

New Questions to Gender and Engineering in Research



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Introduction

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- EU FP5,6,7 have designed research topics according assumptions from the literature.
- Those hypotheses are useful and well established.
- Anyway, a closer look unveils many counter-examples and unexplained phenomena.
- When and why usual assumptions are true? What are the causal connections behind them?
- Aim of the paper: to question some usual assumptions in order to move towards more complex and qualitative research questions.

Outline:

Questioning 5 issues in an exploratory way

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- Critical mass and cultural change
- Role models
- Work-life balance and career choice
- Networks: belonging and being included
- Single-sex education
- Conclusions

If closer look at usual assumptions:

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- Many counter examples
- Need for questioning factors that impact the results
- Need for a critical perspective for a better understanding
- « Sciences » are defined in this paper in the broad sense of academic disciplines
- New perspectives on the assumptions used in gender and engineering research

The « Critical Mass »

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- Does a critical mass of female students lead to a cultural change?
- Does the cultural change imply better chances for women?
- 2 examples: EU and France
- Sources:
 - *She Figures 2009* p51 and 79
 - *Etat des lieux, les femmes dans la recherche* (France 2007)

Figures from *She Figures* 2009

% of female PHD graduates (in dark)

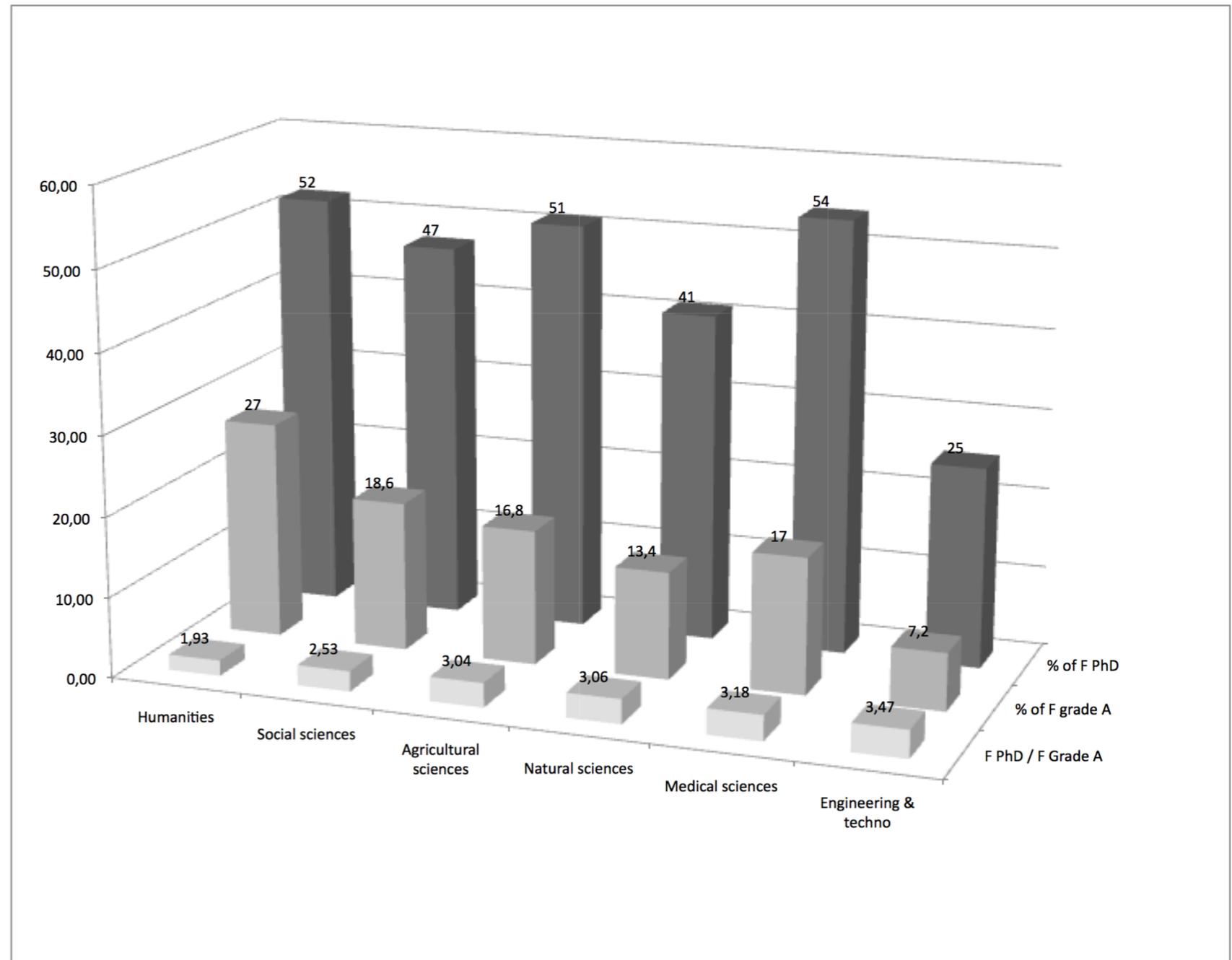
% of female Grade A (in grey)

% of PhD graduates divided by
% of Grade A (in light grey)

"3,06" means: % of PhD is 3,06
times % of grade A.

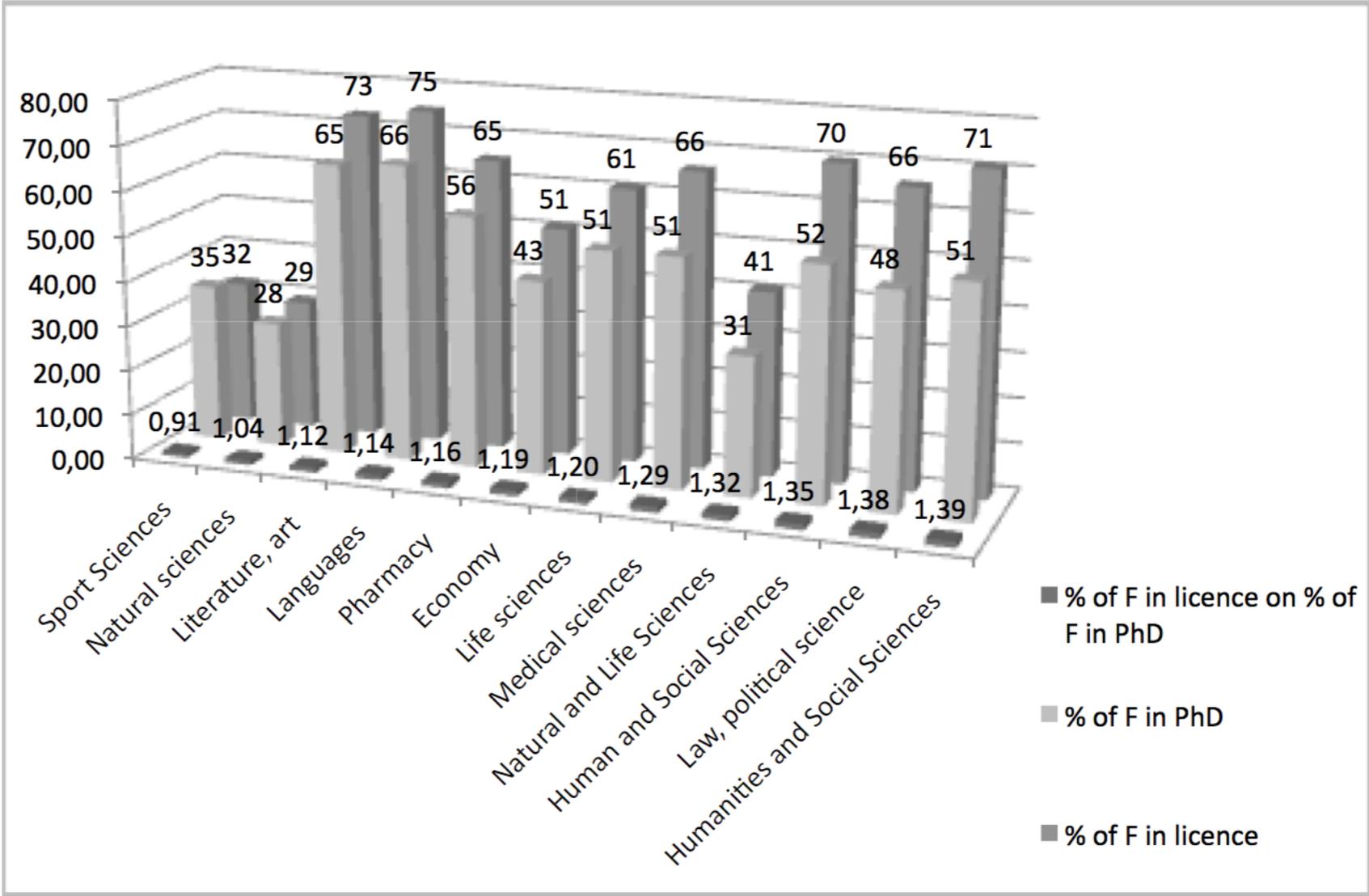
No correlation between % of
PhD graduates: high % of PhD
in medical and agricultural
sciences, but low % of grade A.

No numbers for students in *She
Figures*. National data provide
same results: lack of correlation
between career progress and %
of students.



Etat des lieux, les femmes dans la recherche (France 2007)

No correlation between the proportion of women and their chances to move to the next step. Best chances in Sport Sciences and Natural Sciences. Worse in Pluridisciplinary Humanities and Social Sciences, Law and Political Sciences.



Critical mass

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- Higher % of women at the top when higher % at the beginning: bigger pool.
- But higher % does not always imply better chances.
 - “Law and political sciences” or “Humanities and Social Sciences” are the worst fields for women students in France: 66% and 71% in licence, 51% and 48% at PhD level. Ratio is much better in natural sciences: 29% and 28%.
- Need to have numbers from student to grade A in a same field, to see how chances are changing along the career.
- Need to have numbers for narrower fields: inside “social sciences”, economy and sociology have different profiles.
- **Effort for gender equality should not be limited to fields where women are a minority.**
- **Increasing the proportion of women does not change the culture automatically: who are the gatekeepers?**
- **Being the majority is not an objective *per se*. It may be for bad reasons: poor opportunities, lack of prestige.**

Role models

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- Assumption: “Role models” increase the proportion of women in sciences.
- They are supposed to change representations and speed up cultural changes.
- Help women to imagine themselves as excellent researchers.
- But...
 - Some disciplines became “feminine” without few female role model (law, medicine, art, agronomy, architecture in France)
 - Some disciplines highlight role models with disappointing results: ICT (Augusta Ada Lovelace), Physics (Marie Curie) etc.

About role models:

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- There is no automatic effect of role models.
- Why some fields became attractive with few role models?
- Even if they are attractive, women are not always successful.
- Why some fields remain unattractive despite role models?
- Need to understand which factors are impacting the success of role models.
- Need to understand how fields became attractive without role models, and with a poor women success rate in their careers.
- Need to understand how “role models” are interacting with other factors as curriculum, profession, images, etc.
- Behind the role model: comparisons between fields and images of the fields (sometimes not corresponding to reality).

Work-life balance and career choice

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- Usual assumption: work-life balance is an important factor for attractiveness and success. Confirmed by many case studies.
- But...
 - Some professions with a bad work-life balance are traditionally feminine: nurse.
 - Business schools and engineering schools offer the same kind of jobs (in France) with same balance issues. Anyway there are more than 50% of women in business schools, 20% in engineering schools.
 - Singles have mediocre careers even if they have less balance issues [Marry].
 - Successful women consider family as a support, not a burden [Husu].

About work-life balance

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- Work-life balance in itself is not the only criteria.
- Work-life balance is not specific to women. Men express the same concern.
- What are the other criteria, and how are they combined with work-life balance? Freedom? Autonomy? Personal satisfaction?
- Need to study professions with many women and bad work-life balance. What are the motivations?
- Impact of work-life balance on career success and overall job satisfaction.

Belonging and being included

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- Usual assumption: belonging to networks, being an alumni is crucial for careers. Focus on “attracting and retaining”.
- But... if biographical stories confirm that importance of networks, they are not enough: in an organisation all fellows are not equal.
- Case of Simone Weil (French philosopher):
 - Well integrated: “normalienne” and “agrégé” in philosophy, two very masculine institutions in the ‘30s. [“agrégé” means “aggregated” to the institutional body of philosophy teachers]
 - Not integrated: better included in the mathematicians networks through her brother André than to the philosophers’ networks. No letters with former classmates (Sartre, Aron), no participation to conferences, no access to academic research, no position in the academia, etc.
 - Developed informal and interdisciplinary topics out of usual academic classifications.

About inclusion

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- Belonging is not being included.
- Efforts to attract and retain women are useful, but not enough.
- Need for a better comprehension of inclusion issues.
- Biographical stories and ethnographic methodologies could be a starting point for such studies.

Single-sex education

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- Assumption: Single-sex education could be a solution to attract and retain more women scientists.
- In fact, a complex picture. Case of Ecoles Normales Supérieures in France:
 - High proportion of active women full professors are “normaliennes”.
 - Between 1940 and 1985, ENS has been *de facto* single-sex. Recruitment of the same numbers of men and women: rich pool of potential women scientists.
 - But the prestige of the female ENS was much lower: usual career perspective was mostly secondary school teacher, not researchers or professors as the male ENS.
 - In 1985, ENS became co-ed, women accessed to the same status as men, but proportion of women recruited in maths and natural sciences dropped.

Conclusions

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- Necessity to move beyond usual assumptions: they hide many complex issues about prestige, hidden hierarchies, clichés, images, personal motivations, networks, (changing) construction of excellence, etc.
- Interactions: attractiveness / funding / excellence
- Linear paths are well described, other paths are poorly taken into account: need to include non-linear path in the conceptualisation.
- Causation issues: if A does not always imply B, why?
 - Because the relation is valid under some conditions. Which ones?
 - Because B was not caused by A, but by some other issue: which one?
 - Because A implies C instead of B, or B and something else: which C?
What relation to B?

Suggestions for further research

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- Do not take for granted usual assumptions.
- Take into account complexity, non-linear paths and overlaps: interdisciplinary, international, inter-sectorial.
- Study counter-examples if any, even if they are not in natural sciences or technology and/or if women are well represented in the field.
- Changing scale provides new perspectives, detailed studies, exploration of informal discourse, may provide new materials: ethnographic studies.
- Question assumptions with comparisons with other fields, especially out of the “pipeline”. The reverse side may be very informative. Try new conceptualisation framework.
- Develop longitudinal and long period studies.