 1980 in the United States and similar in other countries [5].

Number of authorships with n self-citations



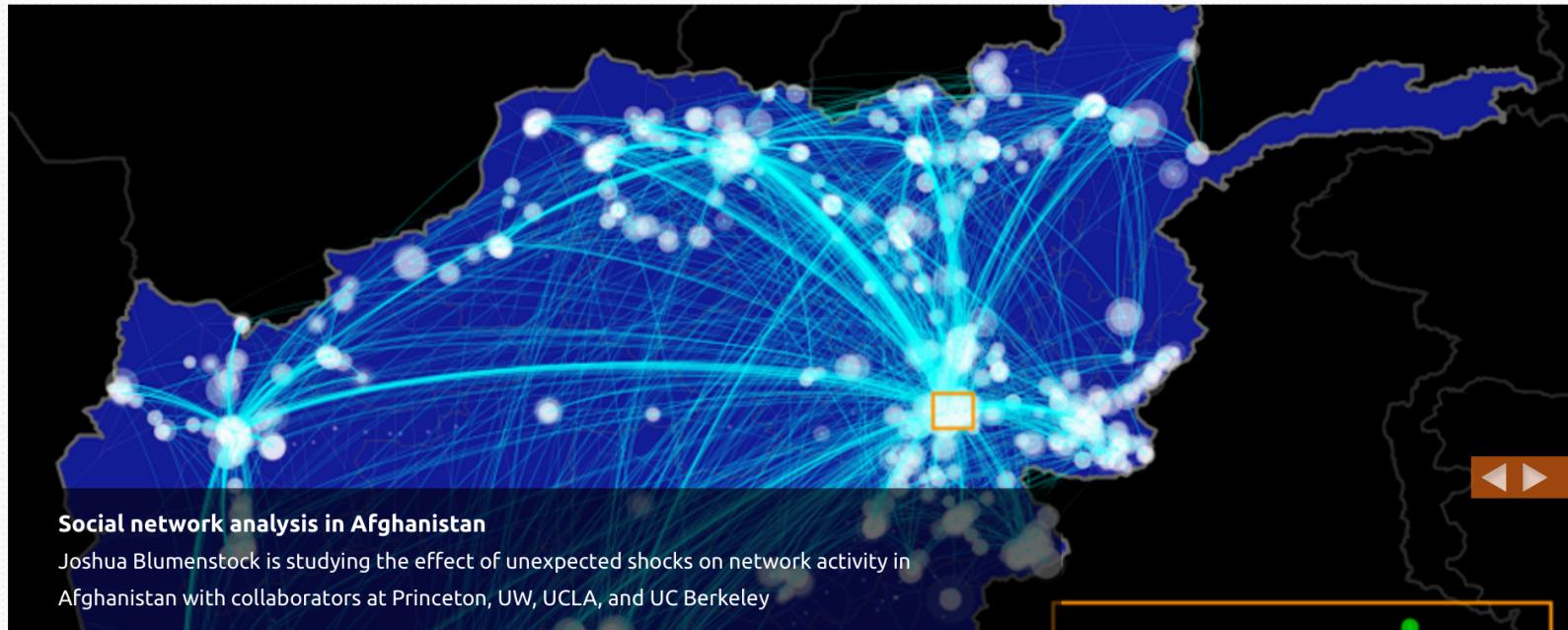
Gender differences in:

Authorship

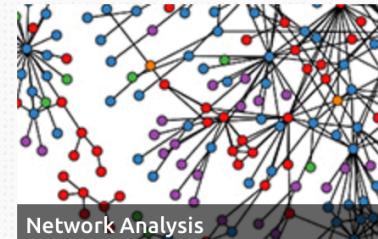
Inventorship

Self-citation

Assortativity



Research Focus Areas



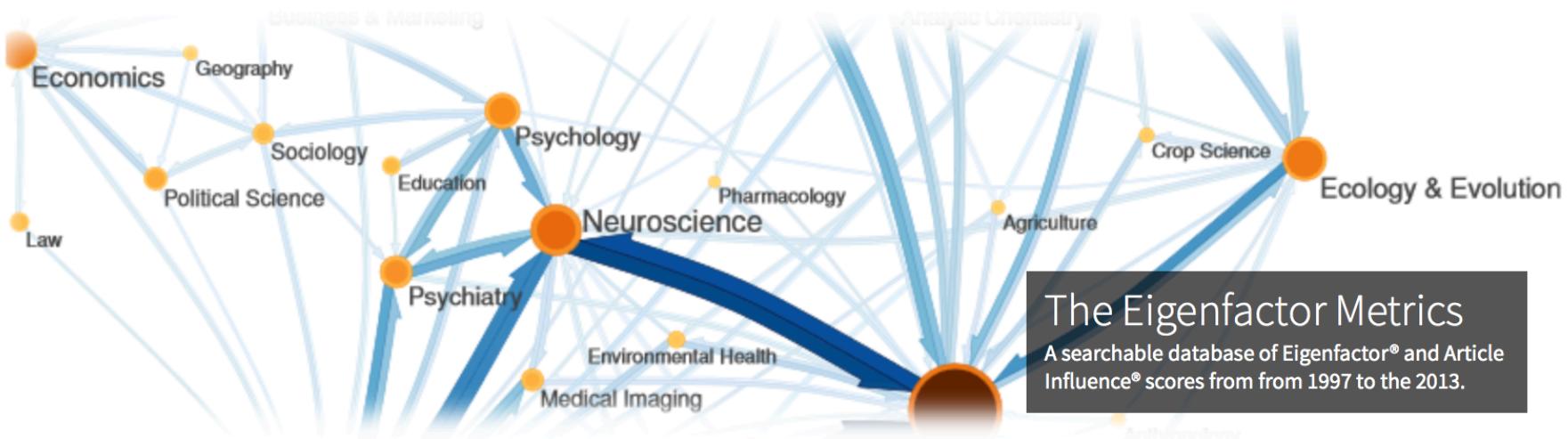
News and Updates

28

Blumenstock at Population Association of America

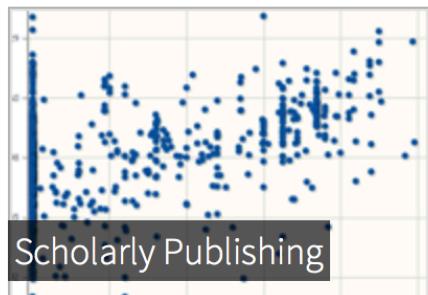
What we do

The DataLab is the nexus for research on Data Science and Analytics at the UW iSchool. We study **large-scale, heterogeneous human data** in an



The Eigenfactor Metrics
A searchable database of Eigenfactor® and Article Influence® scores from 1997 to 2013.

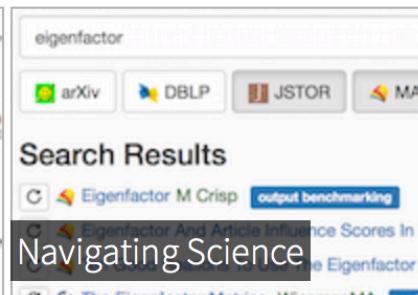
RESEARCH AREAS



Scholarly Publishing



Mapping Science

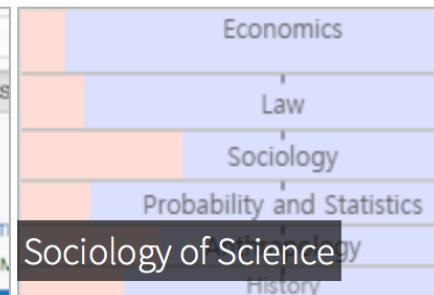


Search Results

Eigenfactor M Crisp output benchmarking

Eigenfactor And Article Influence Scores In The Eigenfactor N

The Eigenfactor Metrics: WisemanMA



Sociology of Science

only a century ago

Women were forbidden from seeking degrees in most universities in Europe...

Do gender disparities still exist in academia?

- 1.7 million scholarly papers in JSTOR from 1665 – 2012
- assigned gender to more than 2 million authorships
- author order means something on most papers



J. Jacquet
NYU



C. Bergstrom
UW



S. Correll
Stanford



M. King
Stanford

What gender disparities still exist across academia?



Jennifer Jacquet
NYU

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

Data: “authorship” =

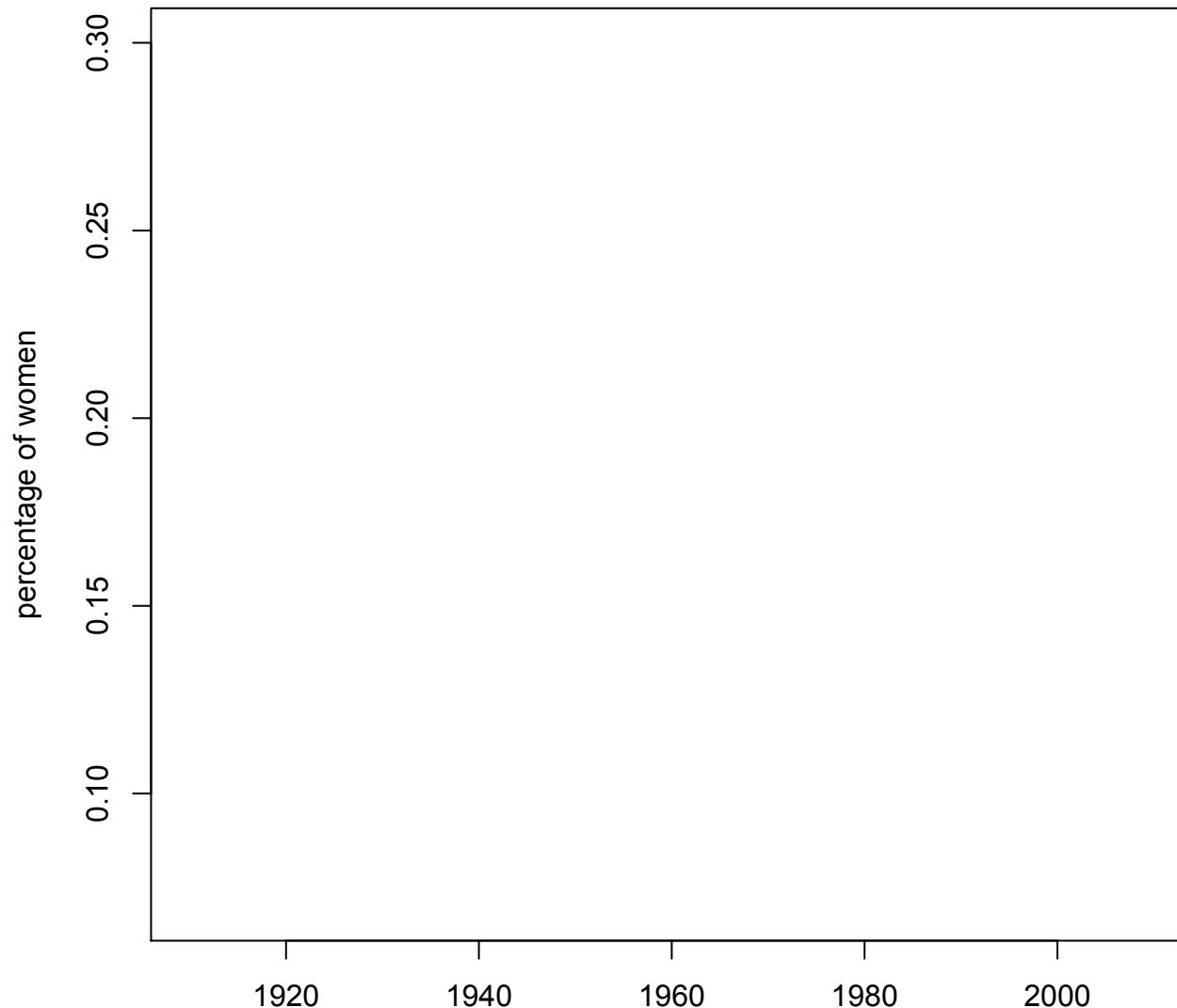
a person

+

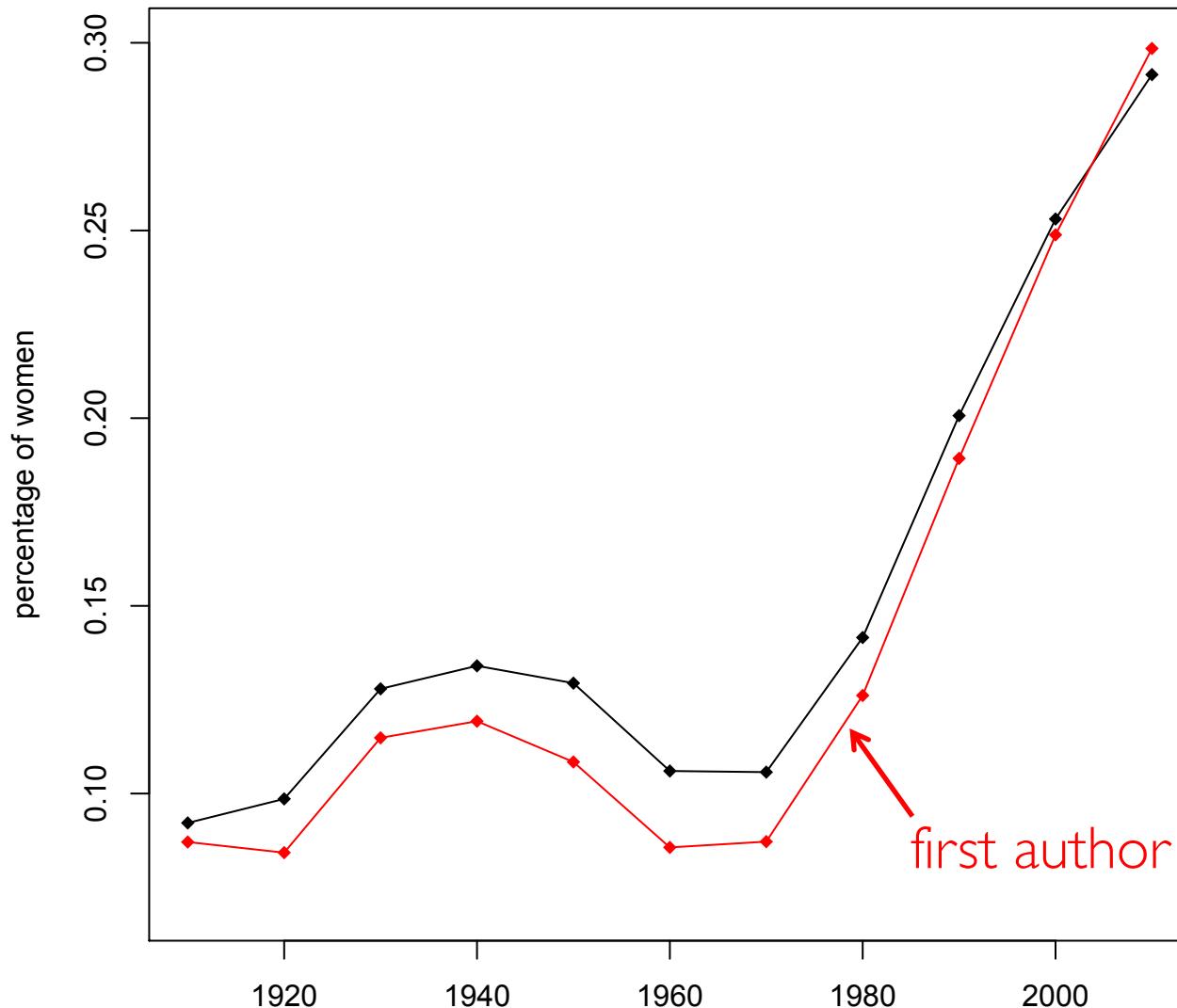
a paper for which the person is
designated as a sole or co-author

3.6 million authorships

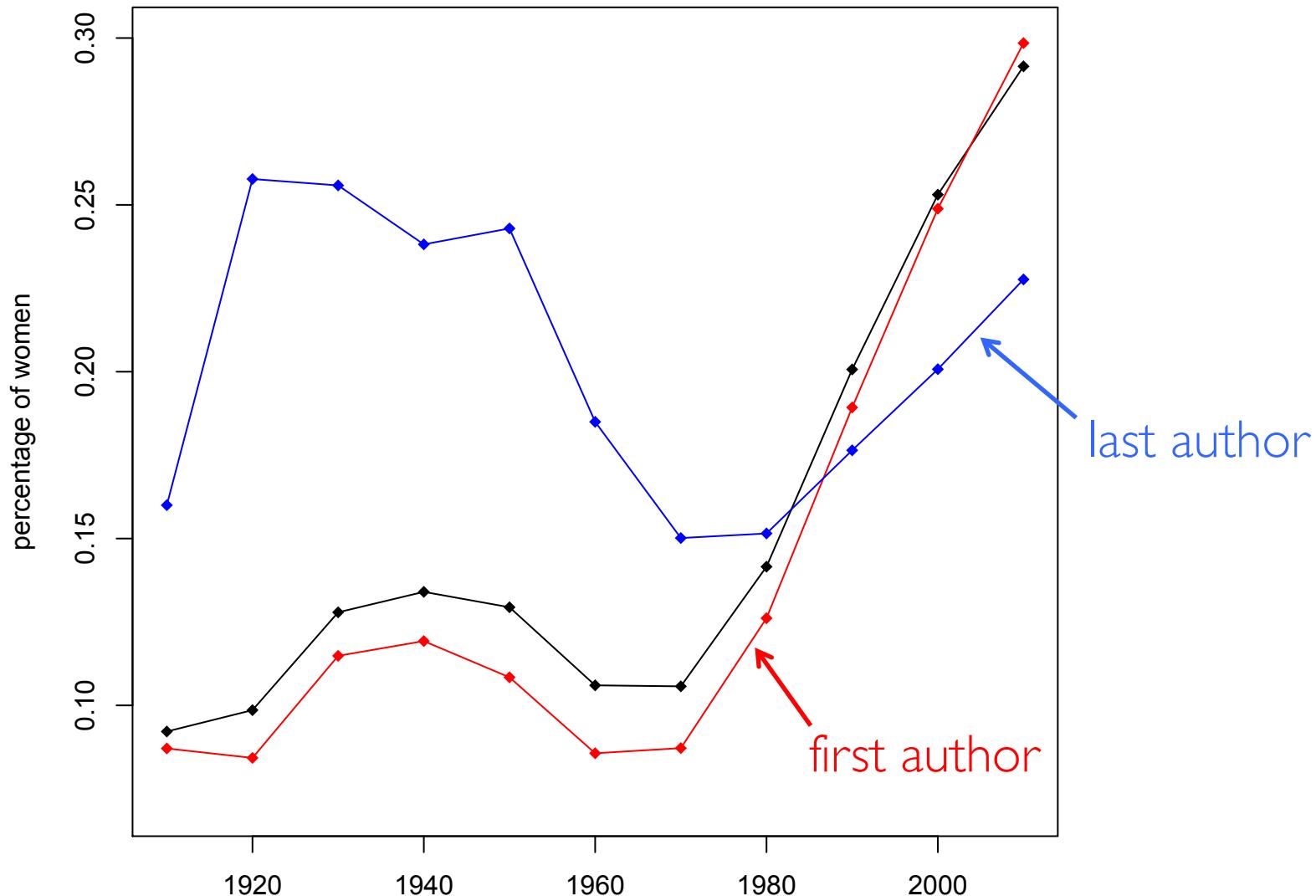
What gender disparities still exist across academia?



What gender disparities still exist across academia?



What gender disparities still exist across academia?



Field	% female	authorships
Mathematics	10.64	6134
Philosophy	12.04	12190
Economics	13.68	69142
Probability and Statistics	18.11	28324
Political science - international	19.07	14908
Political science-US domestic	19.09	15705
Ecology and evolution	22.76	279012
Law	24.21	18503
Organizational and marketing	25.44	32119
Physical anthropology	27.05	16296
Radiation damage	27.69	7825
Classical studies	28.88	6372
Molecular & Cell biology	29.25	277032
History	30.47	15585
Veterinary medicine	31.81	10960
Cognitive science	32.12	12786
Anthropology	36.46	19900
Pollution and occupational health	37.57	32108
Sociology	41.41	44895
Demography	41.90	7600
Education	46.35	28635

Ecology and evolution

Plant ecology

Evolutionary ecology

Aquatic ecology

Phylogeny

Population genetics

Paleontology

Species diversity and conservation

Map

Molecular & Cell biology

Cell growth

Exosome

The tree

Values for new sequence

Economics

Theoretical economics

Stock markets

Macroeconomics

Growth economics

Yellow

US constitutional law

Law

Sociology of the family

30 other areas under investigation

10 different areas

Probability and Statistics

Anthropology

History

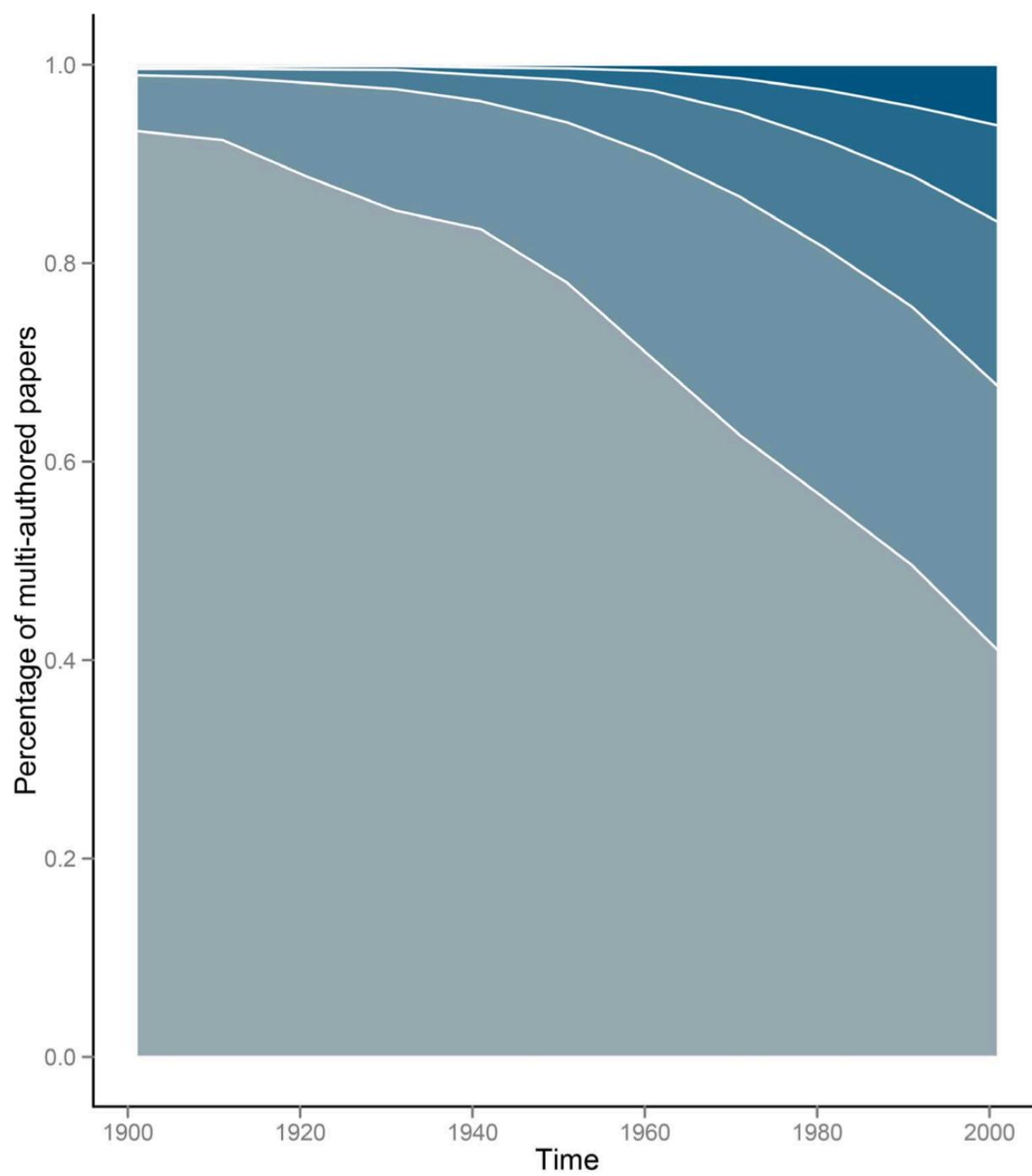
Education

Organizational and marketing

Classical studies

Mathematics

Philosophy



Gender differences in:

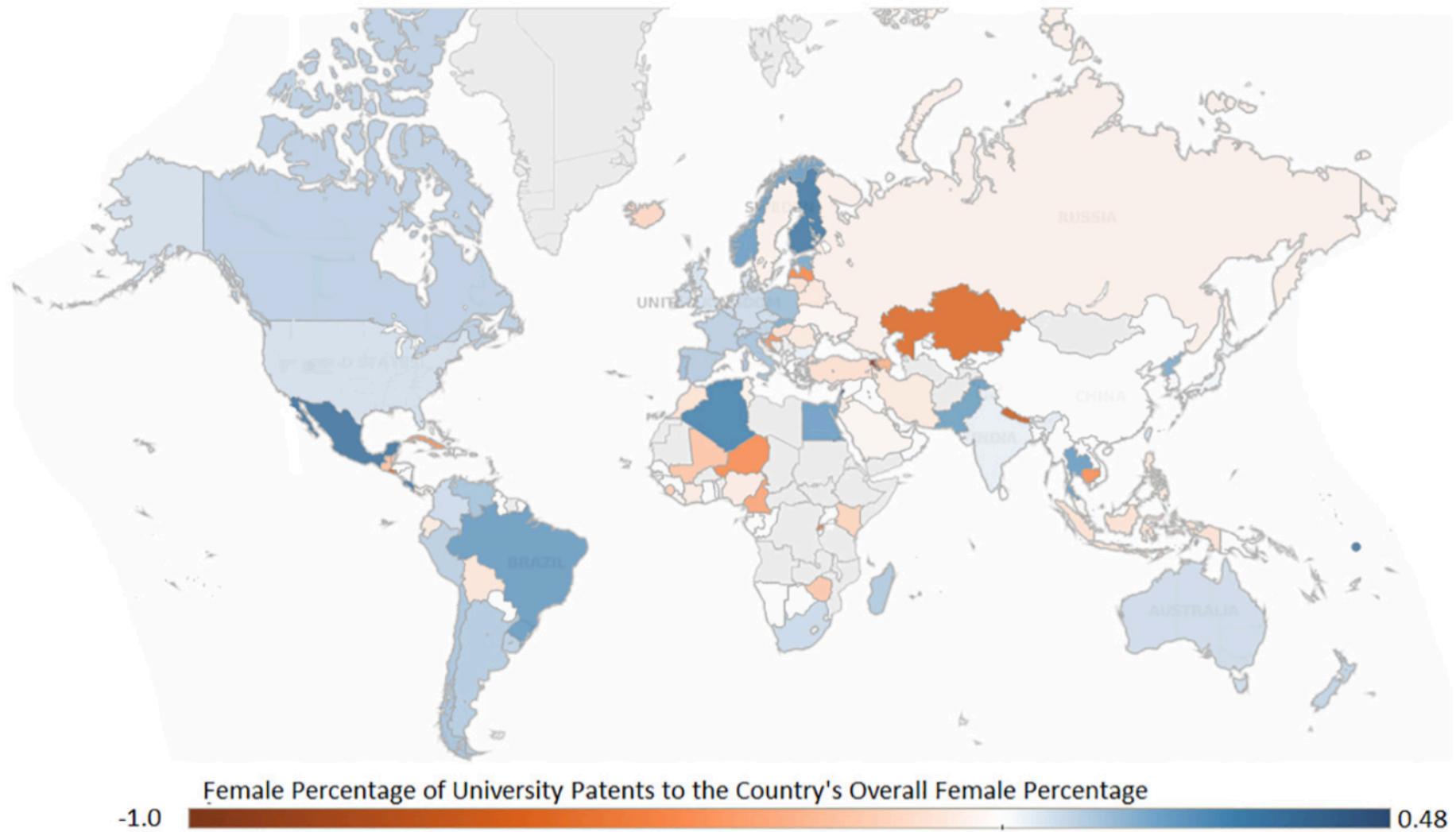
Authorship

Inventorship

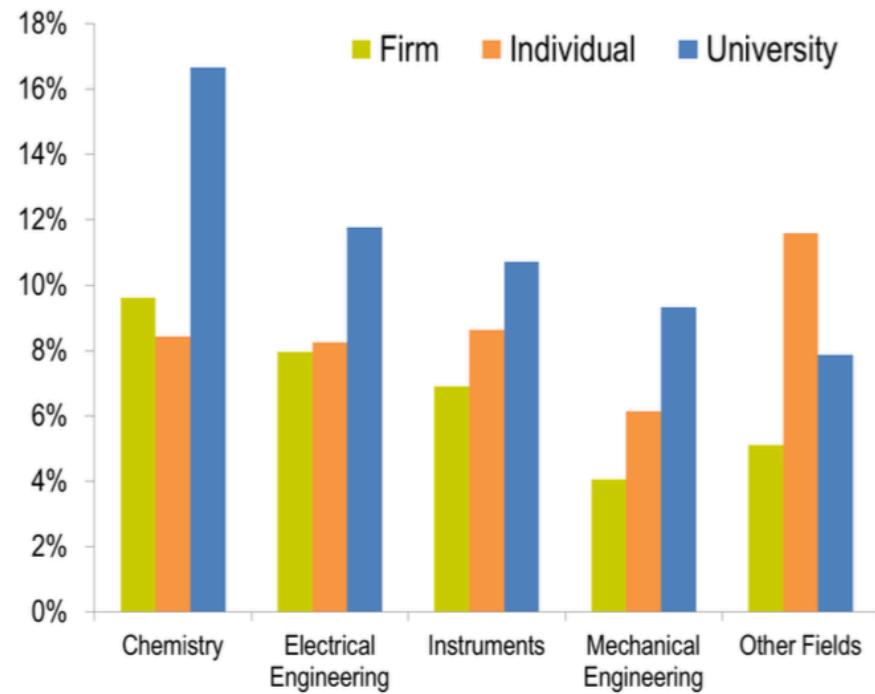
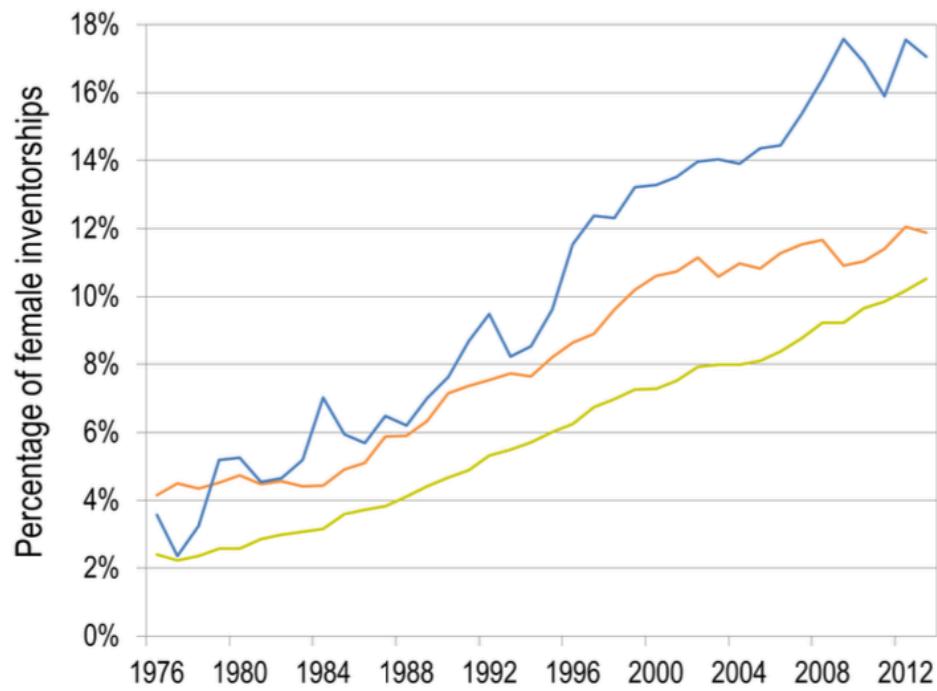
Self-citation

Assortativity

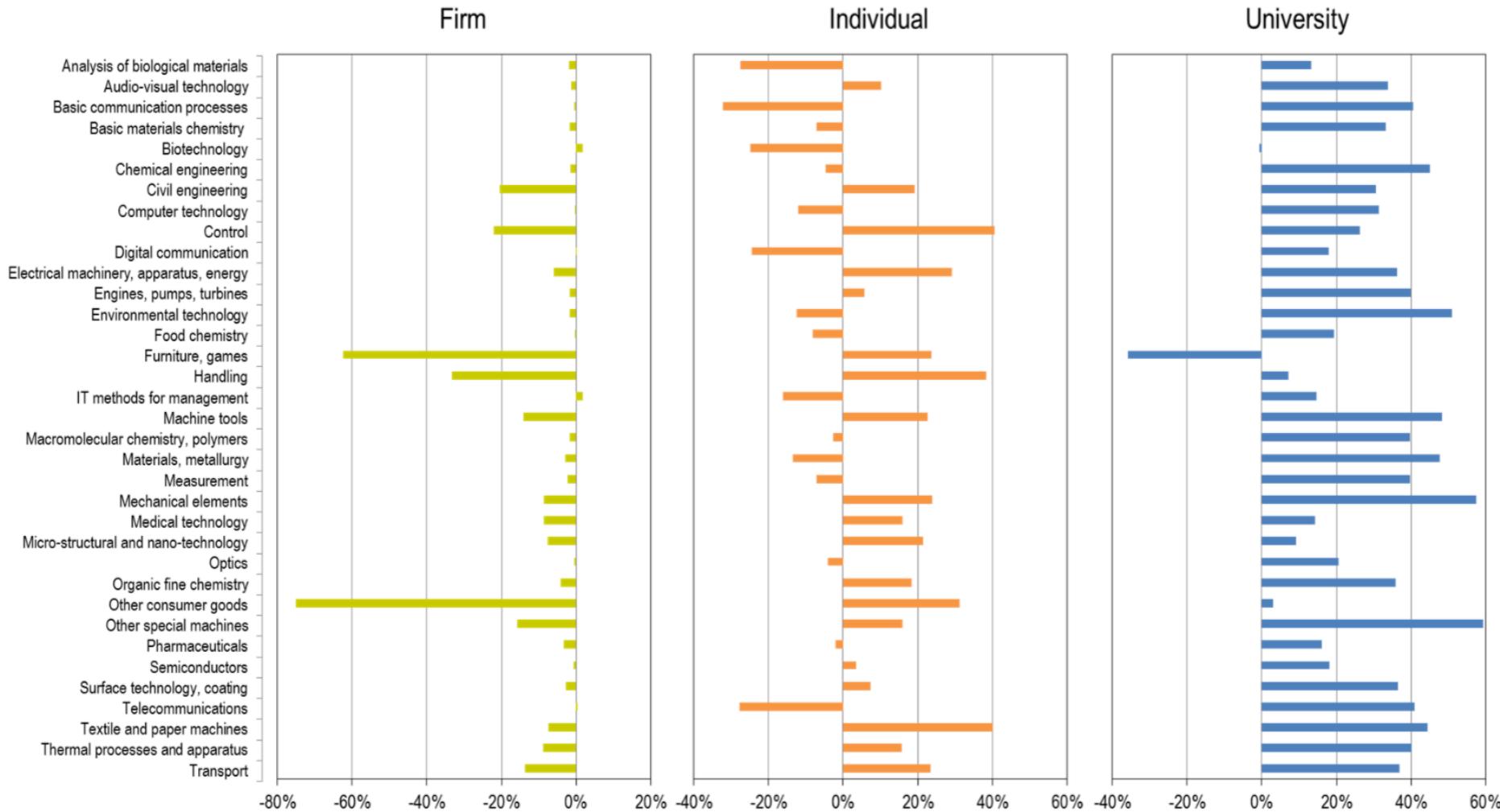
Gender Disparities in Patents



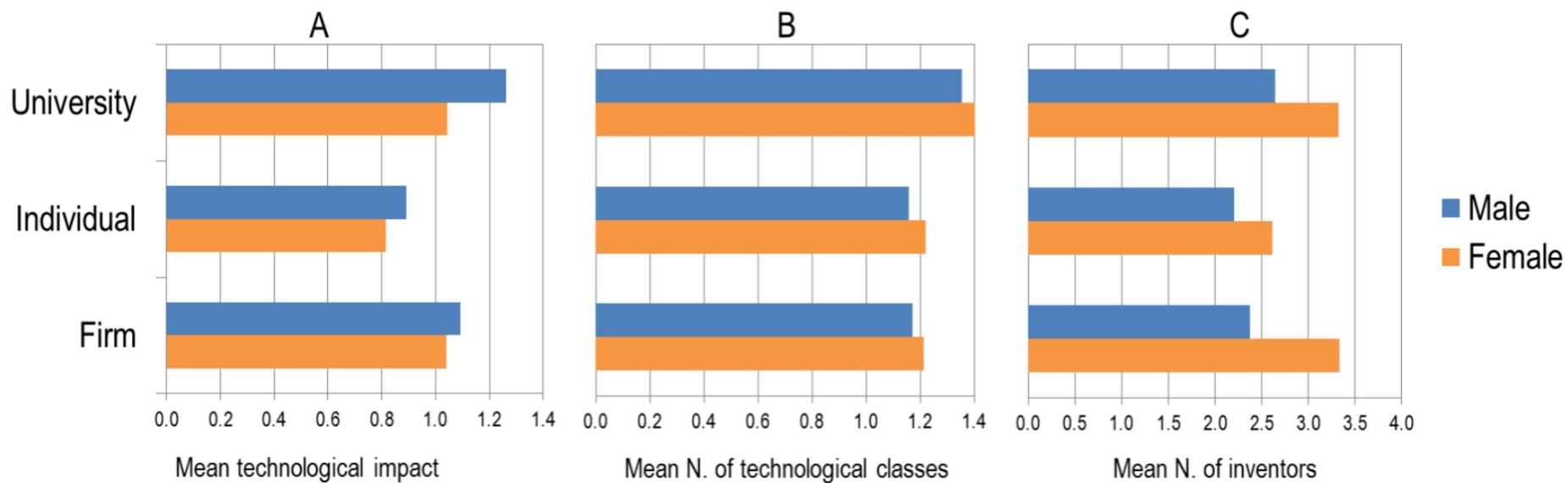
University Patent Environments



Gender Differences by Industry



'Impact' differences by gender



Gender differences in:

Authorship

Inventorship

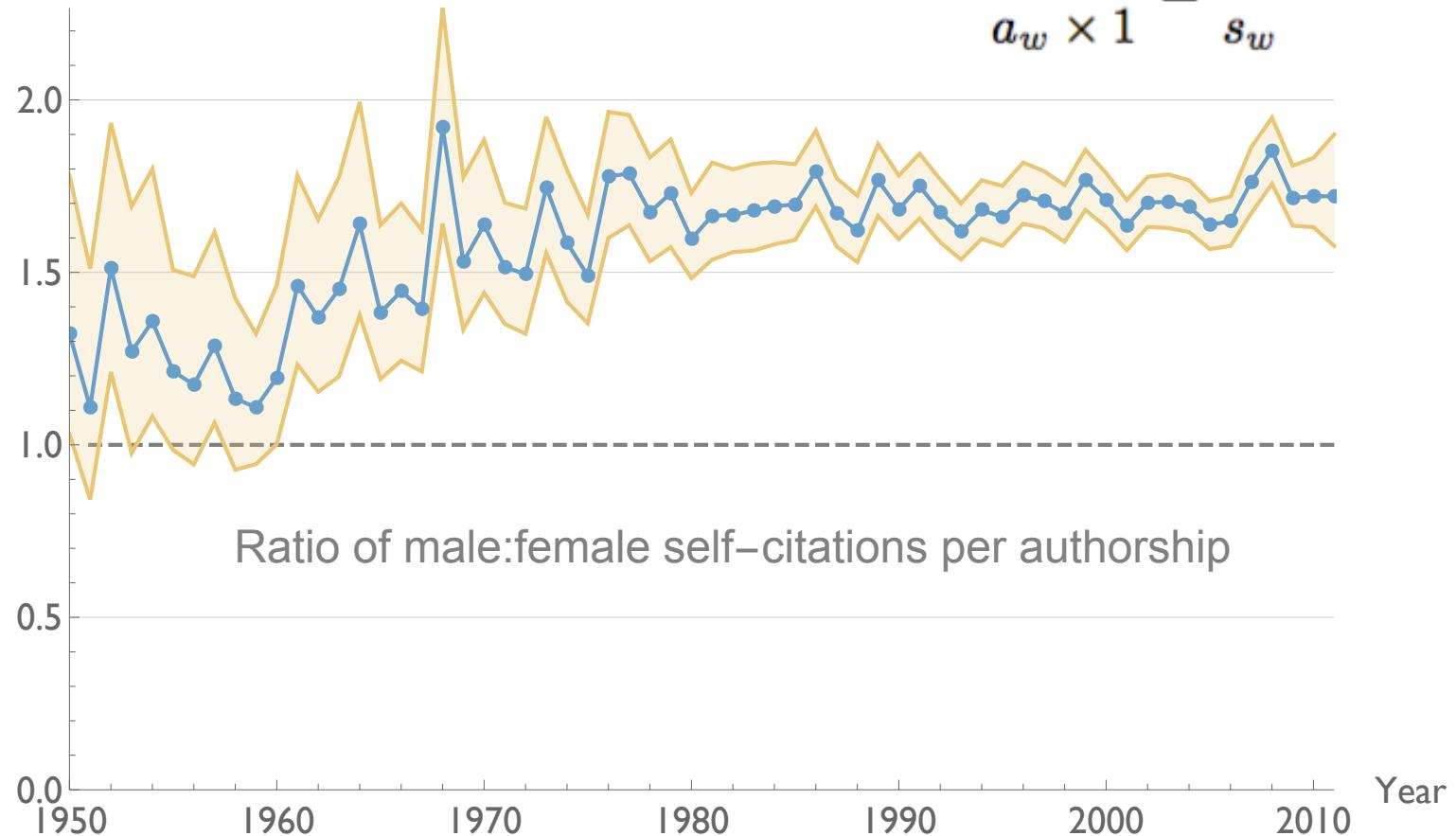
Self-citation

Assortativity

Self-citation over time

Ratio M:F

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

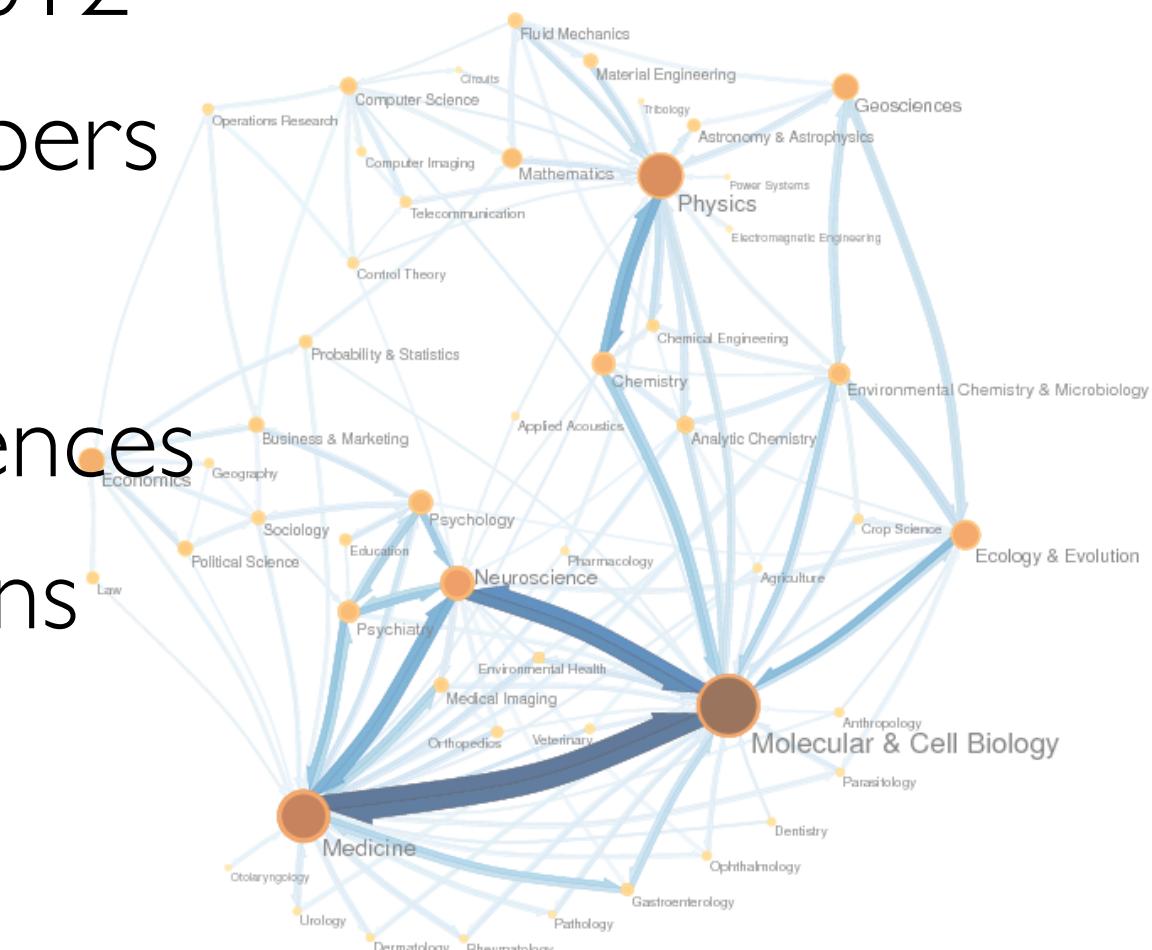


Motivation: Why Study Self-Citation?

- 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

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

Rita Paulson, Colin Jones, and Sarah Erikson (2008)

9 authorship-to-authorship citations **39.4M**
| 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

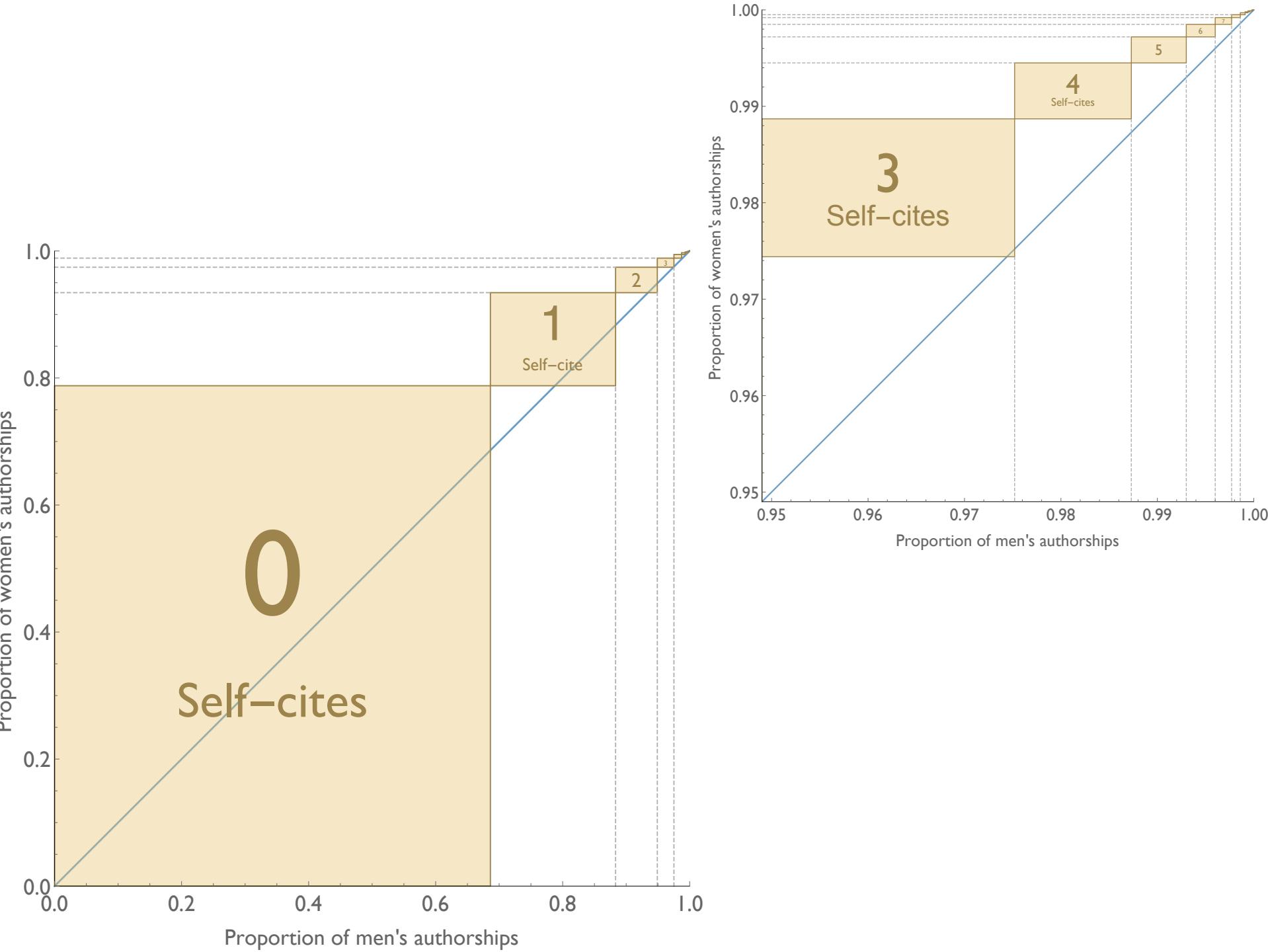
Women self-citations represent 15.2% of the population.

448,389 women

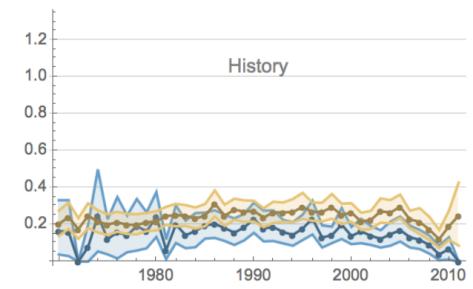
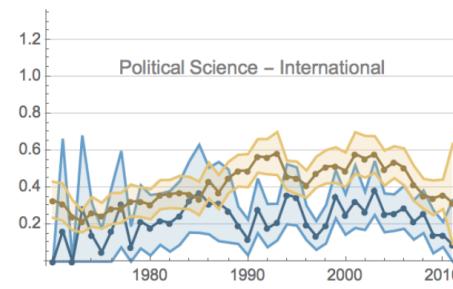
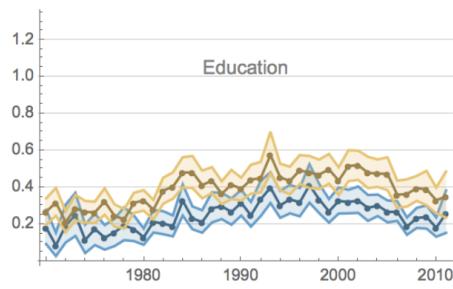
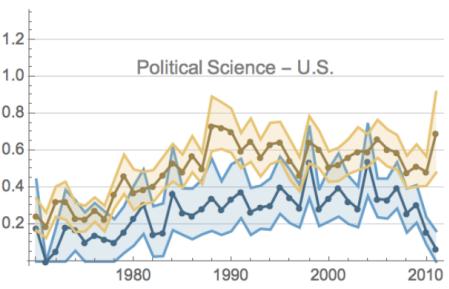
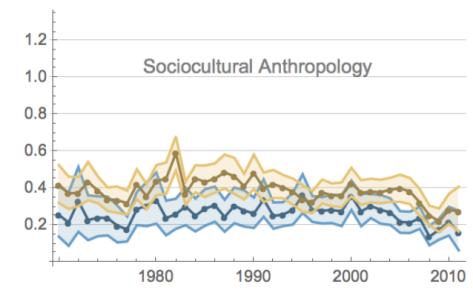
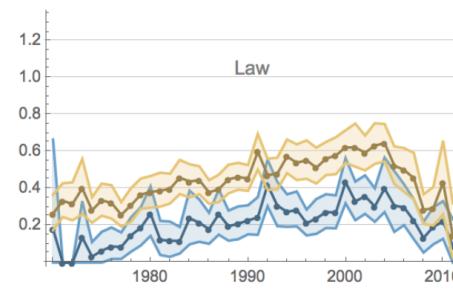
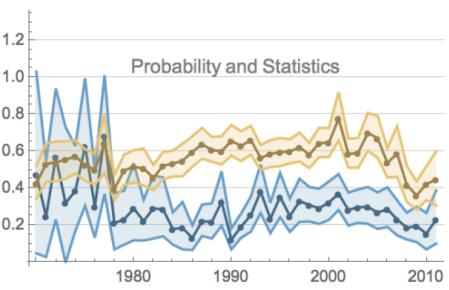
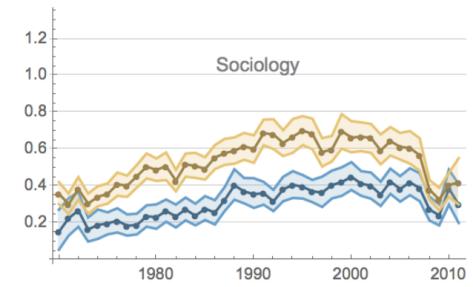
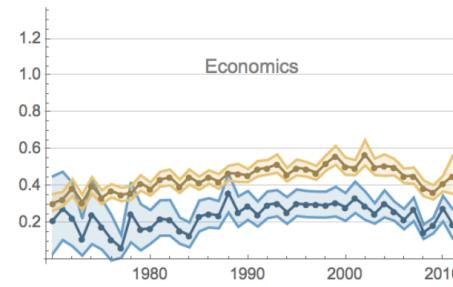
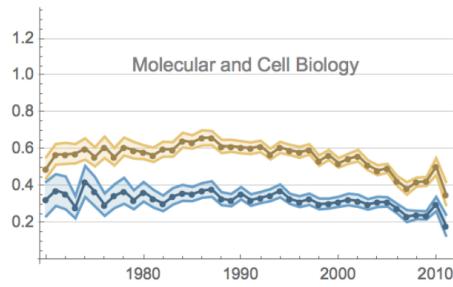
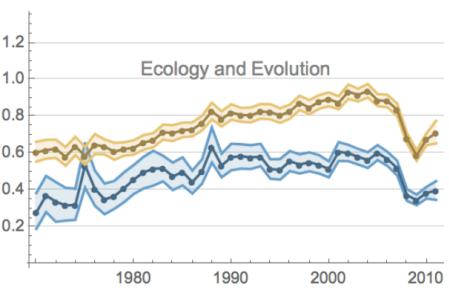
1,596,125 men

Men represent 78.1% of the population.

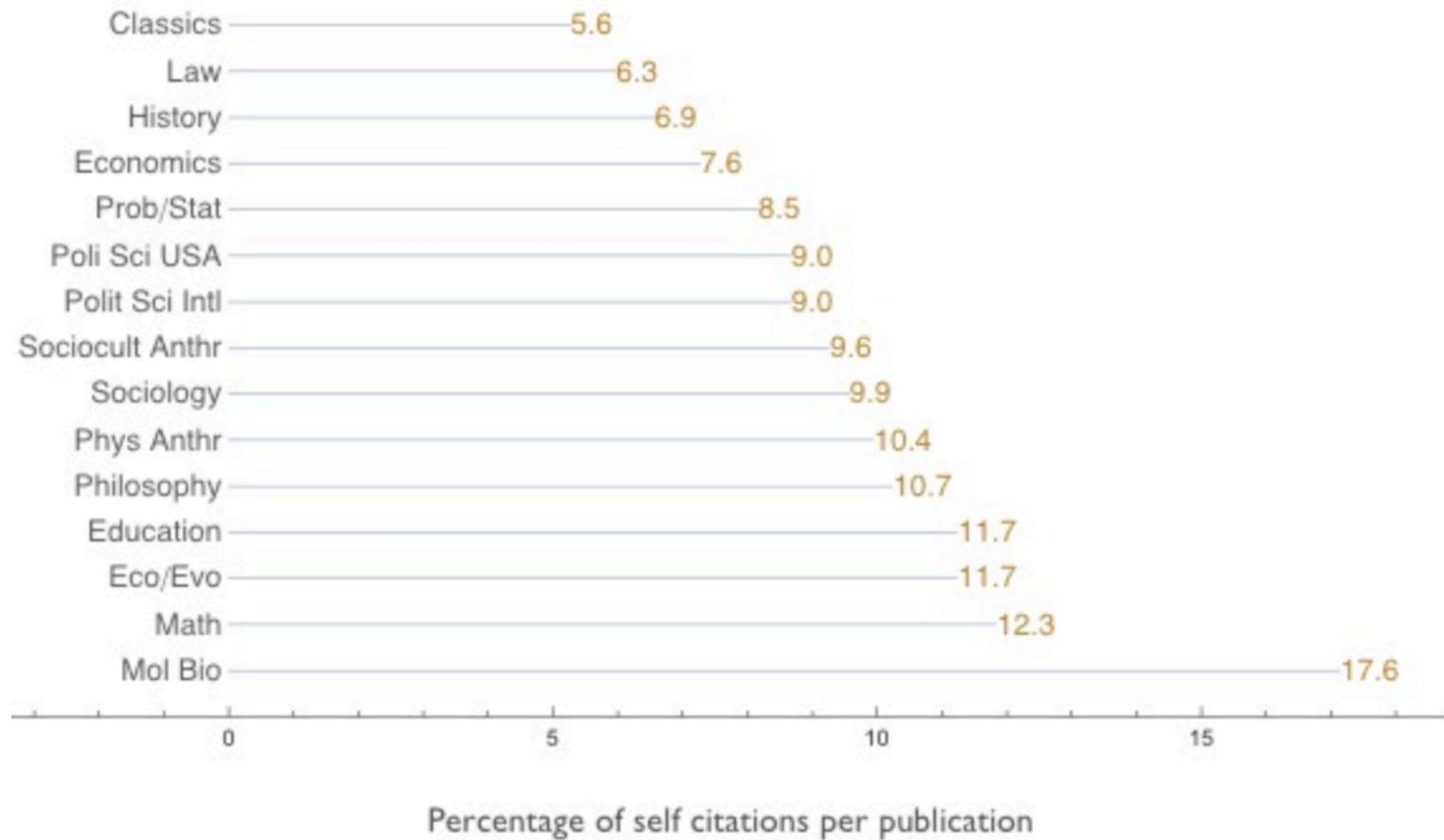
Women represent 21.9% of the population.



Self Citation by Field

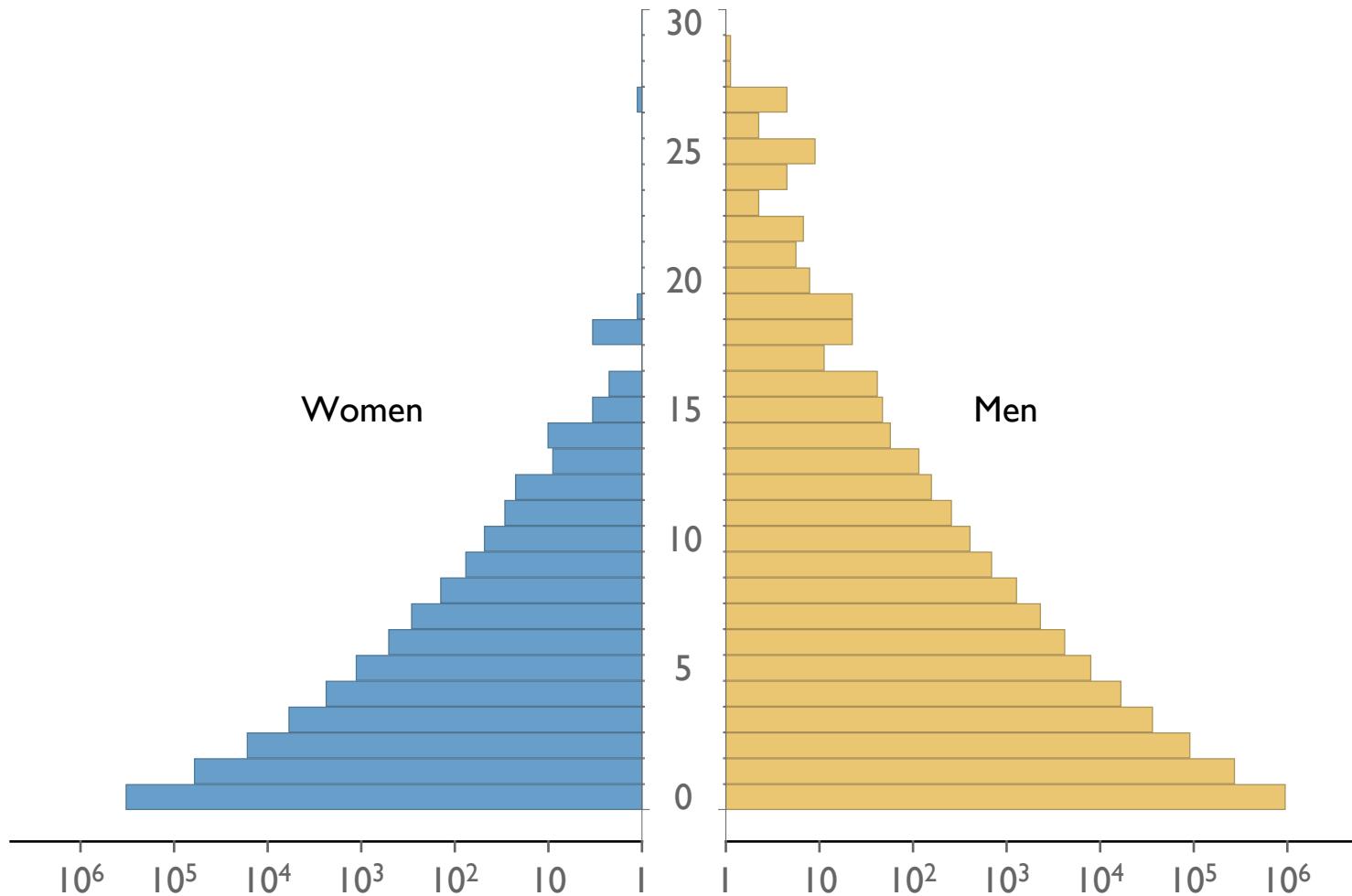


Self Citation by Field



Excessive Self Citation

Number of authorships with n self-citations



Potential Mechanisms: Why might men self-cite more?

Compared to women, men:

- evaluate their abilities more positively.
(Correll 2001, 2004; Cech et al. 2011; Thebaud 2010)
- face fewer social sanctions for self-promotion.
(Rudman et al. 2012; Rudman 1998)
- publish different types of papers. (West et al. 2013)
- publish more papers, particularly earlier in their career
(Leahy 2006; Long 1992; review in Bentley & Adamson 2004)
- specialize more in academic subfields. (Leahy 2006; Snyder and Bonzi 1998)

Gender differences in:

Authorship

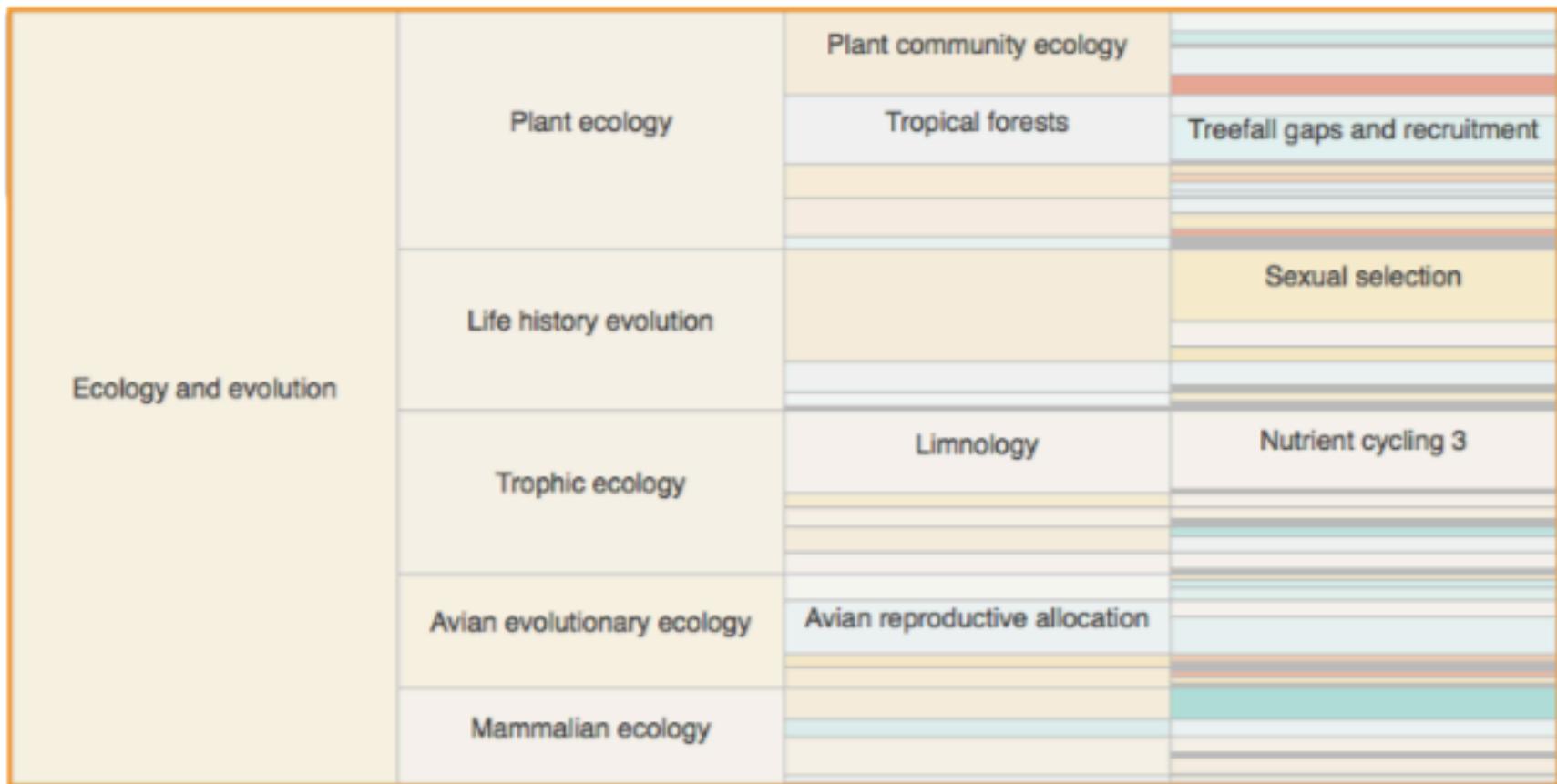
Inventorship

Self-citation

Assortativity

Homophily vs Heterophily

Time Period (1665 - 2009)



Conclusions

- Authorship: differences across field and over time
- Inventorship: 2.7% to 12%
- Homophily: still figuring out
- Limitation: Author Disambiguation

Future Directions

- Full disambiguated data set (SSRN, Orchid)
- Paper and journal status effects
- Homophily versus heterophily
- Patent acceptance rates

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Shelley Correll, Department of Sociology, Stanford University

Ted Bergstrom, Department of Economics, USCB

Carole Lee, Department of Philosophy, UW

Elena Erosheva, Department of Statistics, UW