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How to gender Physics

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How to **discover** Gender **in** Physics

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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 ...

Basic model – Levels of Change

Londa Schiebinger, Stanford University

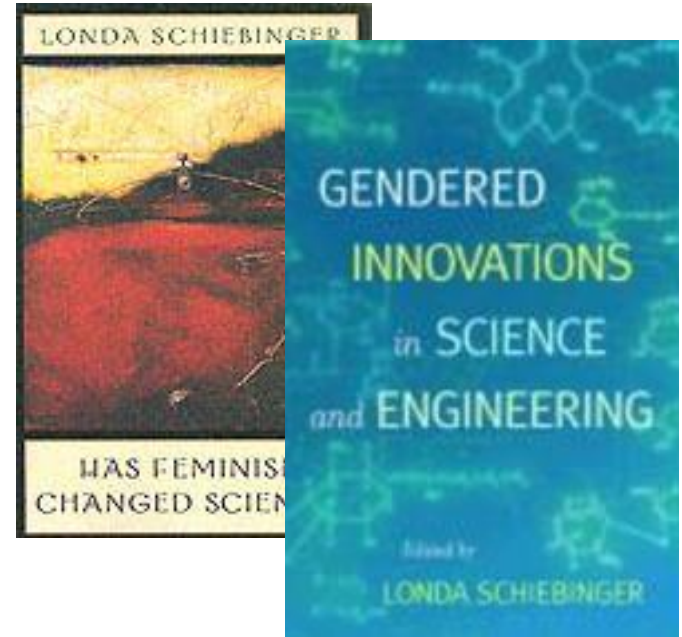
1. Numbers

2. Culture

Gender awareness

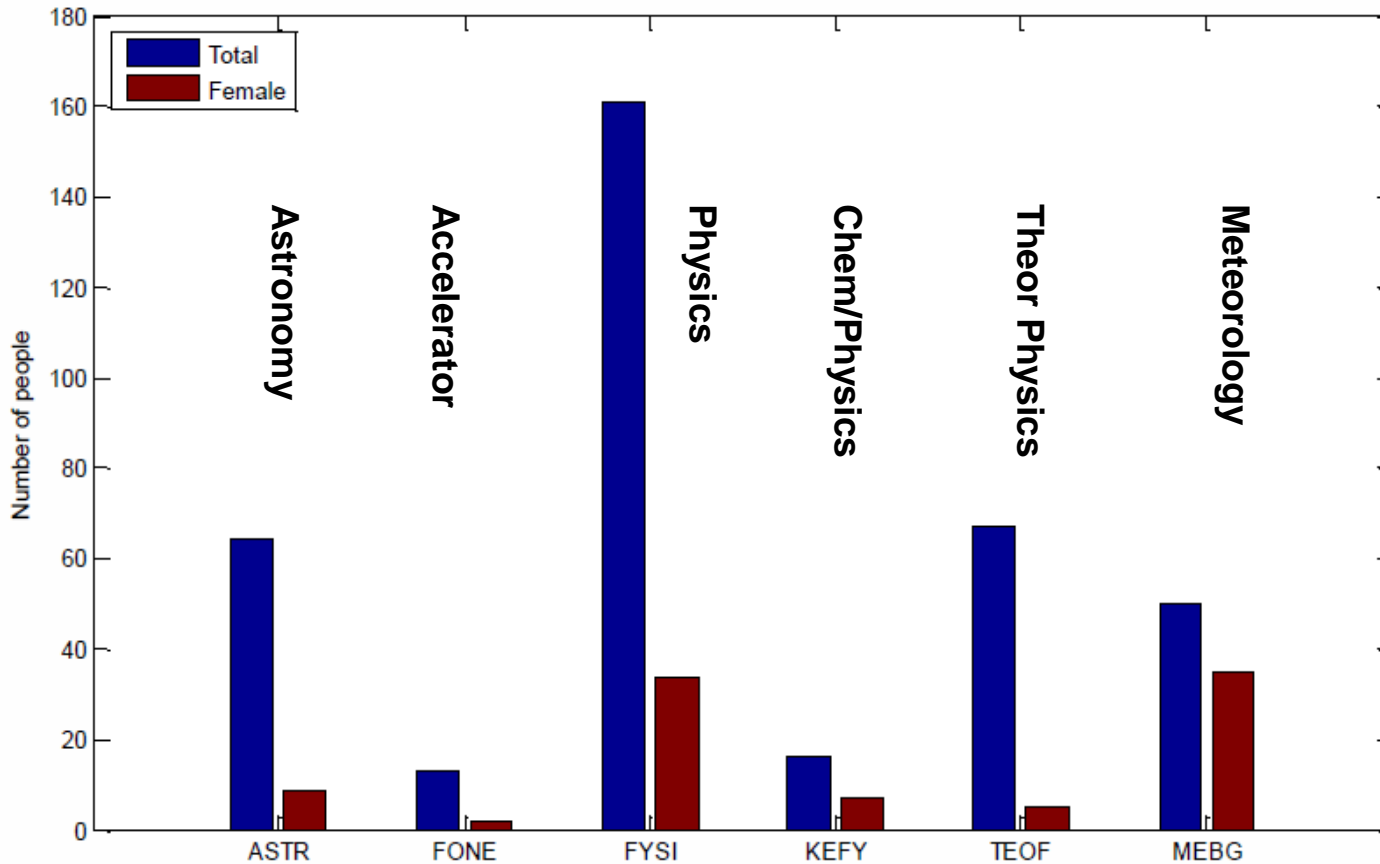
3. Subject

Gender perspective



Level 1: Numbers

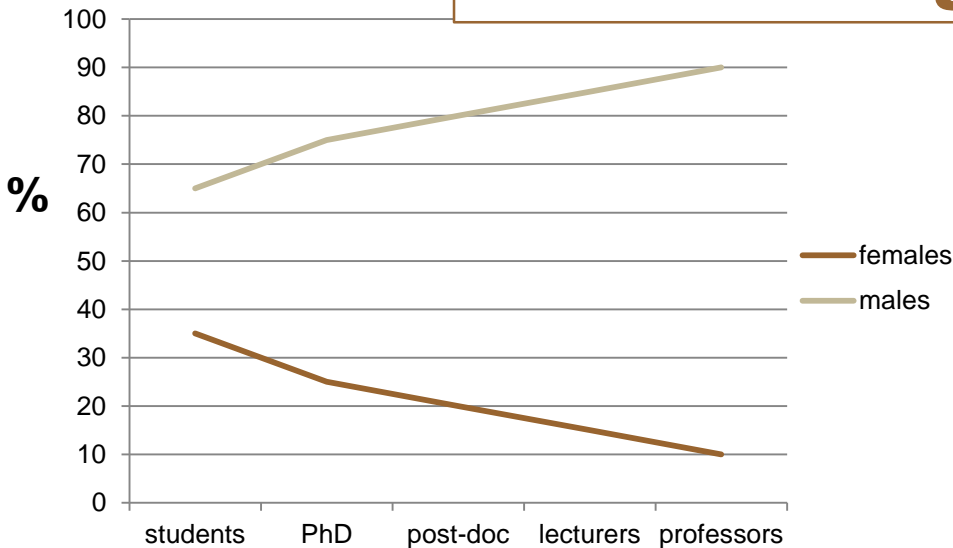
Numbers – Horizontal segregation of Physics in Lund



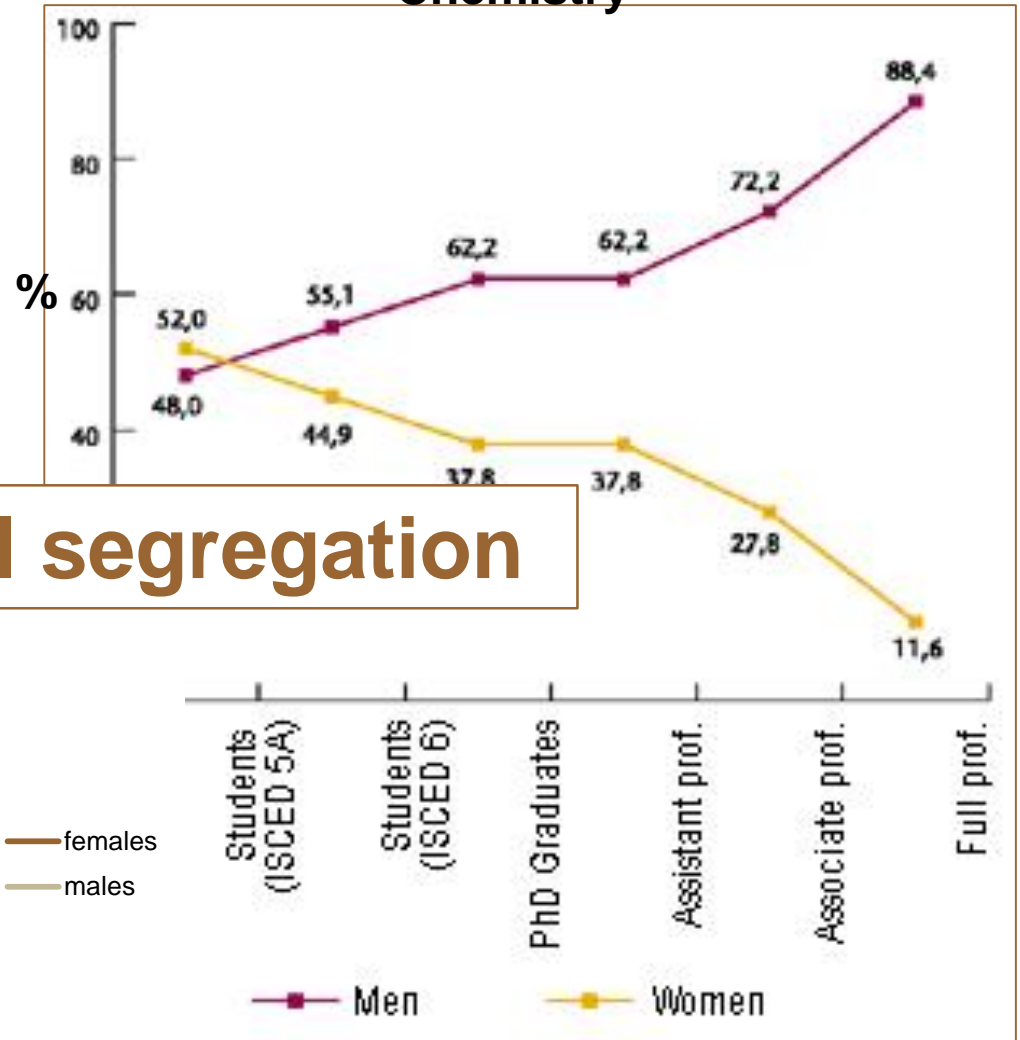
Numbers - The scissors diagram

Phys

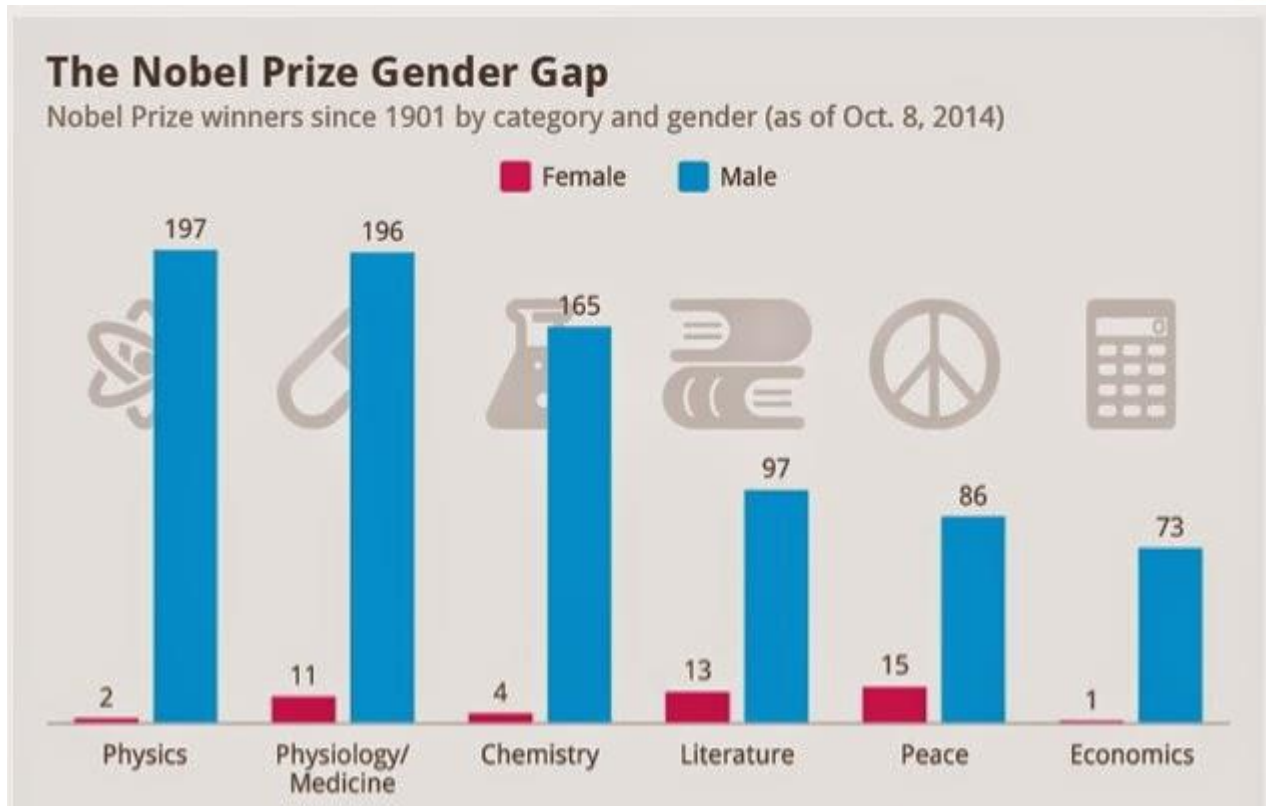
Vertical segregation



Chemistry



Vertical Segregation – even higher



Courtesy www.statista.com

.. No women in Physics?



*Marie Curie 1903
(och 1911)*



*Maria Goeppert-
Mayer 1963*



*Lise Meitner
(not 1944!!)*



*Jocelyn Bell
(not 1974!!)*

Numbers – vertical segregation

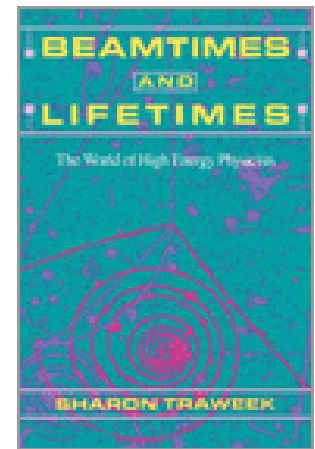
From the leaky pipeline ..



.... to the vanishing box

Etzkowitz and Ranga 2011 *Gender Dynamics in Science and Technology ...*, Brussels Economic Review

Level 2: "Culture"



The culture of Physics

Antropology – a classic:

Sharon *Traweek* – *Beamtimes and Lifetimes*

- *A culture without culture*
- *what is male, defines excellence*

And since then work in

Pedagogics – with shortcuts for learning

History of Science – false in textbooks

Sociology – it is the culture within Physics

Psychology – Implicit bias and stereotypes

Core values – bias ruins meritocracy

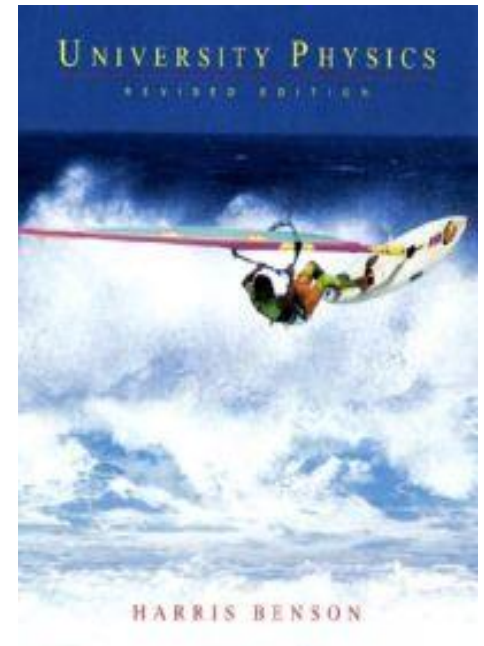
Today

- One simple investigation
- One brilliant research

Culture – visual presentations in textbooks

Calculus based, introductory books

- Benson, University Physics
– Traditional book

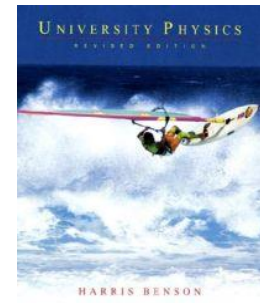


Culture – visual presentations

23. What arrangement of mirrors would produce the multiple images of Ann Margaret shown in Fig. 35.51?



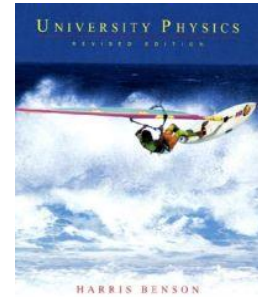
FIGURE 35.51



Benson

Culture – visual presentations

Pictures of women



Benson



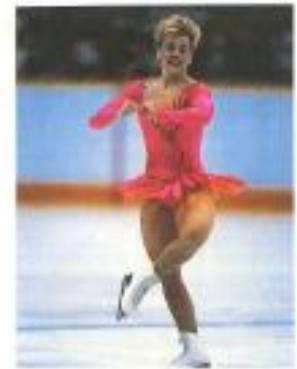
What do you notice about the front wheel?



The net work done on the javelin is equal to the change in its kinetic energy.



During a grand jeté, a ballet dancer appears briefly to "float in air". However, the center of mass still follows a parabolic path.



Elizabeth Manley controls her angular speed by varying her moment of inertia.

Culture – visual presentations

Pictures of men

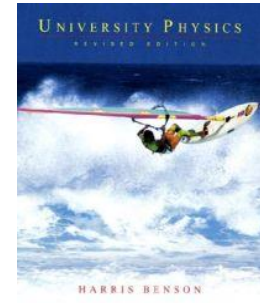


FIGURE 9.1 René Descartes (1596–1650).



FIGURE 1.8 Johannes Kepler (1571–1630).

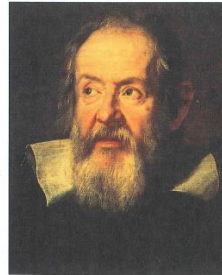


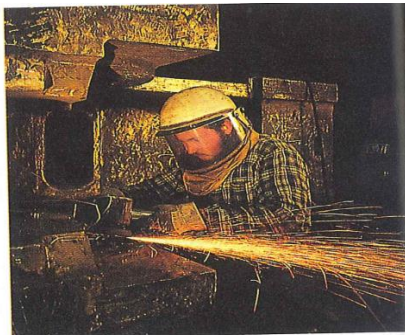
FIGURE 1.9 Galileo Galilei (1564–1642).



FIGURE 5.1 Sir Isaac Newton (1642–1727).



FIGURE 6.1 Gottfried W. Leibniz (1646–1716).



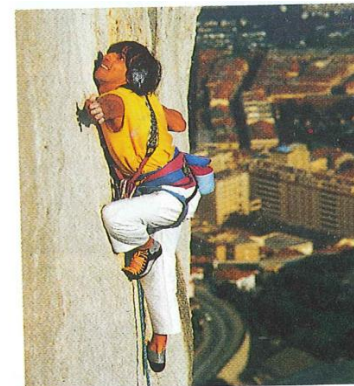
(b)



Although the mass of Edwin Aldrin, Jr., had not changed, his weight on the moon was roughly one-sixth his weight on earth.



A weightlifter does work to lift weights but not to hold them at rest.



The climber has done work to increase his potential energy.

Culture - Sociology:

Hasse and Trentemoller: UPGEM-project (2008)

UPGEM
Understanding Puzzles in the
Gendered European Map

What is the percentage of women among Physics professors?

Denmark, Estonia, Finland, Italy, Poland

Which has the largest percentage?

Which has the smallest percentage?

Culture - Sociology:

Hasse and Trentemoller: UPGEM-project (2008)

UPGEM
Understanding Puzzles in the
Gendered European Map

What is the percentage of women among Physics professors?

Denmark, Estonia, Finland, Italy, Poland

Denmark – 3%

Estonia – 11%

Finland – 12%

Poland – 14%

Italy – 23%

Is it Physics in culture?

Using "Culture Contrasts" to understand:

Is it Physics in Culture – outside Physics?

1. The Classically schooled Physicist
2. Family culture
 - a) Parenthood contra motherhood
 - b) Child care contra nannies
 - c) Nuclear contra extended family
 - d) Strong border between family and work?

What about flexibility?

3. Religion

Denmark – 3%
Estonia – 11%
Finland – 12%
Poland – 14%
Italy – 23%

... Or is it Physics as culture?

Three cultures "discovered":

1. Hercules-culture – the fighter's culture
2. Care taker-culture – the social culture
3. Working bee-culture – the industrious culture

Denmark – 3%
Estonia – 11%
Finland – 12%
Poland – 14%
Italy – 23%

Hercules:

Oh yes, there is a lot of competition. This whole process is extremely competitive. The case that the department needs to make to the university is that I am not only good enough for the job, but I am the best person in the world for this job.

Care-taker:

There's always a team behind a genius. (...) Good teamwork always brings the best results, but of course, not everyone is lucky enough to find a good group to work with. Sometimes when there are very competitive people, it is difficult to form a group..

Working bee:

But in this respect, for us not to show ourselves too much and do no crazy things, we had to sit quiet and pretend we were not there

Investigation of five countries:

Denmark, Finland, Estonia, Poland and Italy

What culture defines Physics departments in the different countries?

Denmark – 3% - Hercules

Estonia – 11% - Working bee

Poland – 14% - Working bee

Italy – 23% - Care-taker

Finland – 12% - not a clear culture

Remember: It is the perception of the culture, but

..... is it really the culture of Physics?

..... and what do they say to their students?

So – what can we do?

- **Education**, information, infiltration
- **Gender mainstreaming**
through e.g. gender integrated leadership education
- **Bias observers**
- Not only **affirm women**, but also **confine men**
– but do get involved
- **Counterspaces** (see Maria Ong et al.)
- **Awards/Certification** for best practices (e.g. Athena Swan or Gender certification)

It is not easy...



Thank you for your attention!



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