

Dissertation Authors and Their Mentors. Can Gender Diversity in Russian STEM be Achieved?

Elena Chechik

Center for Institutional Analysis of Science & Education, European University at St.Petersburg

Introduction

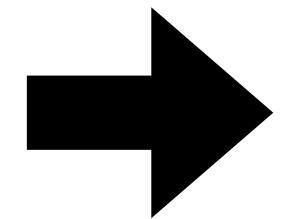
Gender disparities in Russian academia – bibliometric data (primarily WoS):

- Paul-Hus, Bouvier, Ni, Sugimoto, Pislyakov & Larivière (2015)
- Pilkina & Lovakov (2022)

Datasets of mentorship:

- Schwartz, Lienard, David (2022) (Academic Family Tree)
- Ke, Liang, Ding, David & Acuna (2022) (Academic Family Tree + Microsoft Academic Graph)

Data



Cover sheet (PDF)

- First & last name of the author (+ patronymic) → Gender (recognized for 97%)
- First & last name of the mentor (+ patronymic) → Gender (recognized for 83%)
- Research subfield → 325 subfields in 18 fields
- Dissertation type → PhD, Doctor of Science (DS)
- Year → 2012-2016 (PhD); 2008-2016 (DS)

**Dissertations in Russia by general research fields:
PhD (2012-2016), DS (2008-2016)**

	Field	PhD (N=32972)	DS (N=12636)
1	Technical science	7608 (23.1%)	1877 (14.9%)
2	Economics	4078 (12.4%)	1945 (15.4%)
3	Medical Sciences	3613 (11.0%)	2242 (17.7%)
4	Physics & Math.	2909 (8.8%)	614 (4.9%)
5	Biology	2139 (6.5%)	915 (7.2%)
6	Education	1861 (5.6%)	740 (5.9%)
7	Philology	1816 (5.5%)	739 (5.8%)
8	Chemistry	1599 (4.8%)	314 (2.5%)
9	Earth Sciences	1430 (4.3%)	335 (2.7%)
10	Law	1387 (4.2%)	553 (4.4%)
11	Agriculture	1030 (3.1%)	604 (4.8%)
12	History	947 (2.9%)	540 (4.3%)
13	Psychology	634 (1.9%)	181 (1.4%)
14	Philosophy	515 (1.6%)	366 (2.9%)
15	Sociology	468 (1.4%)	220 (1.7%)
16	Political Science	413 (1.3%)	183 (1.4%)
17	Art Studies	292 (0.9%)	94 (0.7%)
18	Culturology	233 (0.7%)	174 (1.4%)

List of research fields with numbers of papers with at least one Russian author in 2017–2019 (WoS)

	Field	Number of papers in WoS	%
1	Physics	28277	23.2
2	Chemistry	25187	20.7
3	Materials science	10026	8.2
4	Geoscience	8357	6.9
5	Engineering	7969	6.5
6	Mathematics	6563	5.4
7	Clinical medicine	5783	4.7
8	Biology & biochemistry	4823	4.0
9	Plant & animal science	4465	3.7
10	Space science	3499	2.9
11	Molecular biology & genetics	2887	2.4
12	Environment/Ecology	2716	2.2
13	Social science	2153	1.8
14	Computer science	1894	1.6
15	Pharmacology & toxicology	1518	1.2
16	Neuroscience & behavior	1481	1.2
17	Microbiology	1165	1.0
18	Agricultural science	1036	0.8
19	Psychiatry/Psychology	930	0.8
20	Immunology	571	0.5
21	Economics & business	568	0.5
22	Multidisciplinary	85	0.1

Source: Pilkina, M., & Lovakov, A. (2022). Gender disparities in Russian academia: a bibliometric analysis. *Scientometrics*

**Dissertations in Russia by general research fields:
PhD (2012-2016), DS (2008-2016)**

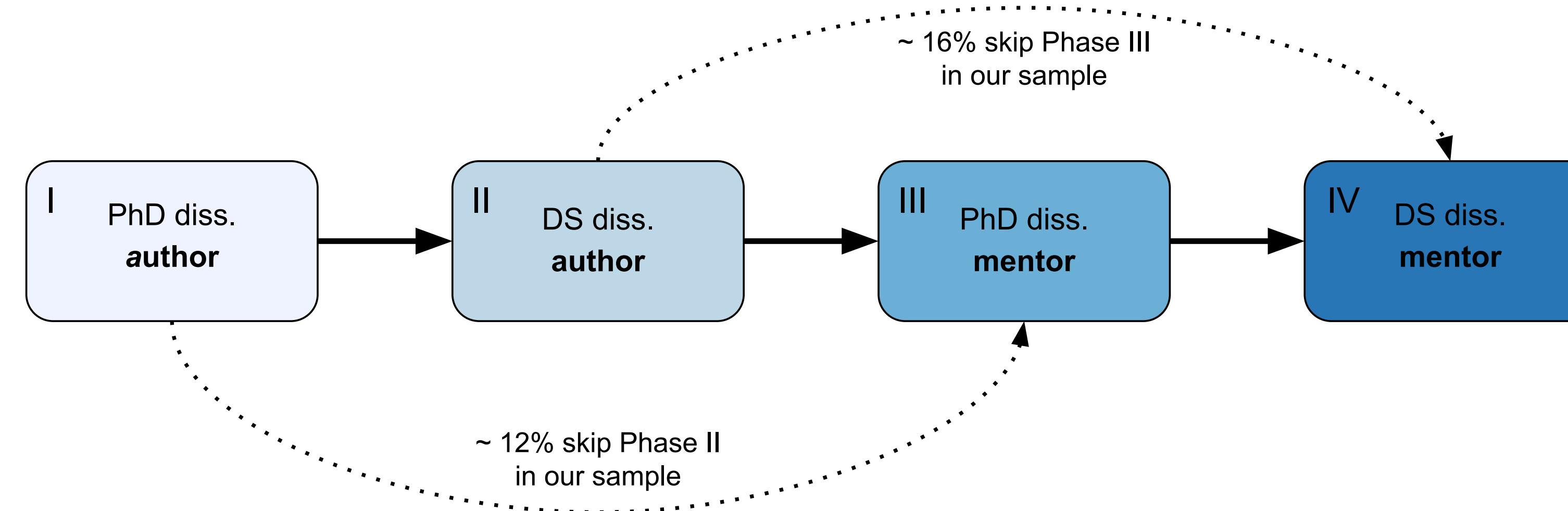
	Field	PhD (N=32972)	DS (N=12636)
1	Technical science	7608 (23.1%)	1877 (14.9%)
2	Economics	4078 (12.4%)	1945 (15.4%)
3	Medical Sciences	3613 (11.0%)	2242 (17.7%)
4	Physics & Math.	2909 (8.8%)	614 (4.9%)
5	Biology	2139 (6.5%)	915 (7.2%)
6	Education	1861 (5.6%)	740 (5.9%)
7	Philology	1816 (5.5%)	739 (5.8%)
8	Chemistry	1599 (4.8%)	314 (2.5%)
9	Earth Sciences	1430 (4.3%)	335 (2.7%)
10	Law	1387 (4.2%)	553 (4.4%)
11	Agriculture	1030 (3.1%)	604 (4.8%)
12	History	947 (2.9%)	540 (4.3%)
13	Psychology	634 (1.9%)	181 (1.4%)
14	Philosophy	515 (1.6%)	366 (2.9%)
15	Sociology	468 (1.4%)	220 (1.7%)
16	Political Science	413 (1.3%)	183 (1.4%)
17	Art Studies	292 (0.9%)	94 (0.7%)
18	Culturology	233 (0.7%)	174 (1.4%)

List of research fields with numbers of papers with at least one Russian author in 2017–2019 (WoS)

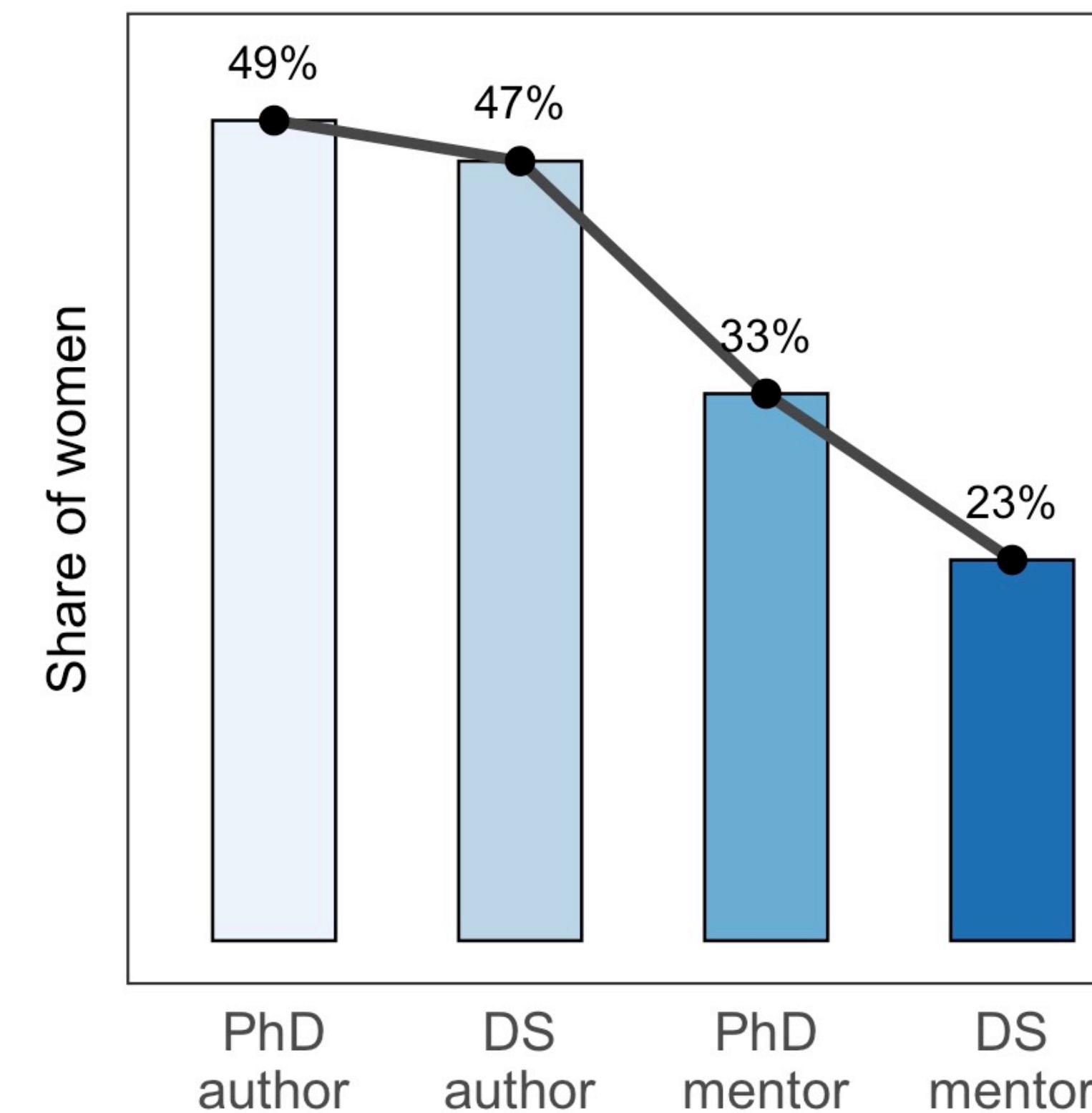
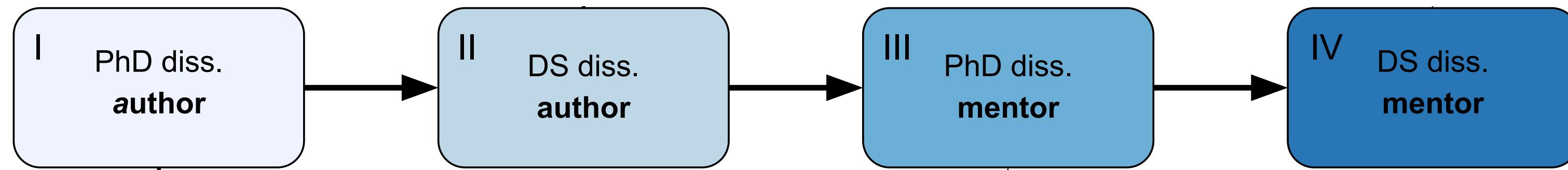
	Field	Number of papers in WoS	%
1	Physics	28277	23.2
2	Chemistry	25187	20.7
3	Materials science	10026	8.2
4	Geoscience	8357	6.9
5	Engineering	7969	6.5
6	Mathematics	6563	5.4
7	Clinical medicine	5783	4.7
8	Biology & biochemistry	4823	4.0
9	Plant & animal science	4465	3.7
10	Space science	3499	2.9
11	Molecular biology & genetics	2887	2.4
12	Environment/Ecology	2716	2.2
13	Social science	2153	1.8
14	Computer science	1894	1.6
15	Pharmacology & toxicology	1518	1.2
16	Neuroscience & behavior	1481	1.2
17	Microbiology	1165	1.0
18	Agricultural science	1036	0.8
19	Psychiatry/Psychology	930	0.8
20	Immunology	571	0.5
21	Economics & business	568	0.5
22	Multidisciplinary	85	0.1

Source: Pilkina, M., & Lovakov, A. (2022). Gender disparities in Russian academia: a bibliometric analysis. *Scientometrics*

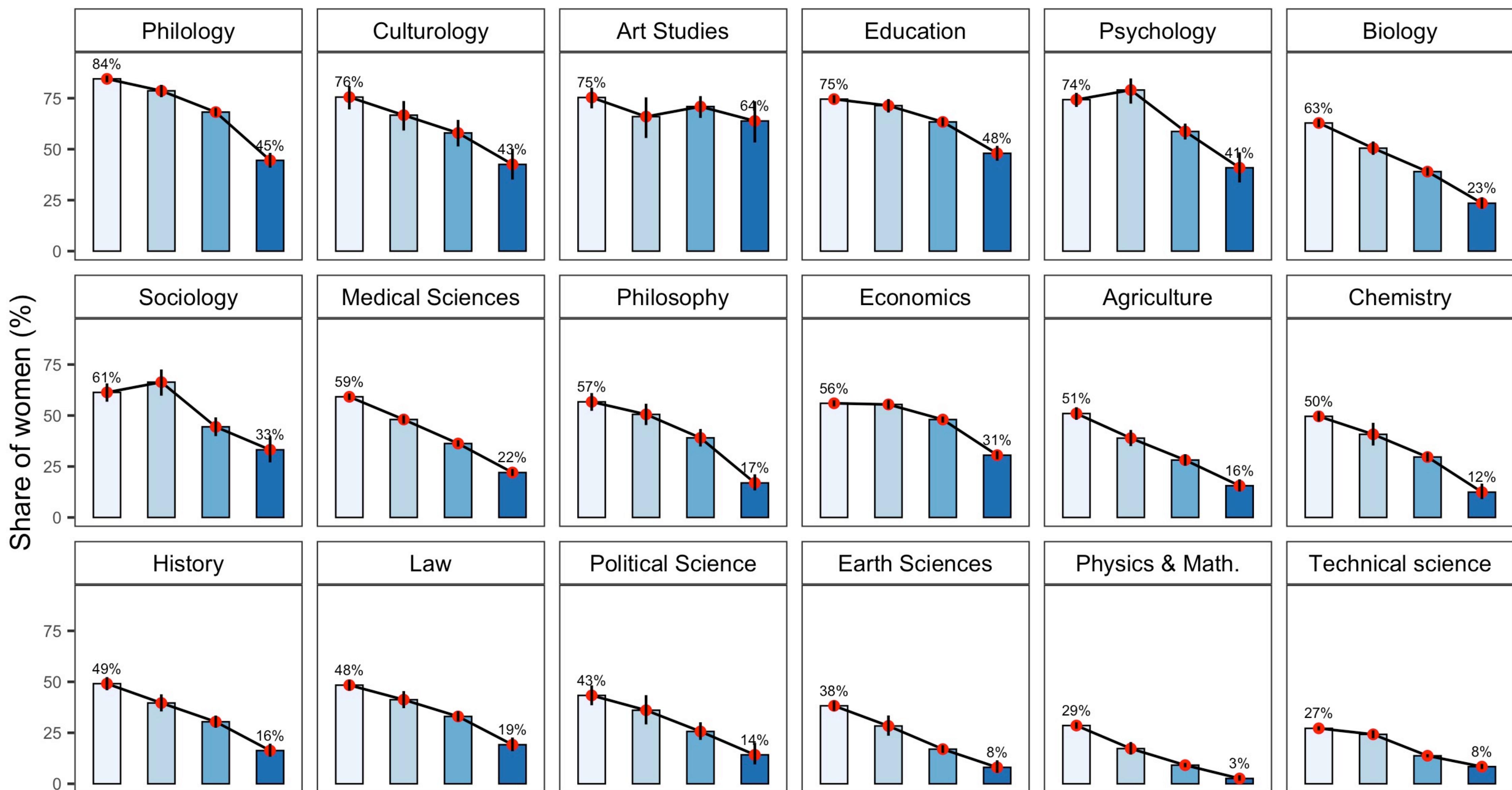
Dissertation‘pipe’

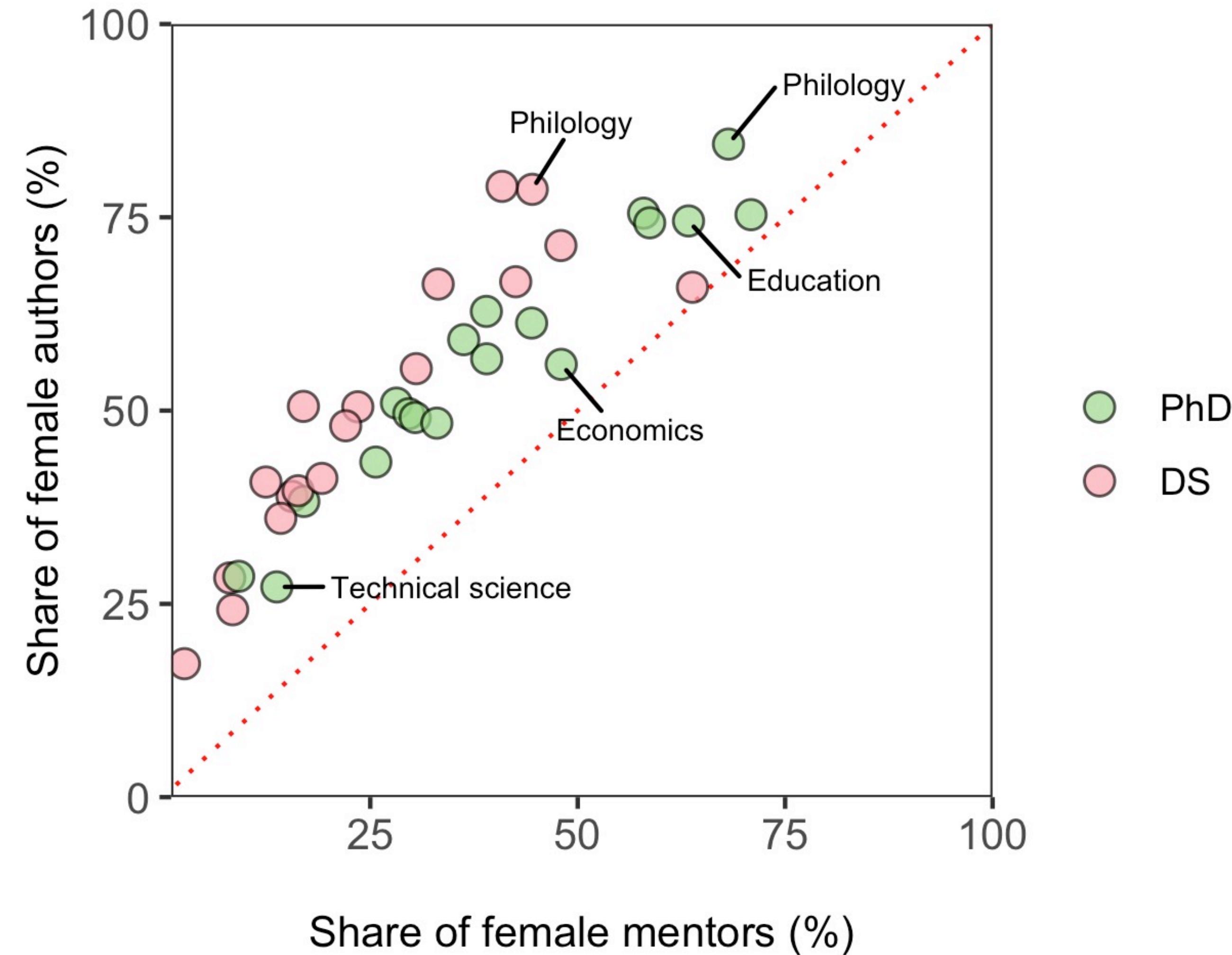


Dissertation'pipe' and share of women

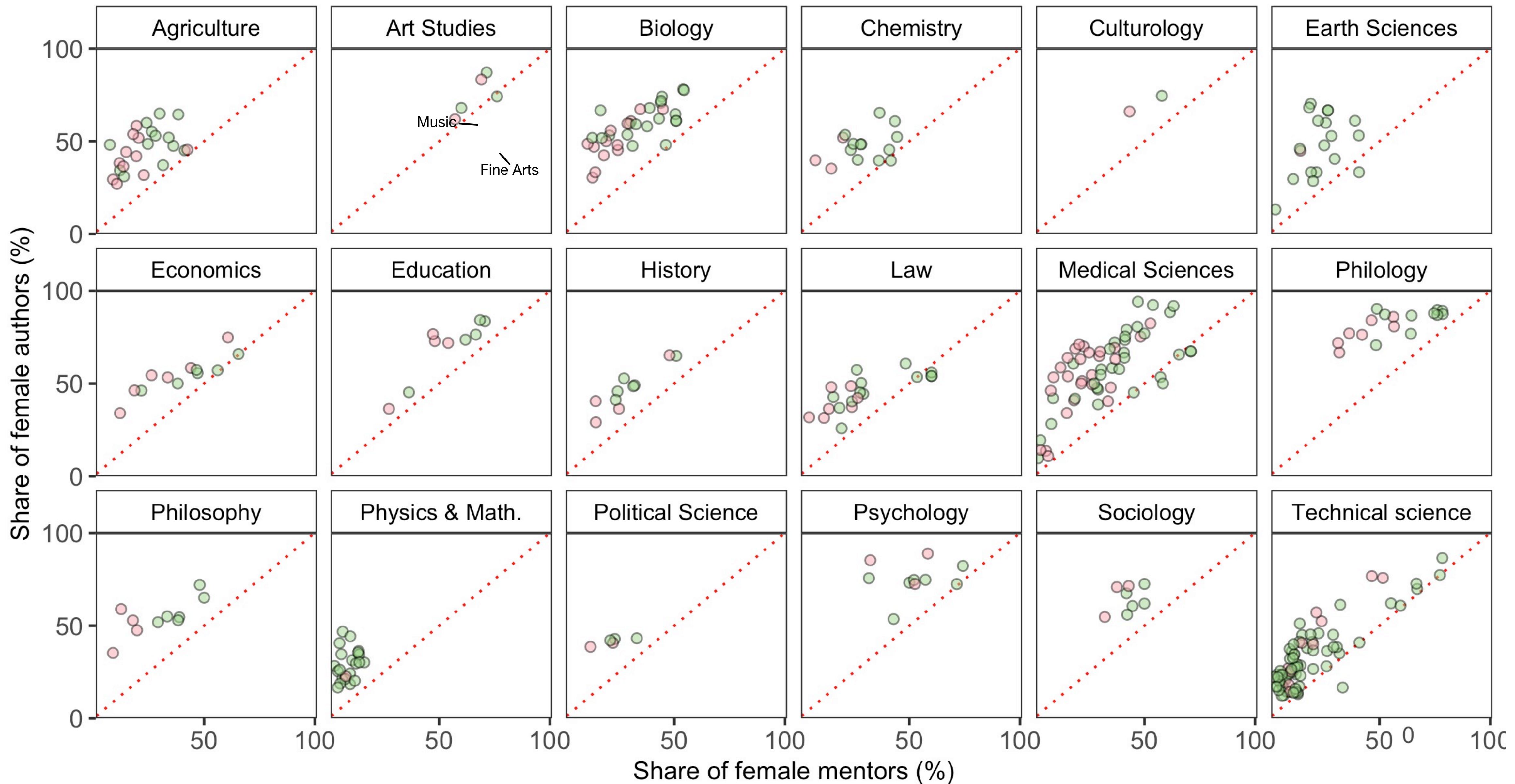


Author (PhD) Author (DS) Mentor (PhD) Mentor (DS)





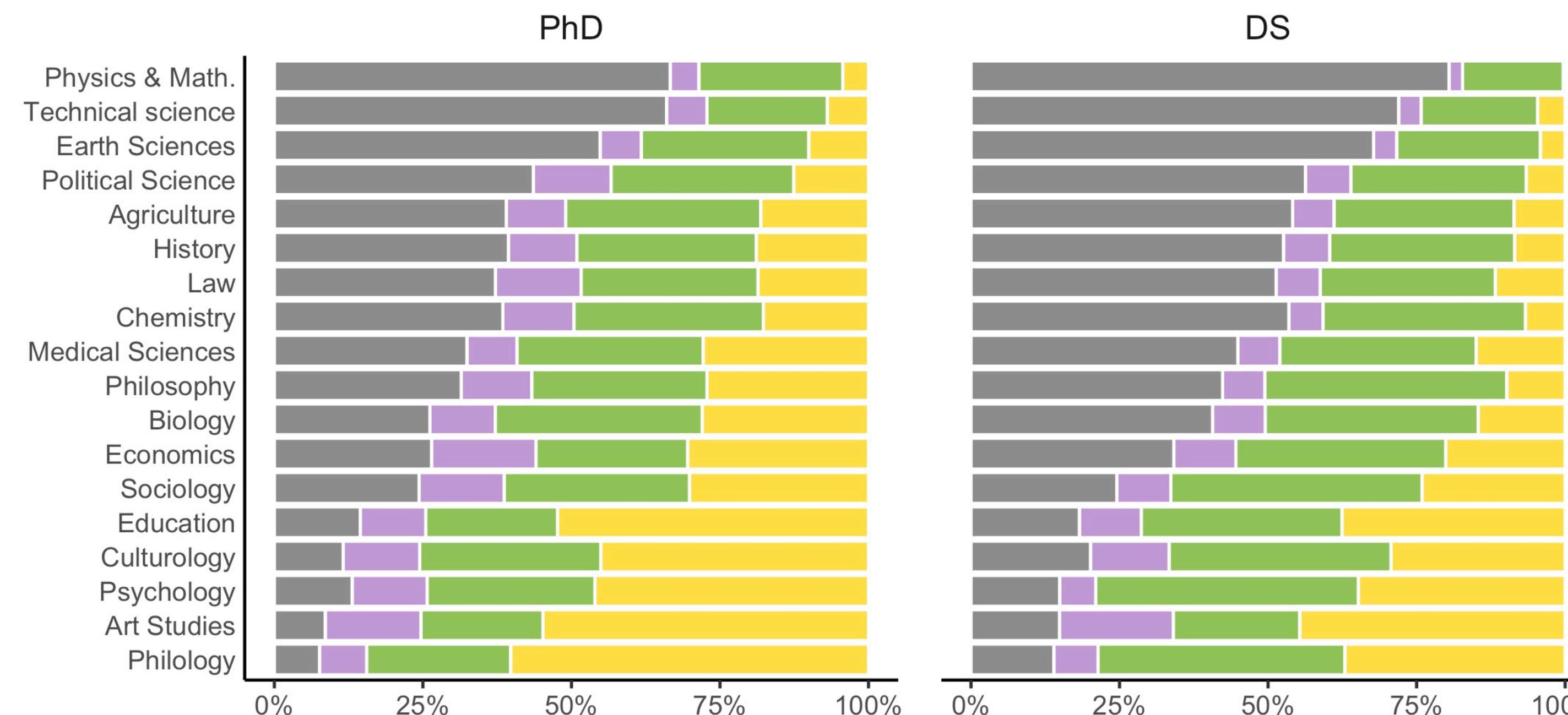
● PhD ● DS

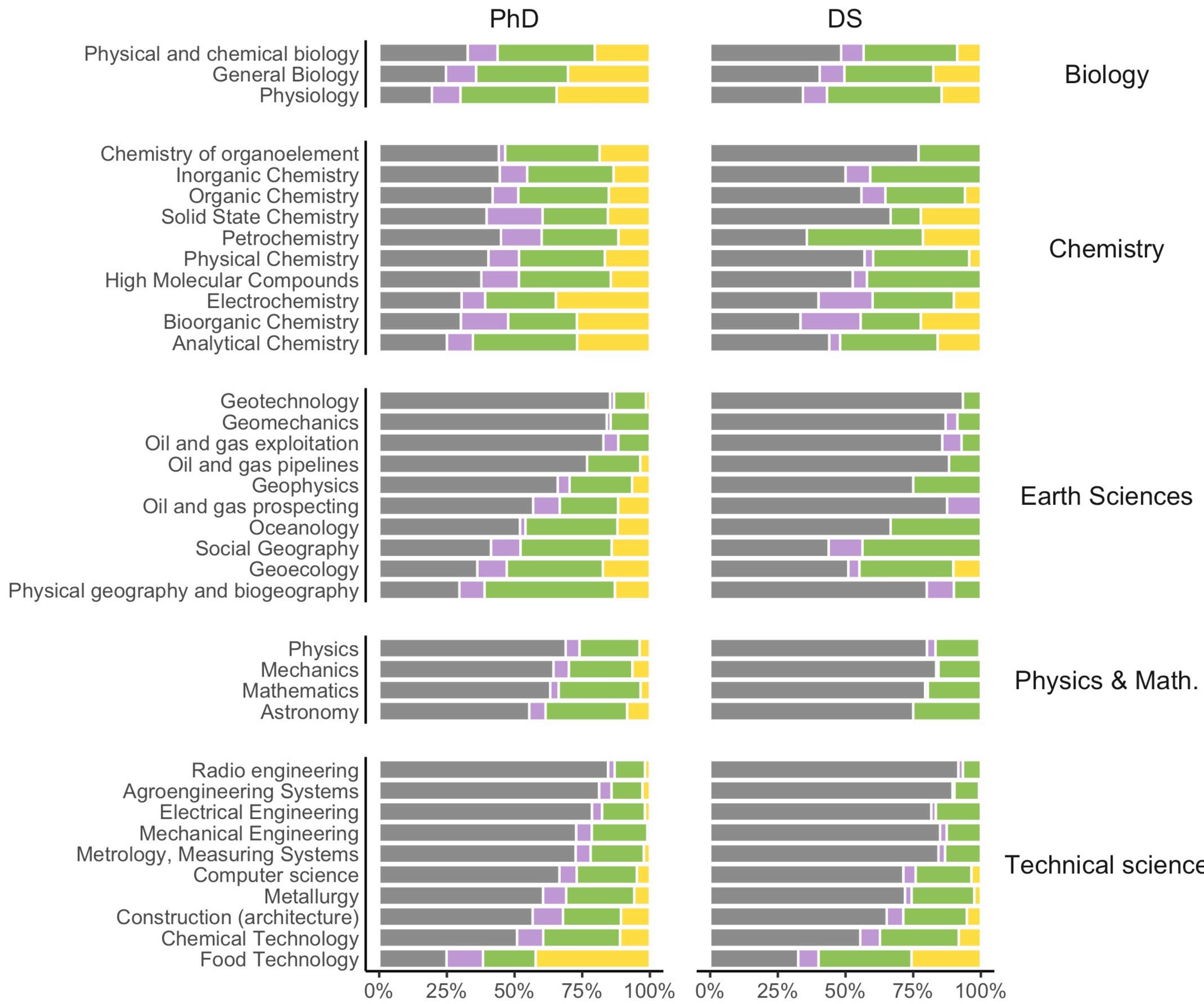


Collaboration types

	PhD (N=32972)	DS (N=12636)	Overall (N=45608)
both male	13458 (40.8%)	5804 (45.9%)	19262 (42.2%)
male autor + female mentor	3302 (10.0%)	927 (7.3%)	4229 (9.3%)
female autor + male mentor	8702 (26.4%)	3948 (31.2%)	12650 (27.7%)
both female	7510 (22.8%)	1957 (15.5%)	9467 (20.8%)

█ both male
 █ male autor & female mentor
 █ female autor & male mentor
 █ both female





Notes: Chemistry, Technical, and Earth Sciences are presented by 10 top subfields.

Conclusions

- disciplines structure based on dissertation \neq disciplines structure based on bibliometric analysis;
- **rather female:** Philology, Art Studies, Education; **rather male:** Technical, Physics & Math;
- a lower share of women in the «top position» (mentor of DSs): is typical for all fields, including rather female fields;
- subfields matter
- STEM fields are not similar (in terms of gender gap), but in general, primarily male

Thank you!



Supplementary materials:
github.com/hellche/stem_sti

For any questions

elenachechik@gmail.com



EUROPEAN
UNIVERSITY AT
ST. PETERSBURG



Center
for Institutional Analysis
of Science & Education



The work was supported by
Russian Science Foundation
grant #21-78-10102

Figure S1: Dynamics of the share of women as Ph.D. and Doctoral authors: by general fields (2004-2016)

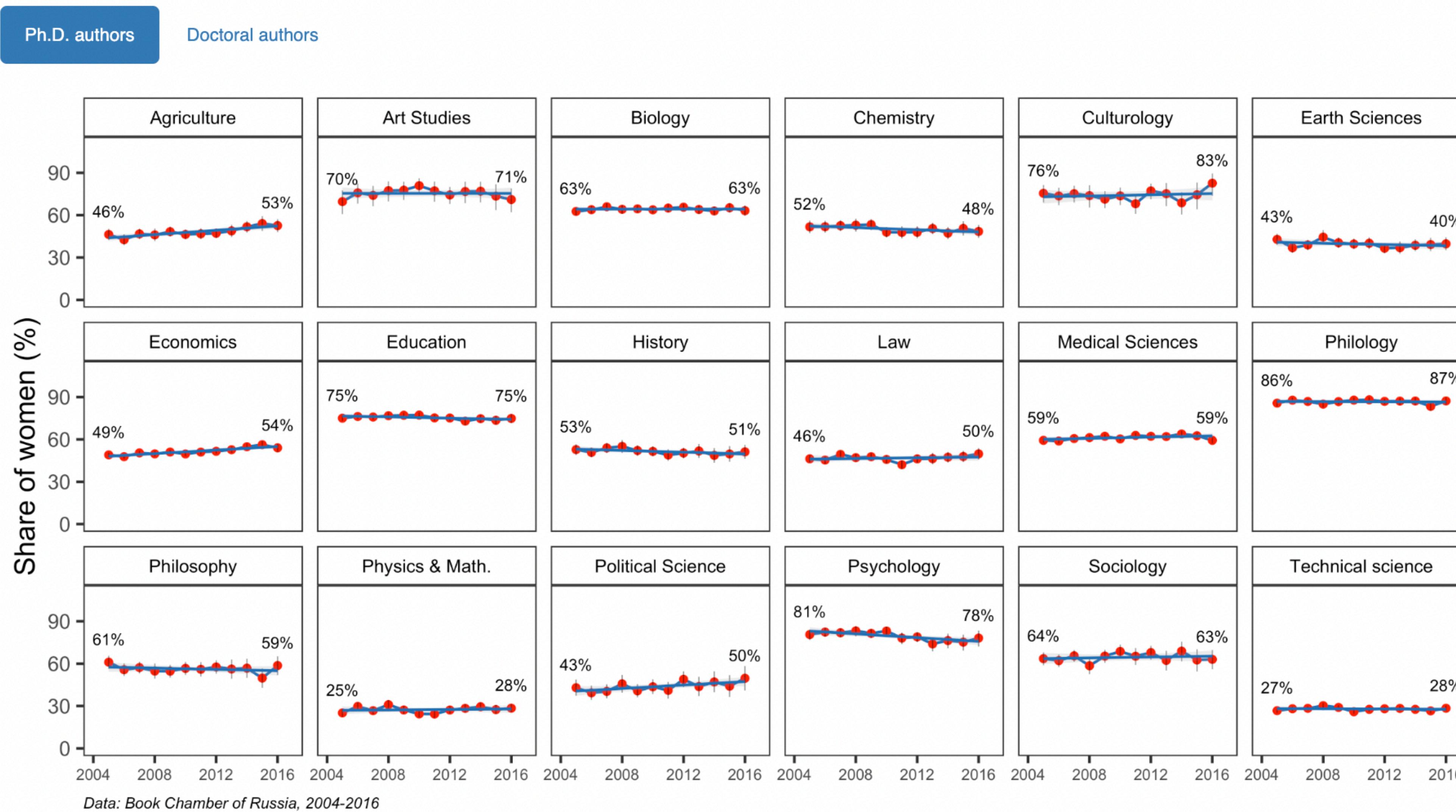
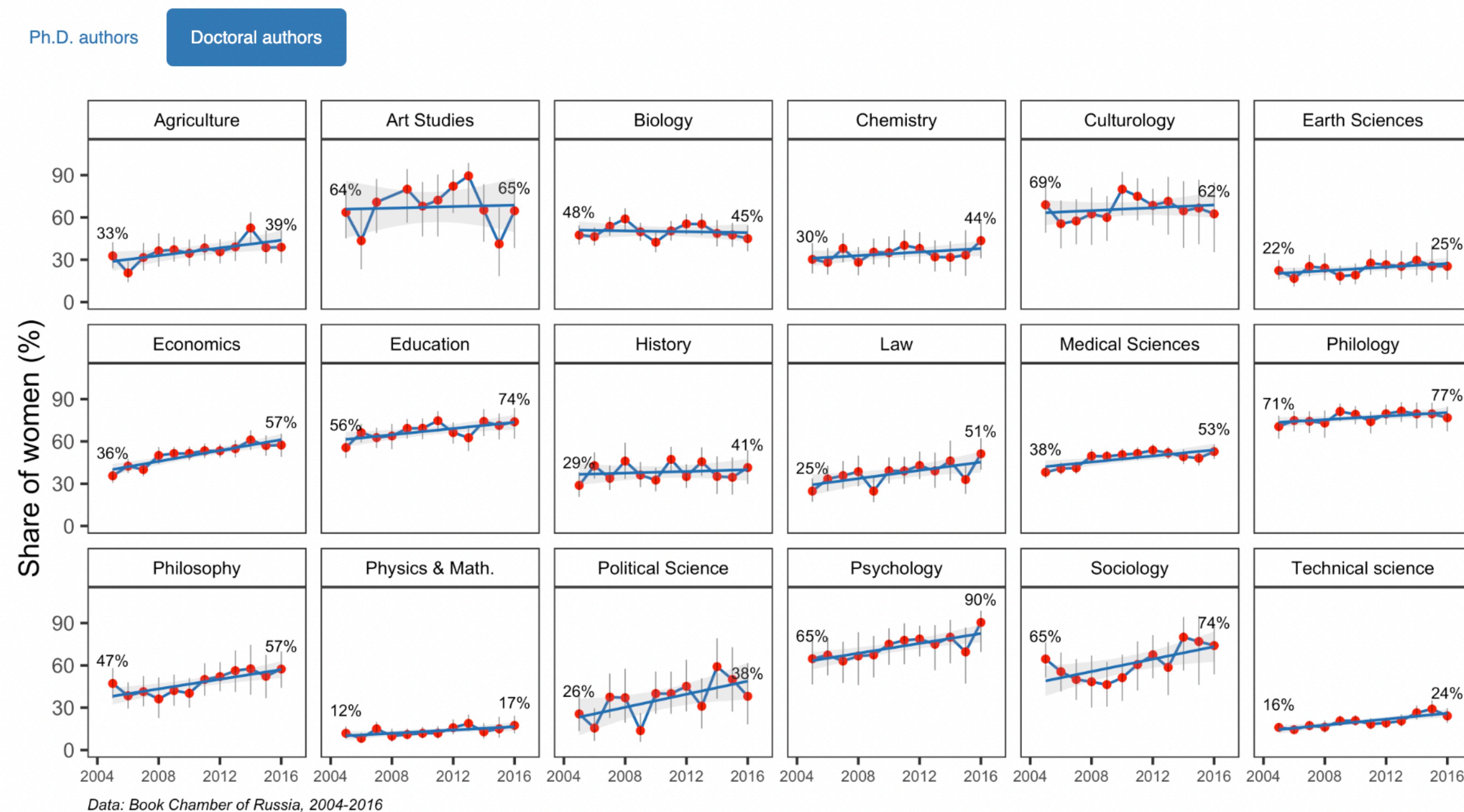
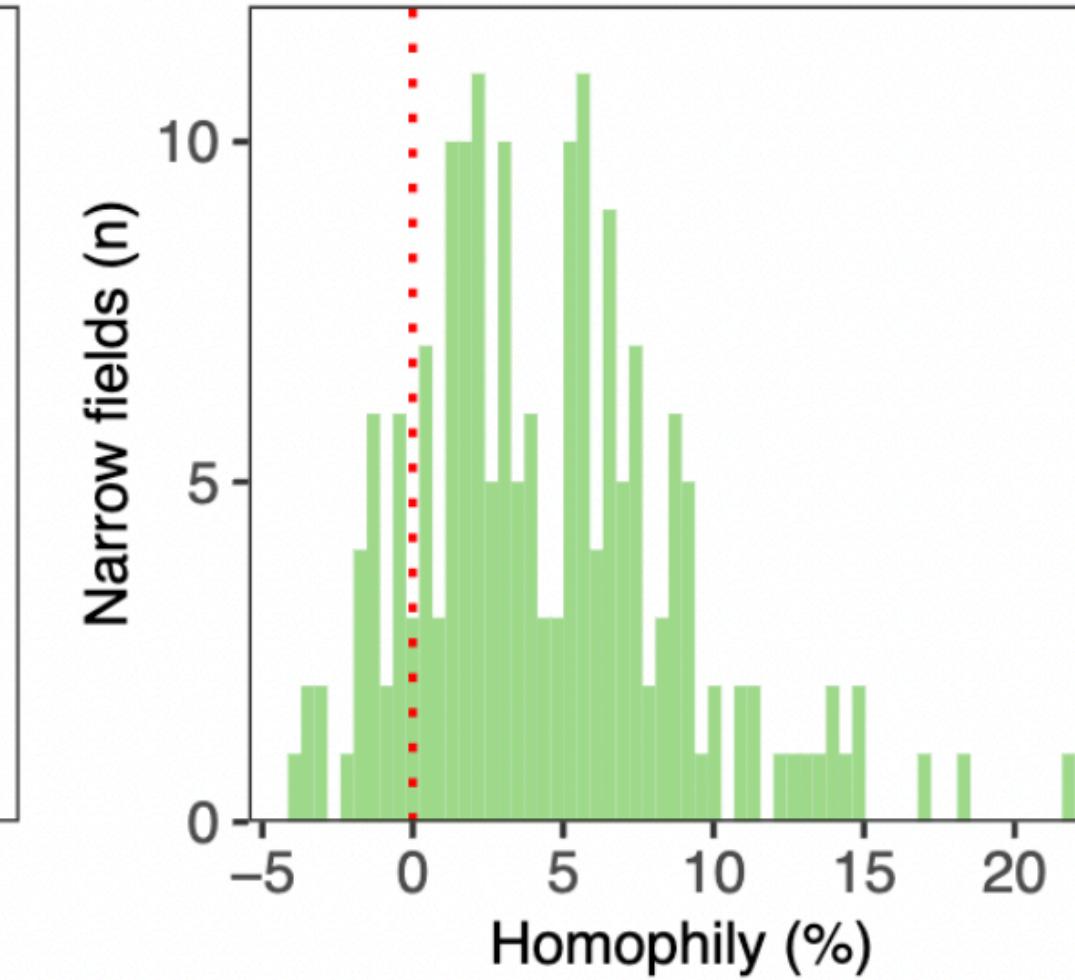
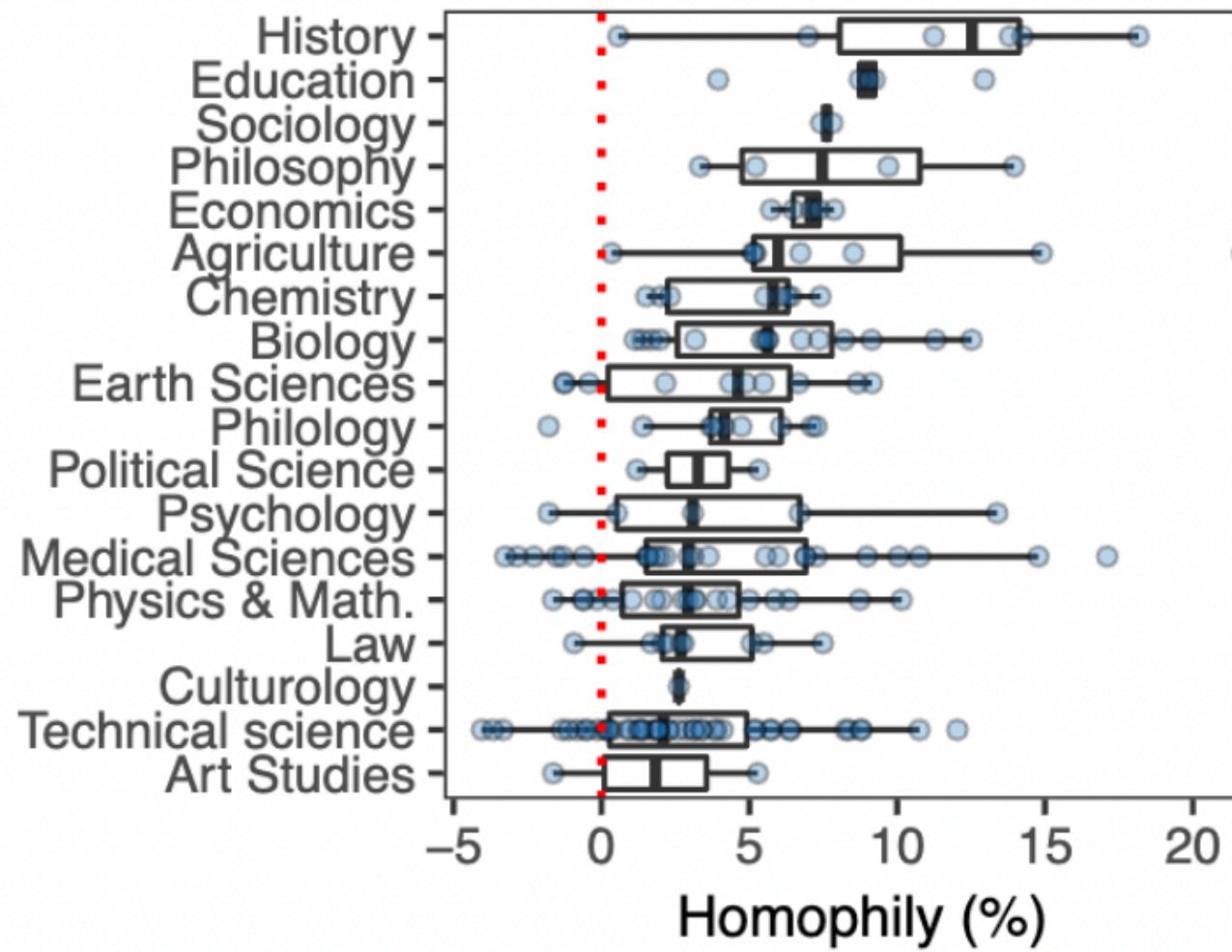


Figure S1: Dynamics of the share of women as Ph.D. and Doctoral authors: by general fields (2004-2016)

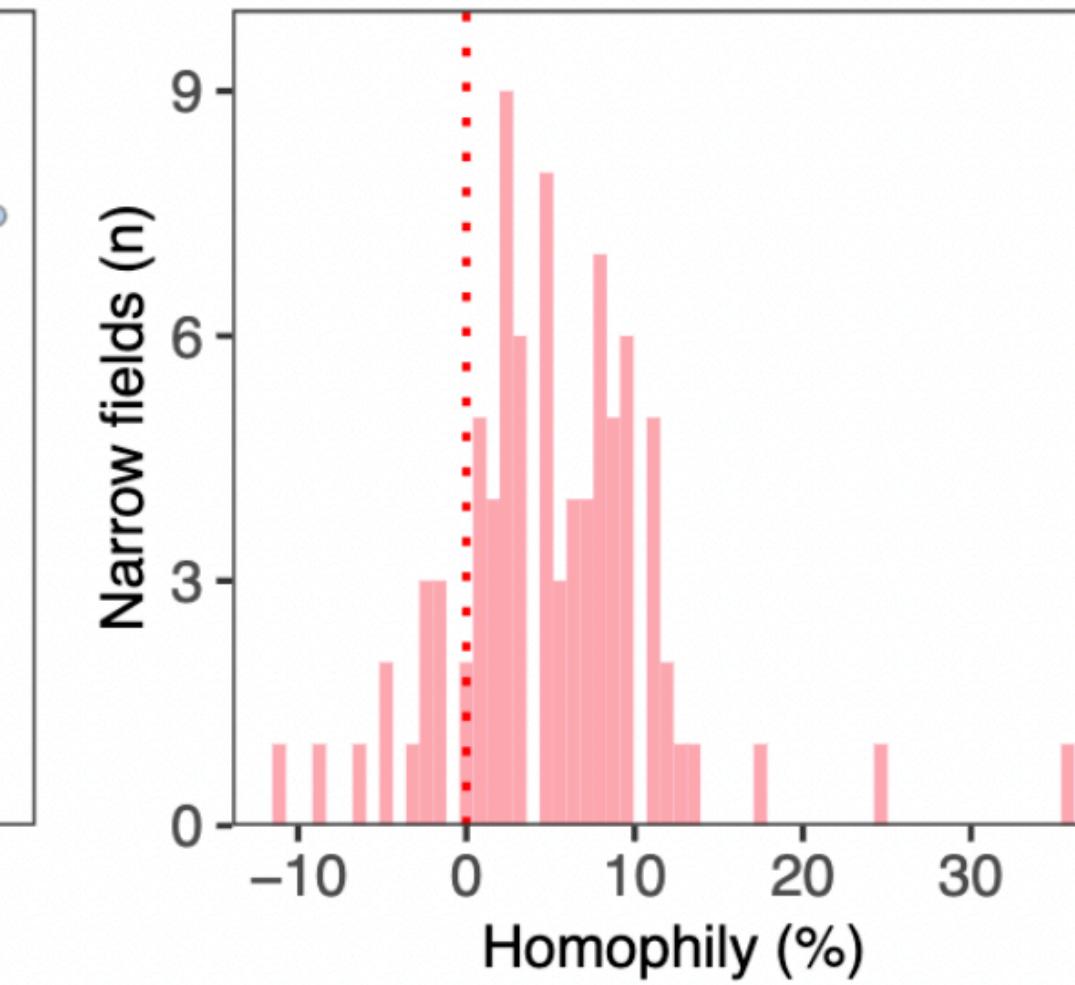
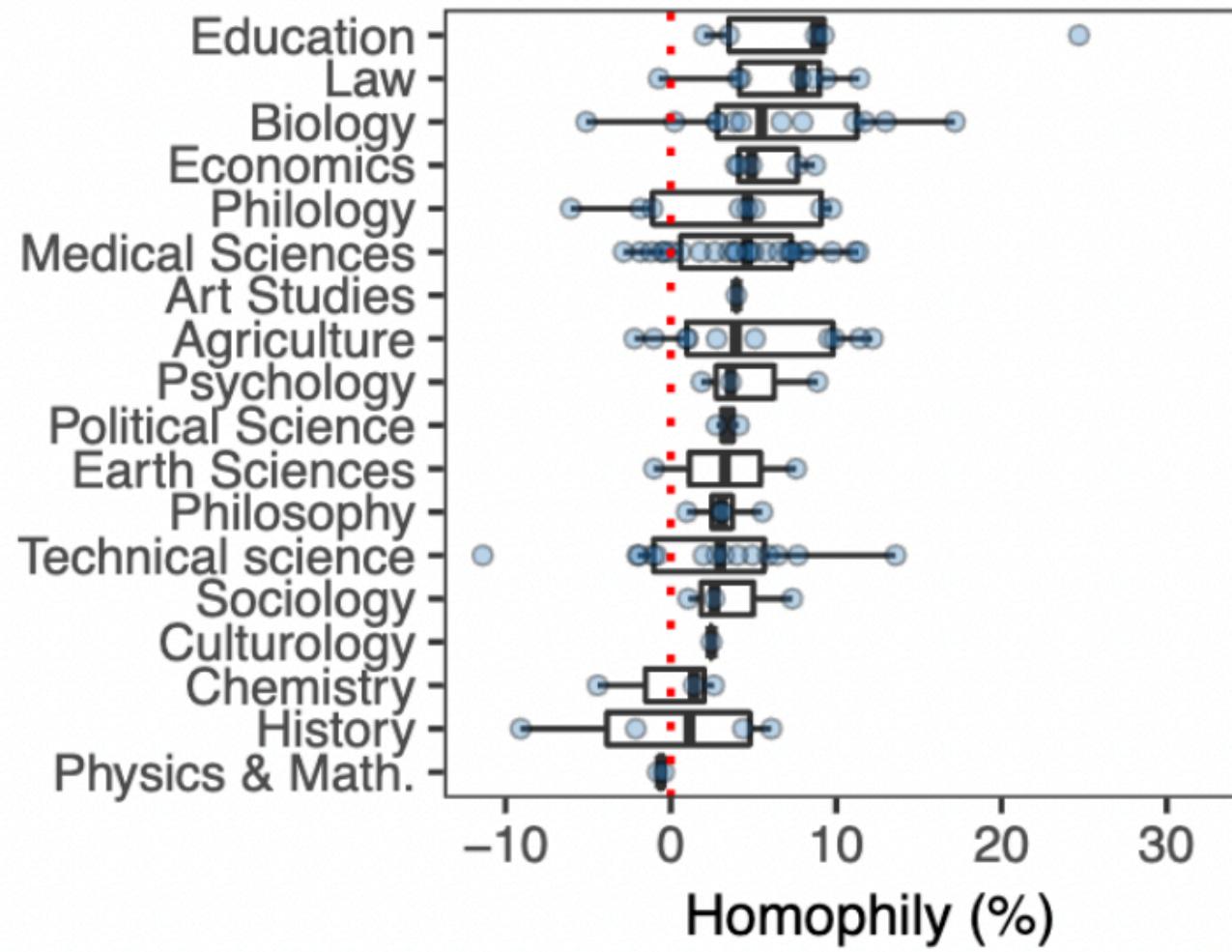


Homothily

A. PhD



B. Doctoral



Data

Fig 1: Dissertations by general research fields: our sample and population

