

Enhancing excellence, gender equality and efficiency in research institutes, the European perspective

- Some number, the problems
- What we know about
- European strategies to fix institutions
- Introducing gender in science

Alessia Bruni – Istituto Nazionale di Fisica Nucleare, Bologna, Italy and Working Group on Gender and Diversity of Science Europe

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Women in physics,
LHC experiments at CERN



Fabiola Giannotti, new CERN director



Women are 15% of total people in ATLAS experiment

ATLAS
EXPERIMENT

Number of women in physics depends on countries

Country	women	men	total	% women at institute	% women nationality
Grand Total	341	1825	2166	15.6%	15.6%
Turkey	4	9	13	30.8%	40.0%
Italy	47	151	198	23.7%	24.1%
France	27	113	140	19.3%	18.0%
UK	35	170	205	17.1%	15.3%
Germany	37	222	259	14.3%	11.2%
Canada	12	74	86	14.0%	17.9%
USA	56	385	441	12.7%	10.2%
CERN	15	105	120	12.5%	-
Czech Republic	5	58	63	7.9%	8.5%
Switzerland	2	25	27	7.4%	4.3%
Japan	4	78	82	4.9%	5.7%
Russia	5	105	110	4.5%	6.7%

ATLAS experiments at CERN (2008)

Physics and Gender?

Physics is considered to be objective – not affected by the sex or gender or ... of the people involved (researcher, teacher, student ...)

... but

Physics class-rooms, labs, history are extremely affected by sex or gender – almost always dominated by men

... seems like a contradiction

Where did the women go?

In physics we call similar cases as “symmetry breaking” and are considered of extreme interest.

Let's try to investigate women disappearance with the attention it deserves

Definitions: what we call sex, gender

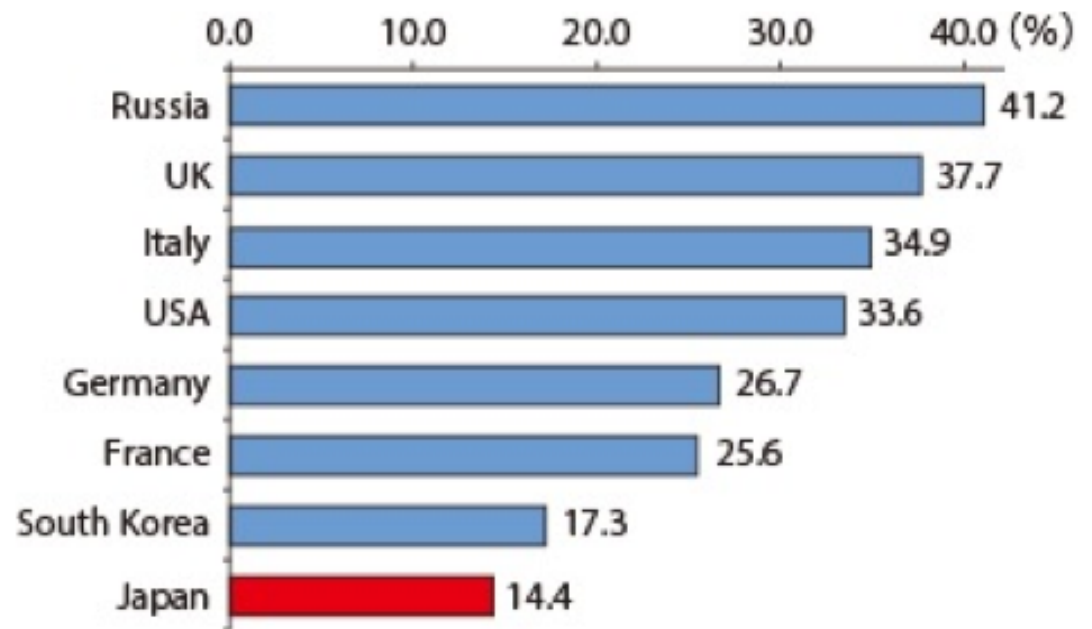
- Sex refers to biological differences; chromosomes, hormonal profiles, internal and external sex organs.
- Gender describes the characteristics that a society or culture delineates as masculine or feminine. What that sex means in terms of your gender role as a 'man' or a 'woman' in society can be quite different cross culturally. These '*gender roles*' have an impact also on the health of the individual.
- 'man' = male sex + masculine social role
- 'woman' = female sex + feminine social role

NB: The definition of masculine and feminine are strictly related !

How many women in research?

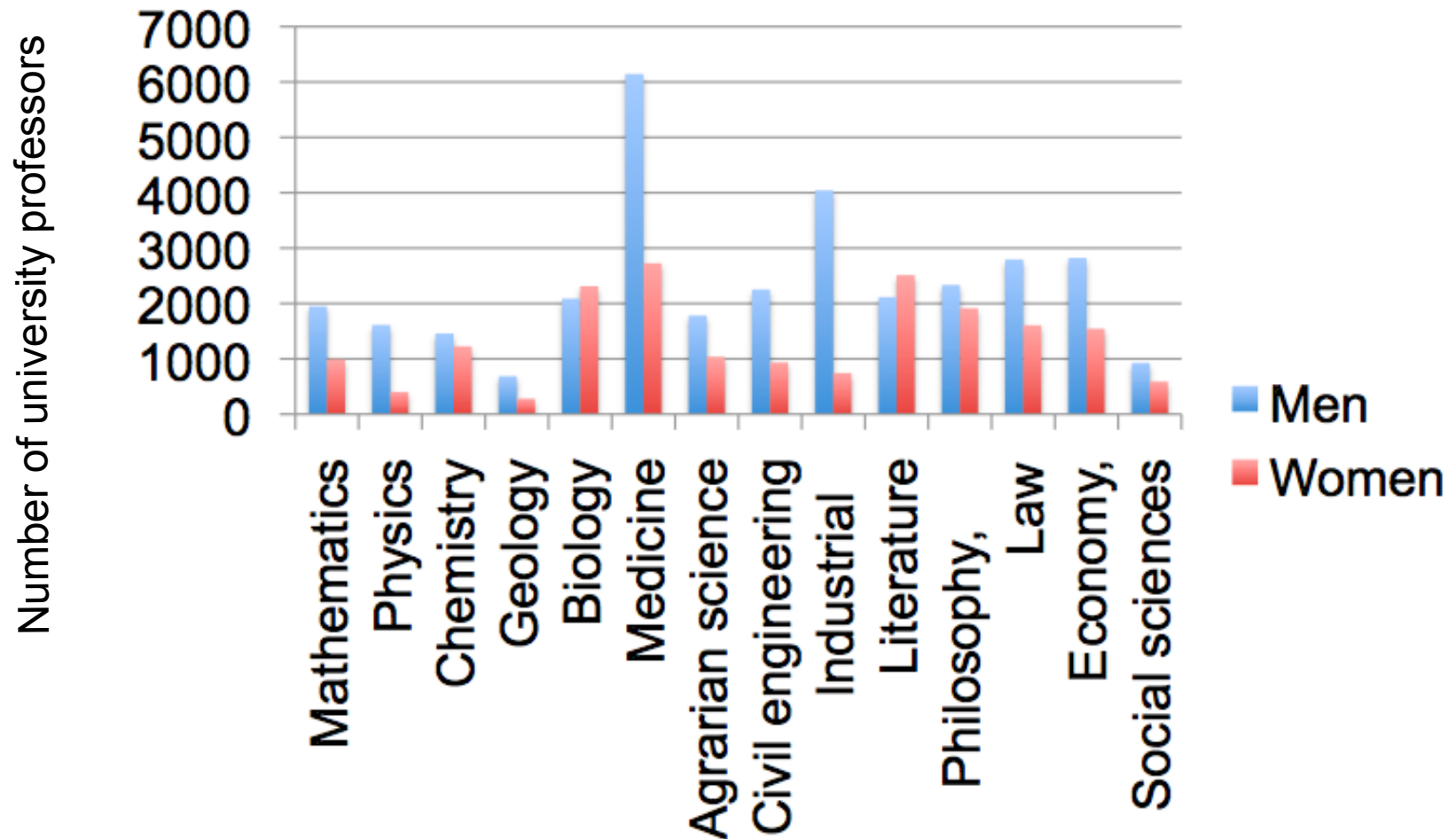
Women are half of
population, they perform
very well at school and
at university

but they are not half of
researchers (data 2013)



<http://www.cwr.kyoto-u.ac.jp/english/introduction.php>

Horizontal segregation, professors in Italy



Women better represented in some areas, why?
i.e. Biology vs Medicine, Chemistry vs Physics

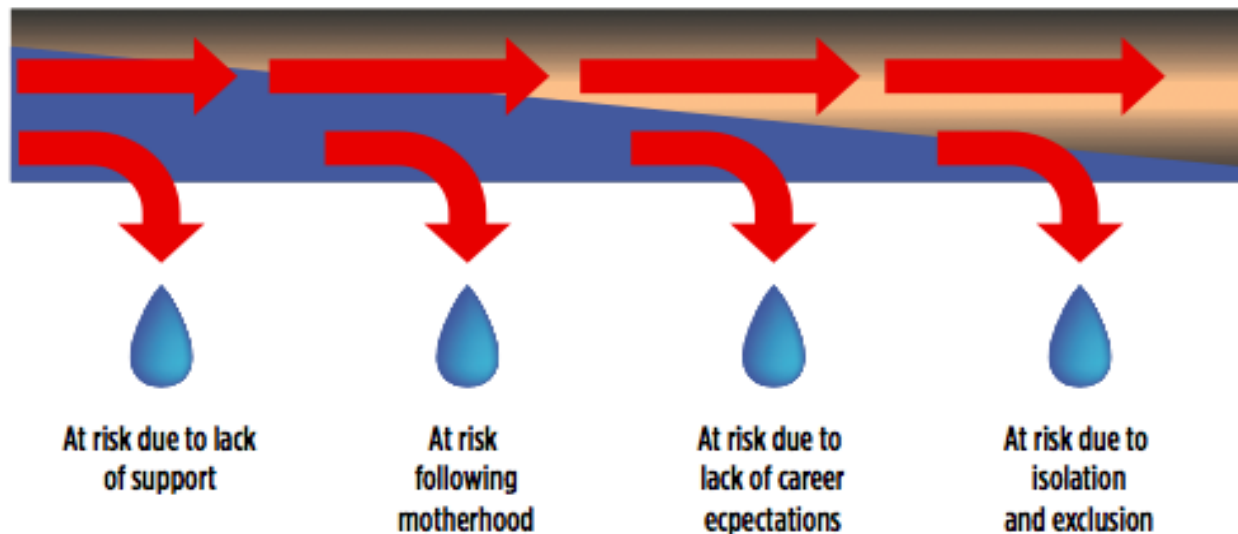
Women career – a leaky pipe

The physics case, Italy. Women are:

38% of the graduated students, 30% at PhD,

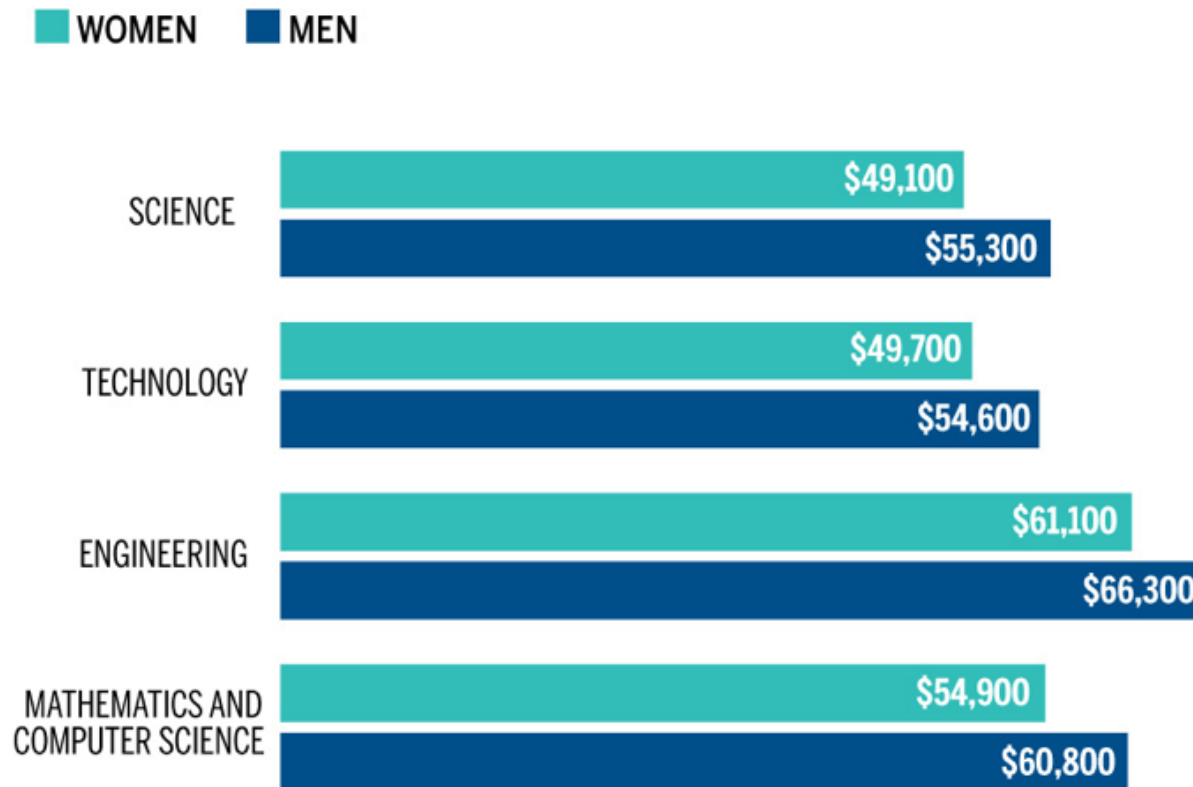
29% at post PhD, 20% of the staff

They have the same probability of a men to become associate professor, but half probability to be full professor.



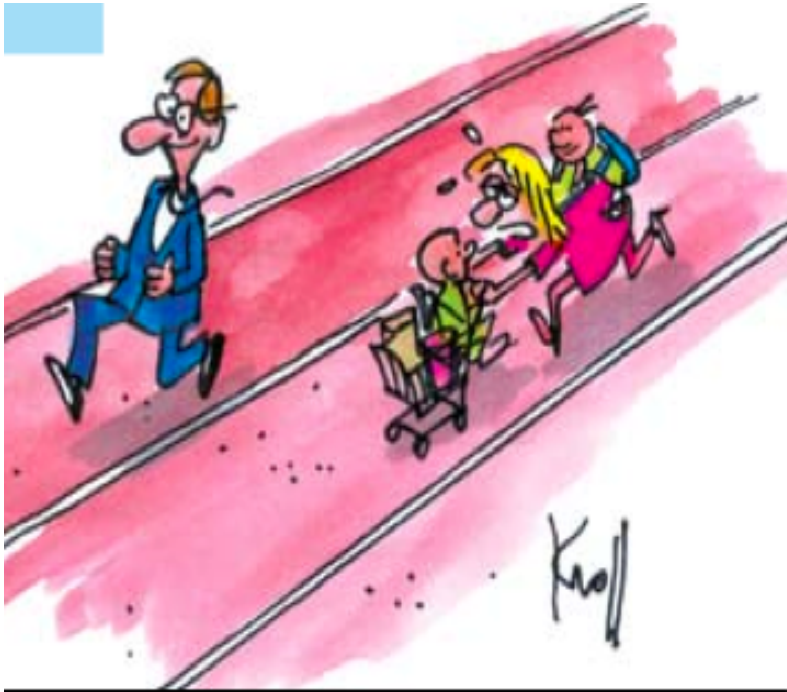
Better careers corresponds to better salaries for men

STEM MEDIAN WAGES AND SALARIES IN CANADA, 2010



In INFN, on average a female researcher earns 3400 euro per year (-6.6%) less than a male colleague

Women and men's careers



Many people still buy into the theory that most women decline to take a career because they can't, or won't, juggle home and work.

It is the full story? There are very good reason to believe that unconscious psychological phenomena are playing a role

Women absent in the content of research

- Up to 1992, 25% of drugs were tested on men only in USA.
 - Between 1997 and 2000, ten drugs were withdrawn from the USA market because of life-threatening health effects—four of these were more dangerous to women.
 - Preclinical research uses primarily male animals
 - Large fraction of biomedical research do not account properly differences related to sex and gender
- 1) Gender bias in research can be very expensive
 - 2) Reduced trust in science and increase distance between society and science

Women absent from the content of innovation

- 13 million of woman are pregnant in Europe each year
- While it has been known since the 1970s that the traditional 3-point seatbelt can cause damage to fetuses, little work has been done to enhance seatbelt design. Test dummies based on children's bodies were introduced in the 1980s, but it wasn't until 1996 that pregnancy became a variable in this research.
- And even today, pregnant crash test dummies are not used in the government-mandated testing

Many other example are possible ...

A problem in academia?

- I. Women excluded by research, mainly in “hard” science
 - II. Women excluded by leadership positions in research
 - III. Women excluded also by the content of research and innovation
- It is a problem of women or the symptom of a problem in research/academia?
 - A science/innovation that do not see the women is a good science?
 - A science blind to gender/sex will be well received by society?

We all have bias



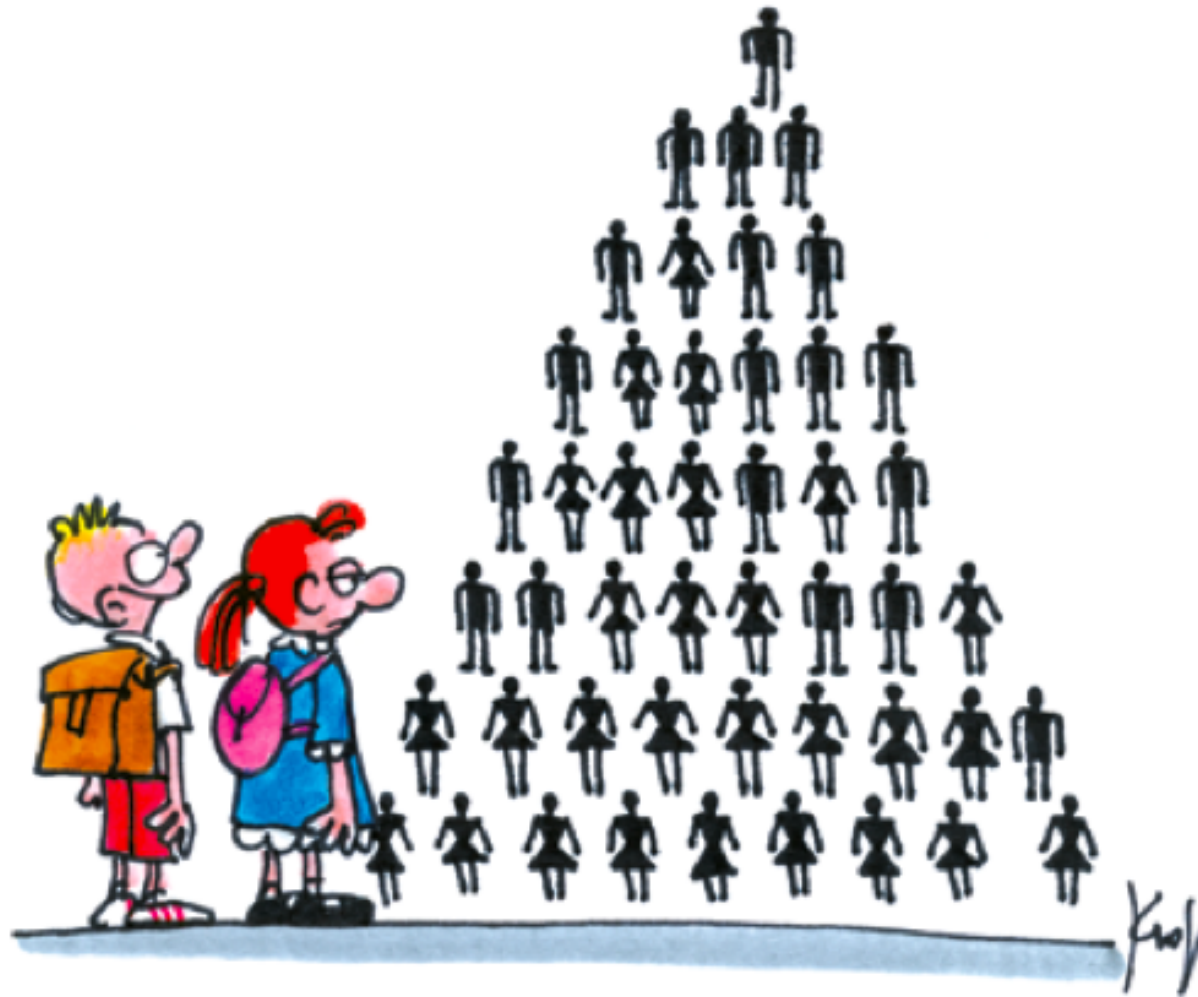
Implicit bias arises from our very useful tendency to make fast association

Test can reveal the bias, ie, Implicit Association Test:
<https://implicit.harvard.edu/implicit/>

70% more readily associate “male” with science and “female” with the arts

76% more readily associate “males” with “career” and “females” with “family”

Implicit/unconscious bias have consequences



What we know about bias

Bias in evaluating performances

CASE STUDY

1

U.S. orchestras revealed women's odds of making it past the first round of auditions increased 50% with blind auditions ⁶

CASE STUDY

2

Study of identical resumes – one with a man's name and one with a woman's name – found that 79% of applicants with a man's name vs. only 49% of those with a woman's name were 'worthy of hire' ⁷

CASE STUDY

3

Mothers overestimate their sons' crawling compared to their daughters' ⁸

FINDINGS



- Relative to females, male performance is often overestimated
 - This is why gender-blind studies usually result in improving the performance of females relative to males
- This is especially true in traditionally male domains, (including technology)

Bias in attributing performances

CASE STUDY Others

Research shows that when men and women work together on tasks, women are given less credit for a successful outcome, viewed as having made smaller contributions to it, and blamed more for failure ¹¹

CASE STUDY Self

Survey of several thousand potential political candidates, all with the credentials to run for office, found that the men were 60% more likely to think that they were “very qualified” to run for office ¹²

CASE STUDY Aff. Action

At Facebook, there is the perception by some that under-represented groups got jobs because of our commitment to diversity and Affirmative Action laws, not because of their qualifications ¹³

FINDINGS



- Success in males is attributed to their own skills, success in women is attributed to help from others, getting lucky and working hard
 - This is true of attribution by others and by the individual
- The assumption that “affirmative action” is helping minorities or women adds to this – another reason women/minorities are perceived as not succeeding on their own

Are scientists doing better? Letters of reference

Man

- “brilliant”
- “outstanding”
- “original”

Woman

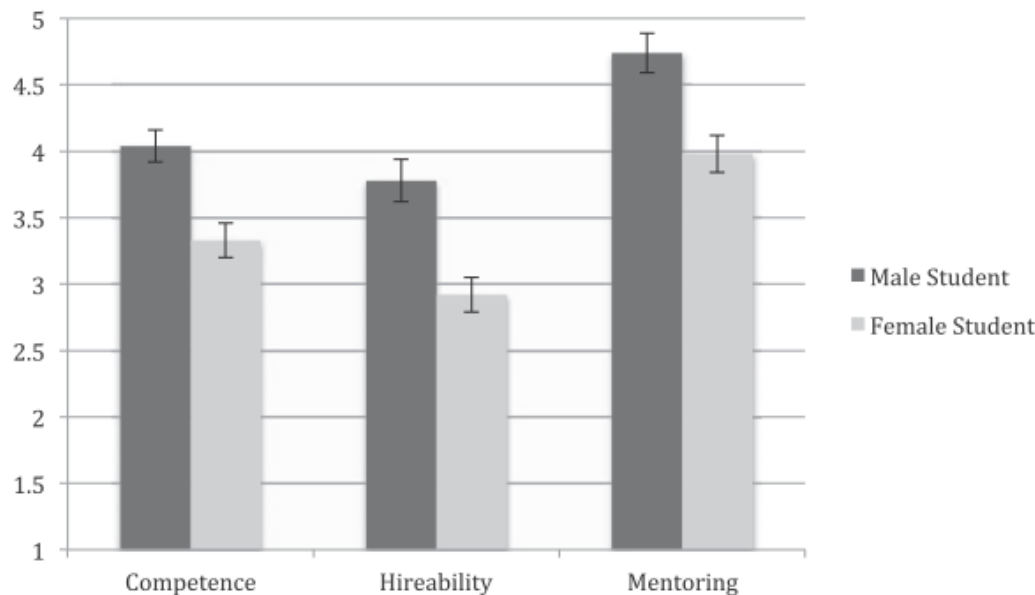
- “works hard”
- “friendly”
- “surprisingly successful”
- “friends with my wife”
- “very attractive”

The traits stressed for women are based on cultural stereotypes of women and are less valuable for success in academic medicine

F. Trix et al (2003) “Exploring the Color of Glass: Letters of Recommendation for female and Male Medical Faculty”

Are scientists doing better? Hiring

- Same CV sent to professors in biology, chemistry and physics, with different names, male and female
- Jennifer was less likely to be hired because she was viewed as less competent than John
- John was proposed for a better starting salary



Are scientists doing better? Promotion

- A study published in 1997 in Nature by Wennerås and Wold entitled “Nepotism and sexism in peer-review”, demonstrated that women had to have 2.4 more merits than men to achieve the same evaluation, equivalent to 20 articles in peer review journals, in calls of the Swedish Academy of Medicine.
- Publication of this study prompted the resignation of top decision makers in Sweden as well as the launching of Swedish gender policies in science
- Studies in Spain, Italy... gave similar result for professor promotion

1st question: why European university promote gender equality?

Gender equality is one of important human rights but in Japan there are still implicit obstacles. When we try to apply the female preferential treatments, some people oppose or ask the merits of them.

Thus, we would like to know how people in charge of gender equality persuade those who are against the preferential treatment.

In Europe there is strong evidence that men receive preferential treatment

Equal opportunity for dissimilar people requires
re-shaping the rules



Looking for changes

Time is showing small or no changes without intervention

The academia is realizing not to be able to promote an equal merit without changing his rules.

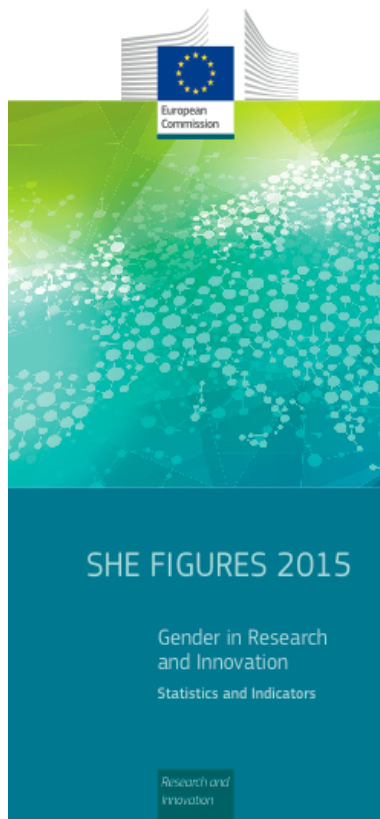
Without changes, the men will continue to receive a preferential treatment

Increasing interest in changes for:

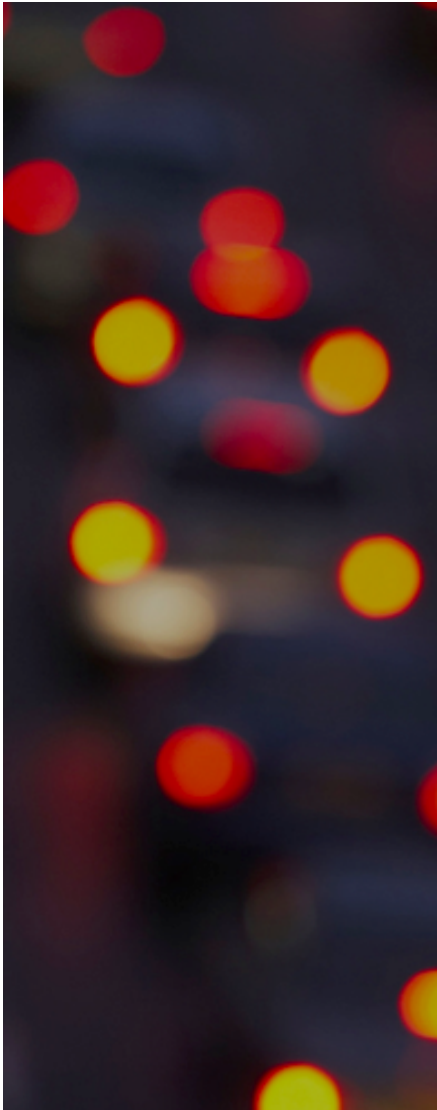
- equal opportunity
- better science
- reduce the distance between science and society

European Strategy

- Fix the numbers/statistics
- Fix women => Fix institutions
- Fix research, gender in science and innovation



Strong commitment of institution is required for changes



SRC Gender Equality Strategy Background

- The primary objective of the Swedish Research Council is to allocate funding to research of the highest scientific quality and that best promotes innovation
- The Swedish Research Council supports the best researchers, regardless of gender.
- The Swedish Research Council assumes that research capacity exists to the same extent in both sexes.
- Moreover, the Swedish Research Council assumes that research is benefited when both genders participate and apply their expertise and experience.
- Gender equality is also a matter of justice. Women and men should have equal opportunities to conduct research and develop professional careers as researchers.

Structural changes in research institutions

Enhancing excellence, gender equality and efficiency in research and innovation, EC 2012

Elements of structural change

- Making decision-making transparent
- Removing unconscious bias from institutional practices
- Promoting excellence through diversity
- Improving research by integrating a gender perspective



European strategy

Sex and Gender in science and gendered innovation

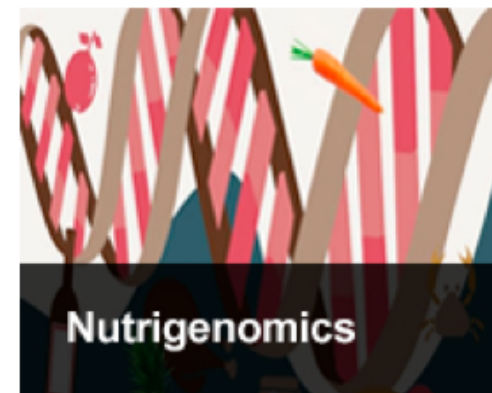
Ensure the effective promotion of gender equality and the gender dimension in research and innovation content.



http://ec.europa.eu/research/science-society/gendered-innovations/index_en.cfm

Medicine – sex and gender analysis

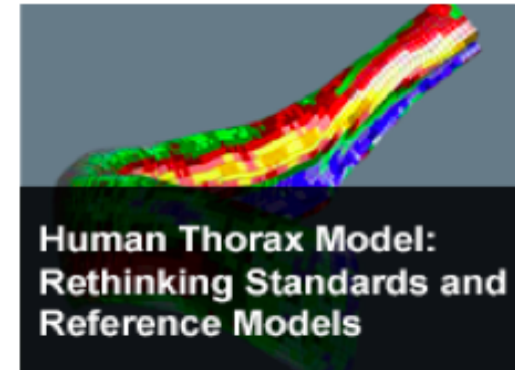
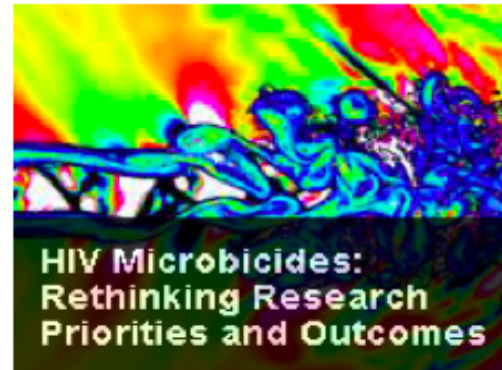
Research applicants will integrate sex and gender when appropriate



Interactive module to increase capacity
of researcher and peer-reviewer in bio-
medical study

<https://www.cihr-irsc-igh-isfh.ca/>

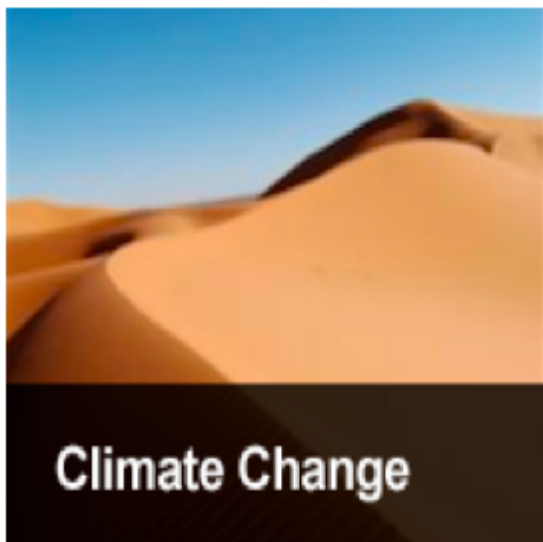
Engineering & Technology Case Studies



Women absent when decision on transports are taken

- Research shows that women and men have persistent different transportation needs, travel behaviors and levels of access to services and infrastructure. Women tend to travel shorter distances, closer to the home, and make more trips; they are the main users of public transportation
- Women are overrepresented in social groups with specific transport needs and greater transport disadvantage: older people, people with special needs, single parents, and working parents who take responsibility for most caretaking tasks.
- Participation of women is particularly low in positions of responsibility, which has an impact on how transport systems are understood and designed.

Environment – sex and gender analysis



IInd question

Are there any changes or innovations of research as the number of female researcher is increased?

- Personally I agrees that mathematics and physics have nothing to do with sex
- Can they have something to do with gender?

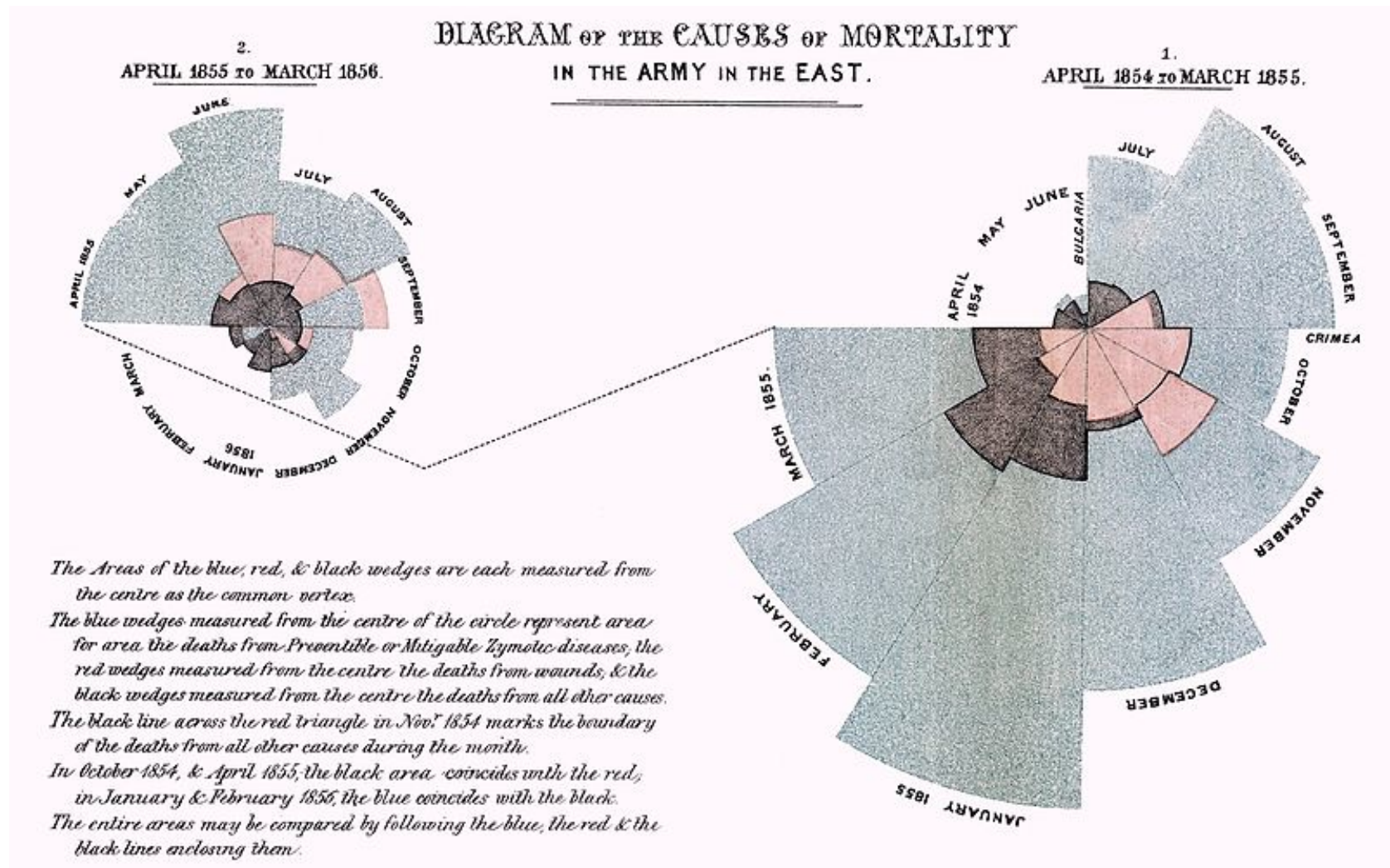
Women in fundamental physics can do the difference?

1914, Marie Sklodowska Curie equipped 20 radiology vehicles and trained 150 female technicians for x-ray diagnostics at war



Women in mathematics can do the difference?

Florence Nightingale – 1858, first use of diagrams to persuade the British government to improve army hygiene



Facebook answer: diversity is relevant

At firms with diverse leaders, employees reported they were:

60%

more likely to
see their ideas
developed or
prototyped

75%

more likely to
see their
innovation
implemented

70%

more likely to
have captured
new market in
past year

45%

more likely to
have improved
market share
in past year

(Center for Talent Innovation, 2013) ¹⁷

Slide by: Managing Unconscious Bias - Facebook Learning & Development
<https://managingbias.fb.com/>

European academia – the problems

- 1) academia in Europe is still losing a considerable amount of its female research capacity. From the PhD (45% females) onwards, women drop out at successive turns and for various reasons, albeit with discipline- /country-specific exceptions. Only 13% of heads of higher education institutions in Europe are women.
- 2) women progressing in an academic career may face (un)conscious bias against their qualifications as excellent researchers. Often relatively small or less obvious in individual cases of selection or promotion, at a group level or in the course of a career, the effects of bias become more significant. In other words, many mole hills together may become a large mountain.
- 3) there are financial considerations such as gender pay gaps, which manifest themselves in academe as they do in other labour sectors. It is important to note that on the whole women tend to receive less funding through research grants.
- 4) a different type of challenge is the lack of an appropriate gender dimension in research design, implementation and organisation. It can result in serious flaws with potentially harmful effects, e.g. in medical research, thus limiting scientific excellence, creativity and benefits to society.

European academia

Problems are stronger than we thought

- *“What does this mean for all of us academics? It means that if we don’t challenge our own biases, if we don’t believe we are influenced by stereotypes, if we insist that we are just and righteous in our promotion, publication and funding systems, that we are not biased and that we make those choices based purely on merit and quality, we are fooling ourselves and much worse:*
- *we are shortchanging the academic women that we are biased against because we do nothing to rectify the situation. And in case of the knowledge we are producing: we are shortchanging half the world.”*

Simone Buitendijk, League of European Research Universities (LERU)

Global Research Council agenda next year:

- 1) "Equality and Status of Women in Research"
- 2) "Interdisciplinarity"

Selected references

Recommendation for institutions:

- http://ec.europa.eu/research/swafs/index.cfm?pg=library&lib=gender_equality
- http://www.leru.org/files/publications/LERU_AP18_Gendered_research_and_innovation_final.pdf Unconscious Bias

Unconscious bias

- Corinne A. Moss-Racusin et. al. (2012), Science faculty's subtle gender biases favor male students
- MacNeill et al (2014), What's in a Name: Exposing Gender Bias in Student Ratings of Teaching
- Banaji et al, Project implicit, <https://implicit.harvard.edu>
- Facebook Learning & Development <https://managingbias.fb.com/>

The working group on gender and diversity of Science Europe is working on tools, <http://www.scienceeurope.org/>

Woman works more then men, usually

Table IV.3. Time spent in unpaid, paid and total work, by sex, 2013

Time spent in unpaid work			Time spent in paid work			Time spent in total work		
	Men	Women		Men	Women		Men	Women
Country			Country			Country		
Austria	135.3	268.9	Austria	364.8	248.8	Austria	500.1	517.7
Belgium	150.8	245	Belgium	265.6	189	Belgium	416.4	434
Italy	102.9	325.8	Italy	282.9	162.3	Italy	385.8	488.1
Netherlands	163	272.8	Netherlands	297.5	167.5	Netherlands	460.5	440.3
Slovenia	166.5	286.2	Slovenia	299.8	234.2	Slovenia	466.3	520.4
Switzerland

Source: <http://www.OECD.org/gender/data/indicatorsofgenderequalityinemployment.htm>

A better science for society

