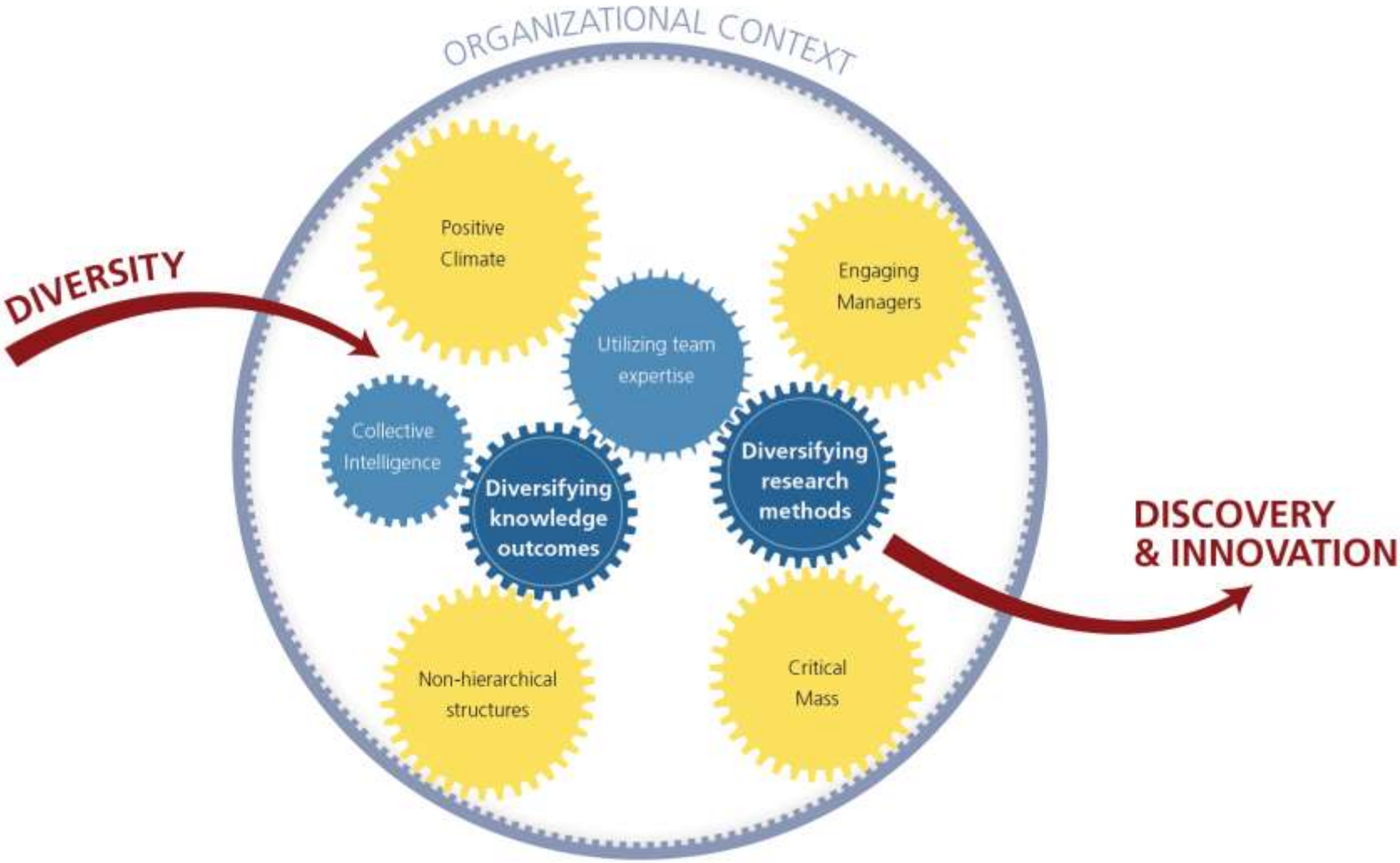
STANFORD

SCHOOL OF
HUMANITIES AND SCIENCES

Londa Schiebinger
John L. Hinds Professor of History of Science

Director, Gendered Innovations in Science, Health & Medicine, Engineering, and Environment

Science and Engineering



Nielsen, M., et al. "Gender diversity leads to better science." *Proceedings of the National Academy of Sciences* 114.8 (2017): 1740-1742.

New Study

- Our findings demonstrate a symbiotic relationship between increasing the numbers of women in academic medicine and enhancing excellence in research by incorporating gender and sex analysis.

Nielsen, M., Andersen, J., Schiebinger, L., and Schneider, J., 1.5 million medical papers reveal link between author gender and attention to gender and sex analysis, *Nature Human Behaviour,* Nov. 6, 2017.

Gendered Innovations…

- Can we harness the creative power of sex & gender analysis for discovery?

Gendered Innovations

in Science, Health & Medicine, Engineering, and Environment

What is **Gendered Innovations**?

SEX & GENDER ANALYSIS

- Methods
- Terms
- Checklists

CASE STUDIES

- Science
- Health & Medicine
- Engineering
- Environment

POLICY

INSTITUTIONAL TRANSFORMATION

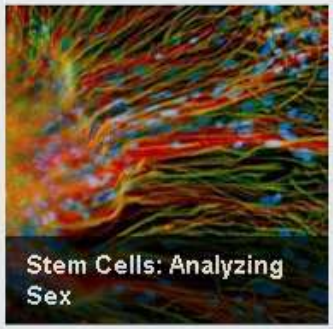
- Sign up for updates
- How to cite website

SCIENCE

Sex and Gender Methods for Research | Gendered Innovations

SCIENCE
HEALTH & MEDICINE
ENGINEERING
ENVIRONMENT

FEATURED CASE STUDIES



Stem Cells: Analyzing Sex

Osteoporosis Research in Men: Breaking the Gender Paradigm

HIV Microbicides: Formulating Research Questions & Analyzing Academic Disciplines

Why Gendered Innovations?

"Gendered Innovations" employs methods of sex and gender analysis to create new knowledge.

Gendered Innovations

1) develop state-of-the-art Methods of sex and gender analysis

2) provide Case Studies to illustrate how gender analysis leads to discovery and innovation.

Doing Research Wrong Costs Lives and Money

- Between 1997 and 2000, 10 drugs were withdrawn from the U.S. market because of life-threatening health effects—8 of those showed greater severity in women.

United States General Accounting Office. (2001). *Drug Safety: Most Drugs withdrawn in Recent Years had Greater Health Risks for Women*. Washington, DC: Government Publishing Office.

Google search

- Men are 5 times more likely than women to be offered ads for high-paying executive jobs.

Datta, Amit, Michael Carl Tschantz, and Anupam Datta. "Automated experiments on ad privacy settings." *Proceedings on Privacy Enhancing Technologies* 2015.1 (2015): 92-112.

Machine Learning

- Standard machine learning can acquire human biases from big data. Word embeddings capture associations between words that risk perpetuating harmful stereotypes, such as “man:computer programmer :: woman:homemaker.”

Bolukbasi, T. et al. (2016). Man is to computer programmer as woman is to homemaker? Debiasing word embeddings. *Advances in Neural Information Processing Systems*, 4349-4357.

Word Embeddings

- The Word Embedding Factual Association Test run in GloVe and validated in Word2vec found that European American names are more often associated with pleasant words and African American names with unpleasant words.

Caliskan, A. et al. (2017). Semantics derived automatically from language corpora contain human-like biases. *Science*, 356(6334), 183–186.

Image Search

- Stereotypes about men's and women's occupations are often exaggerated in image search results: A search for "nurse" results in disproportionately low numbers of male nurses compared to their actual representation in the field.

Kay, M. et al. (2015). Unequal representation and gender stereotypes in image search results for occupations. *Human Factors in Computing Systems*, 3819– 3828.

Emerging Solutions

- Cynthia Dwork: Fairness
- James Zou et al.: Debiasing
- Equalized Odds
- Reducing Bias Amplification

Gendered Innovations Workshop on Machine Learning, March

- Identifying where in machine learning bias resides input (data), output (predictive models), or algorithms.
- Mapping solutions.
- Discussing who should be involved in the decision making to fix these problems: Computer scientists? Ethics teams? Government oversight committees?

Other new Gendered Innovations projects: Workshop on Gender and Robotics

- Gendering robots: Why do people feel the need to attribute gender to robots? Is gender domain specific (a woman's voice ideal for dating advice vs a man's voice for math tutoring)?
- Gender characteristics: What genders a robot? Appearance, voice, mannerisms, movement, demeanor?
- Setting research priorities: Why can't robots clean up the kitchen? What do people want a robot to do in the home? House and caring work are gender issues: Despite recent gains, women globally perform the vast majority of domestic labor.
- Gender and emotional intelligence: What is appropriate social touch between robots and humans in relation to the gender of the person vis-à-vis the robot? Research shows that humans often harass robots. Might this behavior influence relations between human? How do we design socially-responsible robots?

Case Study on Menstrual Cups

Menstrual cups join two social goods:

1. gender equality
2. environmental sustainability

Gender Variables in Health Research

Develops tools for measuring gender attitudes and behaviors for use in health research.

1. Can we capture gender in variables that can be deployed quantitatively in research studies?
2. What are the relative contributions to health of biological sex (including intersex) versus cultural gender (including trans*) as these interact with other social factors, such as ethnicity, SES, age…?
3. How does gender become a modifier of biology, and vice versa?

To be kept up-to-date on Gender Analysis in Research

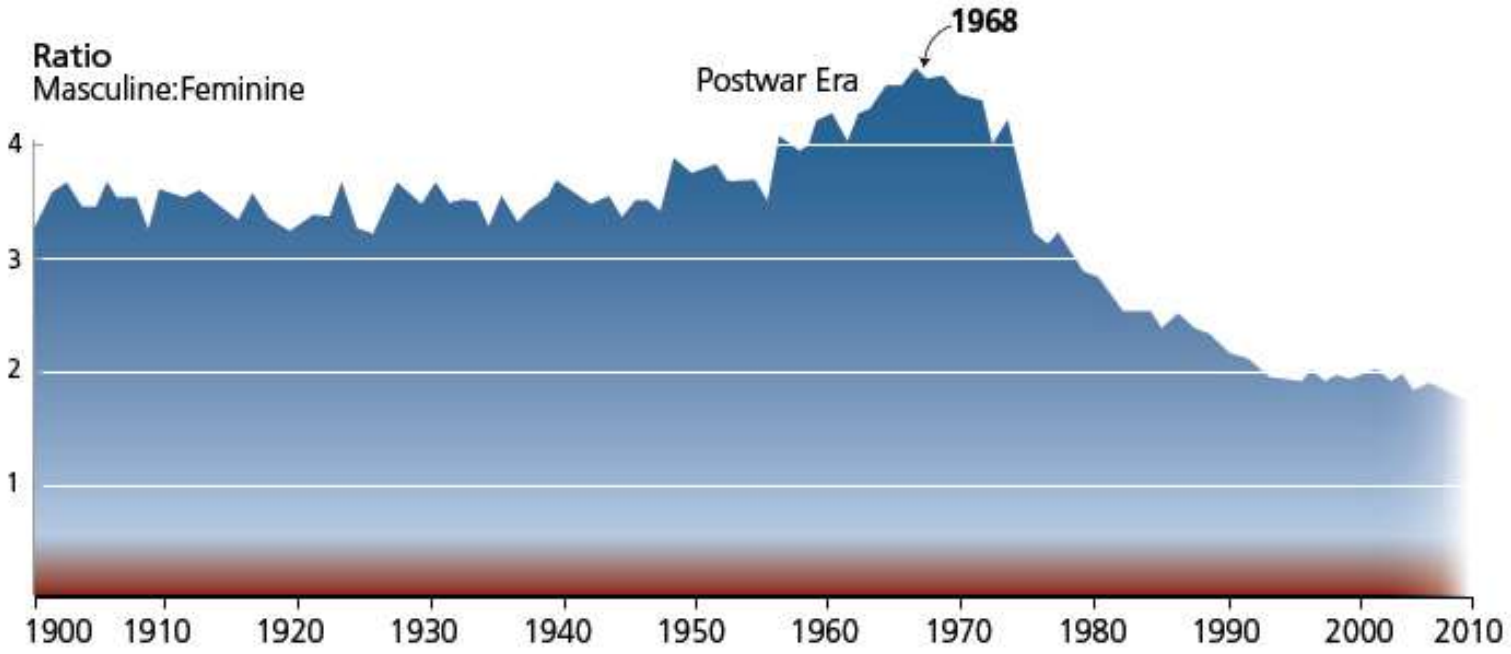
- Add your name to our Gendered Innovations listserv: schiebinger@stanford.edu

- Checkout our website: genderedinnovations.stanford.edu

Original Spanish Text	Automated Translations	
	Google Translate	Systran
El País March 22, 2011 Desde que Londa Schiebinger llegó a la Universidad tuvo claro que era lo suyo. Primero como estudiante y después como profesora. "Decidí quedarme en la enseñanza porque se aprende cada día. Me encanta el conocimiento", dice. Se nota. Esta catedrática de Historia de la Ciencia de la Universidad de Stanford (EE UU) interroga curiosa sobre el pescado del menú del día: merluza. Su traducción al inglés -hake- no le dice nada. No hay problema, mejor probarla…	Since Londa Schiebinger came to the University was clear that was his thing. First as a student and later as a teacher. "I decided to stay in education because you learn every day. I love knowledge," he says. It shows.This professor of History of Science at Stanford University (USA) curious questions about fish from the daily menu: hake. Its translation into English-hake-not say anything. No problem, better try it...	Ever since Londa Schiebinger arrived at the University knew clearly that he was his. First like student and later like professor. "I decided to remain in education because every day is learned.The knowledge enchants to me", it says. Note. This university professor of History of the Science of the University of Stanford (the USA) interrogates peculiar on the fish of the meal of the day: hake. Its translation to the English - hake- does not say anything to him. There is no problem, better to prove it…problem, better to prove it...

Two state-of-the-art systems commonly default to the masculine pronoun; Systran occasionally uses the neuter pronoun "it," as does Google Translate in other paragraphs.

Ratio of Masculine to Feminine Pronouns in U.S. Books, 1900-2008
Changes parallel increases in women's labor force participation, education, age at first marriage, etc.



The ratio of masculine pronouns ("he," "him," "his," "himself") to feminine pronouns ("she," "her," "hers," "herself") peaked at over 4:1 in 1968. By 2000 the ratio dropped dramatically to 2:1 (Twenge et al., 2012).

Data from American English corpus of the Google Books database (~1.2 million books).
Reproduced from Twenge et al., 2012.