Supplementary Information for: Systemic Gendered Citation Imbalance in Computer Science: Evidence from Conferences and Journals

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S1 Additional information on our dataset

S1.1 Flow diagram of the filtering process for papers

Figure S1 shows a flow diagram of the filtering process for papers.

S1.2 Analysis of the representativeness of our final dataset

To check the representativeness of our final dataset, we tracked the proportions of the four gender categories (i.e., "MM", "MW", "WM", and "WW") through the filtering process for papers. We found that the relative representation of each category remained stable throughout the process:

- **Papers assigned to countries of affiliation and gender categories ($N = 1,399,106$):** MM: 75.2%, MW: 7.4%, WM: 10.7%, WW: 6.6%
- **Papers published in ranked conferences and journals ($N = 672,082$):** MM: 76.0%, MW: 7.3%, WM: 10.5%, WW: 6.1%
- **Final set for our analysis ($N = 394,432$):** MM: 75.6%, MW: 7.8%, WM: 11.1%, WW: 5.5%

We also compare the distribution of venue types and subfields between the initial matched dataset, $\mathcal{D}$, and the final dataset. The proportion of conference papers decreased in the final dataset (from 51.8% to 39.3%), while the proportion of journal papers increased. This shift reflects our quality criterion of including only venues ranked by CORE or SCImago; more unranked conferences than journals were excluded from the initial matched dataset. Regarding subfields, the filtering process increased the relative share of the 11 computer science subfields while reducing the share of other subfields (from 51.9% to 41.6%; see Table S1). This indicates that our filtering concentrated the dataset on the central research areas of the discipline.

S1.3 Demographic comparison of included and excluded authors

Table S2 compares the distributions of the country of affiliation between the set of authors assigned a country of affiliation and the set of authors assigned both a country of affiliation and gender. We list individual countries until their cumulative share of authors assigned a country of affiliation reaches 90%, with the remaining countries grouped as "Others". The most prominent shift is the sharp decrease in the relative share of authors from China. Similar decreases are also observed for authors from Taiwan, South Korea, Malaysia, Singapore, and Thailand. These shifts reflect the higher gender ambiguity associated with names from these regions, which often failed to meet our gender inference accuracy thresholds.

S1.4 Summary of metadata for papers

Table S3 summarizes the metadata of the papers included in our dataset.

S1.5 Additional statistics

Table S4 shows the number of papers across each subfield–gender category combination. Table S5 shows the number of papers across each venue rank–gender category combination. Figure S2 shows the survival functions of citations made and received by papers in each gender category.

S2 Pseudocode of the preferential-draws model

Algorithm S1 shows a pseudocode of the preferential-draws model.

Algorithm S1 Preferential-draws model.

Require: Citation network: (V, E) and set of characteristics of the paper: S.
Ensure: Randomized network: (V, E_{rand})

Sort the papers by publication date in ascending order: $v_{x_1}, \ldots, v_{x_N}$.
Initialize $c_{j,l,\text{PD}}$ with zero for any $j = 1, \ldots, N$ for any $l = 1, \ldots, N$.
$E_{\text{rand}} \leftarrow$ an empty list.
for $l = 2, \ldots, N$ **do**
  for each citation $(v_{x_l}, v_j) \in E$ **do**
    Compute the set $\overline{V}_{\text{HD}}(x_l, j, S)$.
    $\overline{V}_{\text{PD}}(x_l, j, S) \leftarrow \{v_{j'} \mid v_{j'} \in \overline{V}_{\text{HD}}(x_l, j, S) \ \wedge \ \lfloor \ln(c_{j',l-1,\text{PD}} + 1) \rfloor = \lfloor \ln(c_{j,l-1,\text{PD}} + 1) \rfloor\}$.
    Draw $v_{j'}$ uniformly at random from the set $\overline{V}_{\text{PD}}(x_l, j, S)$.
    Append citation $(v_{x_l}, v_{j'})$ to E_{rand}.
    for $z = l, \ldots, N$ **do**
      $c_{j',z,\text{PD}} \leftarrow c_{j',z,\text{PD}} + 1$.
return (V, E_{rand})

S3 Detailed results of the over/under-citation

Tables S6–S8 show the over/under-citations under the random-draws, homophilic-draws, and preferential-draws models, respectively. Table S9 shows the over/under-citation made by all papers to papers in a given gender category and in a given subfield. Table S10 shows the over/under-citation made by all papers to papers in a given gender category and in a given venue type. Table S11 shows the over/under-citation made by all papers to papers in a given gender category and in a given venue rank. Figure S3 shows the temporal trends of the Z-scores corresponding to the over/under-citation values shown in Fig. 4 of the main text.

S4 Effects of self-citations on the over/under-citation

We constructed a citation network with self-citations intact, comprising 418,090 papers and 820,258 citations. Recall that a citation is defined as a self-citation if there is any overlap in authorship between the citing paper u and the cited paper v. We then calculated over/under-citations in this network. Table S12 compares these values with those computed from the network in which self-citations were excluded.

S5 Effects of isolated papers on the over/under-citation

We constructed a citation network with isolated papers (i.e., papers that neither make nor receive any citations) intact, comprising 542,550 papers and 752,742 citations. We then calculated over/under-citations in this network. Table S13 compares these values with those computed from the network in which isolated papers were excluded.

S6 Detailed results of the matching experiments

Tables S14–S17 show the results of the matching experiments with respect to the author's gender (MM or WW), venue type, involvement of prominent authors, and local coauthorship network, respectively.

S7 Relationships between the three characteristics of the paper

We investigate the relationships among our three characteristics: venue type, involvement of prominent authors, and local coauthorship network. Specifically, we use Yates's chi-squared test [1] for MM and WW papers separately. Fix a gender category $g \in \{\mathrm{MM}, \mathrm{WW}\}$ and two characteristics, X and Y. Each characteristic is a categorical variable with two possible categories for each paper. We denote by $O_{g,i,j}$ the number of papers in gender category g that fall into category i for X ($i = 1, 2$) and category j for Y ($j = 1, 2$). Let $N_g = \sum_{i=1}^{2} \sum_{j=1}^{2} O_{g,i,j}$ be the total number of papers in category g. We define the test statistic by

$$\chi^2 = \sum_{i=1}^{2} \sum_{j=1}^{2} (|O_{g,i,j} - E_{g,i,j}| - 0.5)^2 / E_{g,i,j}, \tag{1}$$

where

$$E_{g,i,j} = N_g p_{g,i} q_{g,j}, \tag{2}$$

$$p_{g,i} = \sum_{j=1}^{2} \frac{O_{g,i,j}}{N_g}, \tag{3}$$

$$q_{g,j} = \sum_{i=1}^{2} \frac{O_{g,i,j}}{N_g}. \tag{4}$$

The null hypothesis is that X is independent of Y for the papers in g. If the p value of the test is less than 0.001, we reject the null hypothesis.

Table S18 shows the test statistic and p-value for each combination (g, X, Y). For MM papers, every pair of characteristics is not independent. For WW papers, every characteristic pair except "venue type versus local coauthorship network" is not independent.

References

[1] F. Yates. Contingency tables involving small numbers and the χ^2 test. Supplement to the Journal of the Royal Statistical Society, 1:217–235, 1934.

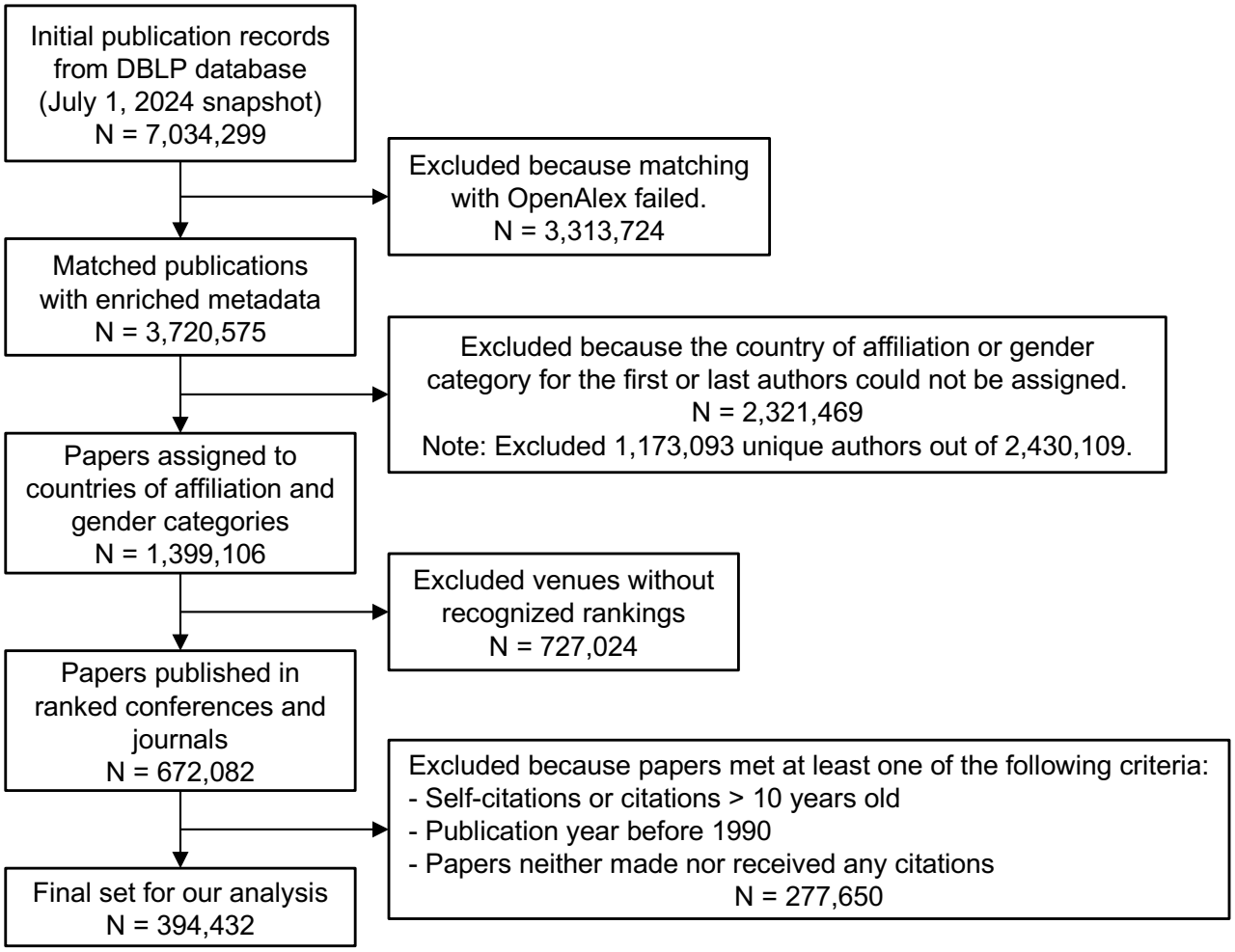

Figure S1: Flow diagram of the paper filtering process. The diagram illustrates the step-by-step reduction from the initial publication records in the DBLP database to the final set of papers for our analysis. At each step, the reason and the number of excluded papers are shown. We also note the number of unique authors excluded because their country of affiliation or gender could not be assigned.

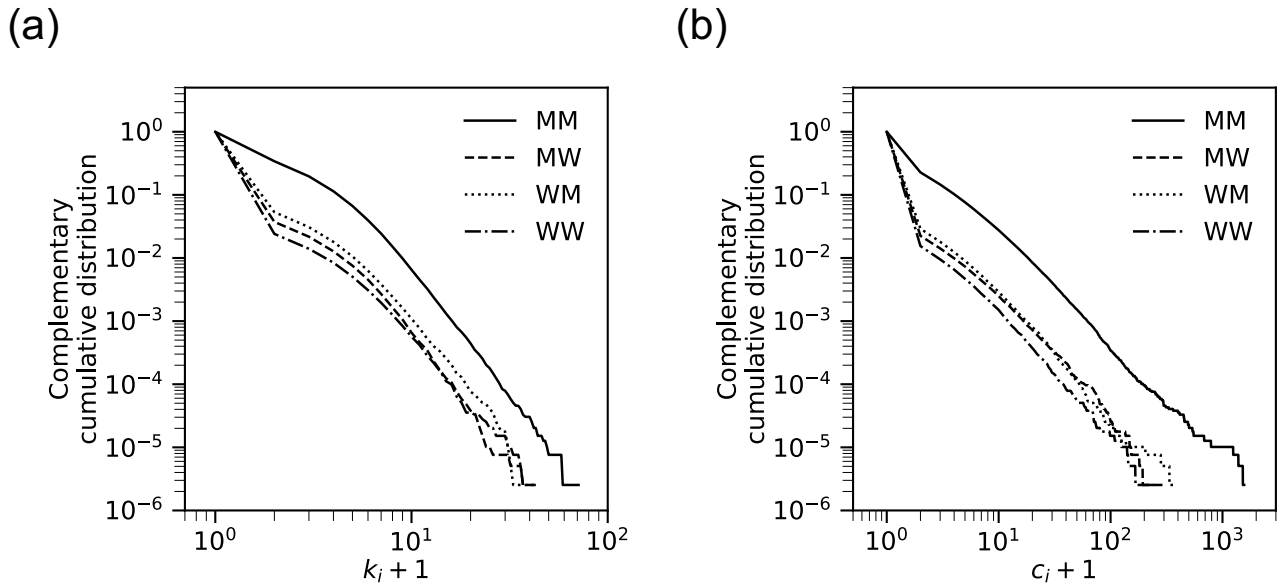

Figure S2: Survival functions of citation counts for each gender category. (a) Number of citations made by a paper, denoted by k_i, plus one. (b) Number of citations received by a paper, denoted by c_i, plus one.

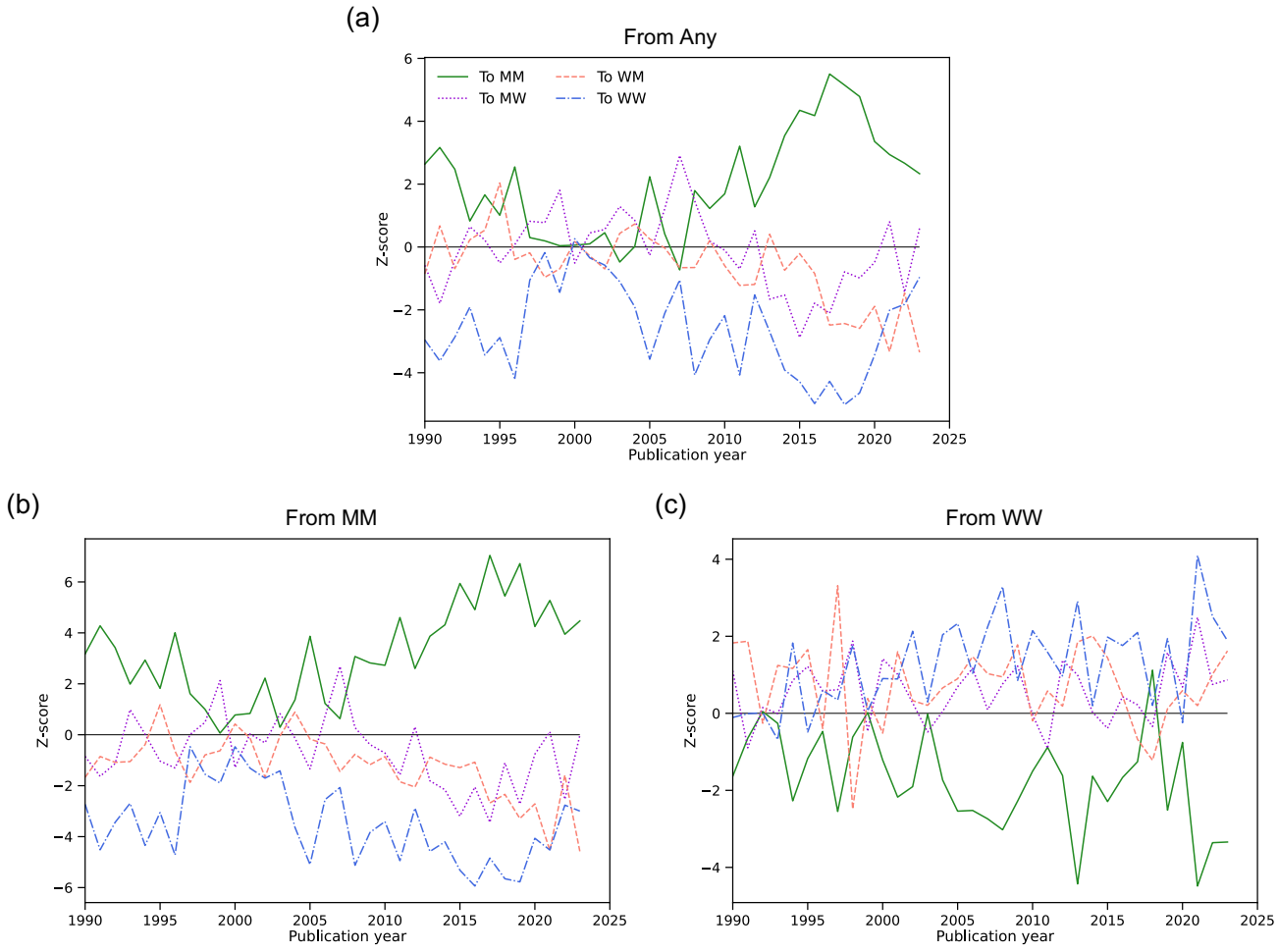

Figure S3: Temporal trends of the Z scores of the over/under-citation made by papers in computer science. (a): All papers. (b): MM papers. (c): WW papers.

Table S1: Comparison of subfield distributions between the initial matched dataset and the final dataset. Subfields not belonging to the 'Computer Science' field in OpenAlex are grouped as 'Others'.

Subfield	Initial Set (%)	Final Set (%)
Artificial Intelligence	12.83	16.50
Computational Theory and Mathematics	3.53	3.86
Computer Graphics and Computer-Aided Design	0.72	1.17
Computer Networks and Communications	9.76	11.63
Computer Science Applications	0.87	1.35
Computer Vision and Pattern Recognition	8.25	9.04
Hardware and Architecture	2.34	3.19
Human-Computer Interaction	1.10	1.71
Information Systems	5.13	6.18
Signal Processing	2.78	2.66
Software	0.78	1.13
Others	51.92	41.59

Table S2: Comparison of the distributions of country of affiliation between authors assigned a country (p_1) and authors assigned both a country and a gender (p_2). Countries are listed individually until the cumulative share of p_1 reaches 90%, with the remaining countries grouped as 'Others'.

Country	p_1 (%)	p_2 (%)
United States	22.21	26.52
China	16.22	1.77
Germany	5.71	8.07
Japan	4.98	6.00
India	4.25	4.31
United Kingdom	4.22	5.20
South Korea	3.41	2.30
Italy	3.15	4.10
Taiwan	2.95	0.56
Canada	2.86	3.46
France	2.67	3.55
Brazil	2.21	3.19
Australia	1.73	2.04
Netherlands	1.50	1.76
Iran	1.26	1.73
Spain	1.20	1.65
Switzerland	0.96	1.30
Greece	0.84	1.13
Sweden	0.81	1.13
Russia	0.81	0.90
Malaysia	0.79	0.68
Belgium	0.73	0.99
Austria	0.70	1.02
Portugal	0.70	1.02
Finland	0.69	0.88
Singapore	0.68	0.44
Israel	0.66	0.73
Pakistan	0.58	0.79
Thailand	0.49	0.37
Denmark	0.48	0.67
Others	9.55	11.74

Table S3: Summary of paper metadata.

Attribute	Data source
Title	OpenAlex
Publication date	OpenAlex
Primary research topic	OpenAlex
Primary research subfield	OpenAlex
Authors' names	OpenAlex
Authors' affiliations	OpenAlex
Authors' IDs	DBLP
Authorship order	DBLP
Papers cited by the paper	OpenAlex
Venue type (i.e., conference or journal)	DBLP
Venue name	DBLP
Venue rank	DBLP, CORE, and SCImago
Country of affiliation	OpenAlex and DBLP
Gender category	OpenAlex, DBLP, Gender API

Table S4: Number of papers by subfield and gender category.

Subfield	MM	MW	WM	WW
Artificial Intelligence	49,852 (76.7%)	5,156 (7.9%)	6,653 (10.2%)	3,413 (5.2%)
Computational Theory and Mathematics	12,383 (81.2%)	938 (6.2%)	1,224 (8.0%)	698 (4.6%)
Computer Graphics and Computer-Aided Design	4,039 (87.8%)	205 (4.5%)	261 (5.7%)	92 (2.0%)
Computer Networks and Communications	36,979 (80.5%)	3,102 (6.8%)	4,425 (9.7%)	1,362 (3.0%)
Computer Science Applications	3,107 (58.5%)	571 (10.8%)	866 (16.3%)	764 (14.4%)
Computer Vision and Pattern Recognition	28,040 (78.6%)	2,552 (7.2%)	3,918 (11.0%)	1,135 (3.2%)
Hardware and Architecture	10,790 (85.6%)	733 (5.8%)	851 (6.8%)	227 (1.8%)
Human-Computer Interaction	4,168 (62.0%)	730 (10.8%)	1,085 (16.1%)	743 (11.1%)
Information Systems	17,497 (71.7%)	2,091 (8.6%)	3,081 (12.6%)	1,725 (7.1%)
Signal Processing	8,266 (78.9%)	750 (7.2%)	1,136 (10.8%)	323 (3.1%)
Software	3,321 (74.5%)	408 (9.2%)	461 (10.3%)	265 (6.0%)

Table S5: Number of papers by venue rank and gender category.

Rank	MM	MW	WM	WW
A*	32,325 (79.3%)	3,062 (7.5%)	3,692 (9.1%)	1,680 (4.1%)
A	28,020 (75.8%)	3,064 (8.3%)	3,851 (10.4%)	2,045 (5.5%)
B	39,782 (76.4%)	4,283 (8.2%)	5,943 (11.4%)	2,091 (4.0%)
C	18,261 (73.1%)	2,101 (8.4%)	3,149 (12.6%)	1,475 (5.9%)
Q1	102,895 (75.9%)	10,381 (7.7%)	15,173 (11.2%)	7,068 (5.2%)
Q2	49,132 (72.7%)	5,509 (8.2%)	8,010 (11.8%)	4,962 (7.3%)
Q3	23,105 (76.0%)	2,134 (7.0%)	3,239 (10.7%)	1,909 (6.3%)
Q4	4,543 (74.5%)	436 (7.2%)	670 (11.0%)	442 (7.3%)

Table S6: Over/under-citation derived from the random-draws model. We present the over/under-citation made by a set of papers (e.g., those in a given gender category or all papers) to another set of papers (also defined by gender category). Here, n_{obs} is the number of citations observed in the original network, while μ and σ are the mean and standard deviation, respectively, of citation counts computed across 100 randomized networks.

Made by	Received by	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
MM	MM	454733	438991.5	304.9	3.6	51.63	< 0.001
MM	MW	38826	40627.3	179.8	-4.4	-10.02	< 0.001
MM	WM	47068	53171.2	234.7	-11.5	-26.01	< 0.001
MM	WW	21853	29689.9	170.9	-26.4	-45.86	< 0.001
MW	MM	45992	47472.8	106.1	-3.1	-13.96	< 0.001
MW	MW	5282	4594.3	64.7	15.0	10.64	< 0.001
MW	WM	6486	6157.7	72.9	5.3	4.50	< 0.001
MW	WW	3688	3223.2	47.2	14.4	9.85	< 0.001
WM	MM	64414	67369.8	131.7	-4.4	-22.44	< 0.001
WM	MW	7692	6777.6	89.4	13.5	10.23	< 0.001
WM	WM	10244	9189.0	94.3	11.5	11.19	< 0.001
WM	WW	5586	4599.6	65.3	21.4	15.10	< 0.001
WW	MM	27220	31674.4	86.4	-14.1	-51.54	< 0.001
WW	MW	3783	3007.8	55.2	25.8	14.06	< 0.001
WW	WM	5115	4021.0	62.6	27.2	17.48	< 0.001
WW	WW	4760	2174.8	41.4	118.9	62.46	< 0.001
All	MM	592359	585508.6	357.2	1.2	19.18	< 0.001
All	MW	55583	55006.9	217.8	1.0	2.65	0.004
All	WM	68913	72539.0	279.9	-5.0	-12.95	< 0.001
All	WW	35887	39687.6	202.0	-9.6	-18.82	< 0.001

Table S7: Over/under-citation derived from the homophilic-draws model.

Made by	Received by	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
MM	MM	454733	447203.8	255.1	1.7	29.51	< 0.001
MM	MW	38826	40175.6	179.5	-3.4	-7.52	< 0.001
MM	WM	47068	50282.7	195.5	-6.4	-16.44	< 0.001
MM	WW	21853	24817.9	132.2	-11.9	-22.43	< 0.001
MW	MM	45992	45988.4	87.1	0.0	0.04	0.483
MW	MW	5282	5099.5	60.2	3.6	3.03	0.001
MW	WM	6486	6662.1	58.0	-2.6	-3.03	0.001
MW	WW	3688	3698.0	49.8	-0.3	-0.20	0.420
WM	MM	64414	64612.6	101.1	-0.3	-1.97	0.025
WM	MW	7692	7556.1	73.0	1.8	1.86	0.031
WM	WM	10244	10208.7	82.0	0.3	0.43	0.334
WM	WW	5586	5558.5	59.0	0.5	0.47	0.321
WW	MM	27220	28031.5	71.1	-2.9	-11.41	< 0.001
WW	MW	3783	3661.3	43.5	3.3	2.80	0.003
WW	WM	5115	4953.4	51.9	3.3	3.11	< 0.001
WW	WW	4760	4231.7	52.0	12.5	10.16	< 0.001
All	MM	592359	585836.3	324.6	1.1	20.10	< 0.001
All	MW	55583	56492.6	217.7	-1.6	-4.18	< 0.001
All	WM	68913	72106.9	242.3	-4.4	-13.18	< 0.001
All	WW	35887	38306.2	170.5	-6.3	-14.19	< 0.001

Table S8: Over/under-citation derived from the preferential-draws model.

Made by	Received by	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
MM	MM	454733	449454.7	341.7	1.2	15.45	< 0.001
MM	MW	38826	39613.1	236.0	-2.0	-3.34	< 0.001
MM	WM	47068	48780.3	233.9	-3.5	-7.32	< 0.001
MM	WW	21853	24631.9	169.4	-11.3	-16.40	< 0.001
MW	MM	45992	46142.0	86.3	-0.3	-1.74	0.041
MW	MW	5282	5076.2	60.2	4.1	3.42	< 0.001
MW	WM	6486	6506.2	61.2	-0.3	-0.33	0.371
MW	WW	3688	3723.6	48.6	-1.0	-0.73	0.232
WM	MM	64414	64799.4	111.4	-0.6	-3.46	< 0.001
WM	MW	7692	7507.8	69.1	2.5	2.67	0.004
WM	WM	10244	10029.6	85.6	2.1	2.50	0.006
WM	WW	5586	5599.2	61.9	-0.2	-0.21	0.416
WW	MM	27220	27979.6	71.7	-2.7	-10.60	< 0.001
WW	MW	3783	3644.2	51.2	3.8	2.71	0.003
WW	WM	5115	4916.9	62.0	4.0	3.20	< 0.001
WW	WW	4760	4337.2	54.6	9.7	7.74	< 0.001
All	MM	592359	588375.6	427.6	0.7	9.32	< 0.001
All	MW	55583	55841.4	302.3	-0.5	-0.85	0.196
All	WM	68913	70233.1	288.2	-1.9	-4.58	< 0.001
All	WW	35887	38291.9	217.5	-6.3	-11.06	< 0.001

Table S9: Over/under-citation by all papers to papers by a gender category and subfield.

Subfield	Gender category	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
Artificial Intelligence	MM	115843	113620.9	214.7	2.0	10.35	< 0.001
	WW	6324	7000.1	125.6	-9.7	-5.38	< 0.001
Computational Theory and Mathematics	MM	21814	21427.3	57.6	1.8	6.71	< 0.001
	WW	951	1077.9	32.2	-11.8	-3.94	< 0.001
Computer Graphics and Computer-Aided Design	MM	11607	11426.6	34.7	1.6	5.20	< 0.001
	WW	158	223.2	17.1	-29.2	-3.80	< 0.001
Computer Networks and Communications	MM	79513	80036.4	145.9	-0.7	-3.59	< 0.001
	WW	2486	2653.5	73.6	-6.3	-2.28	0.011
Computer Science Applications	MM	5980	6195.5	49.6	-3.5	-4.35	< 0.001
	WW	1407	1352.8	37.6	4.0	1.44	0.075
Computer Vision and Pattern Recognition	MM	69467	68487.4	176.9	1.4	5.54	< 0.001
	WW	1787	2208.7	72.6	-19.1	-5.81	< 0.001
Hardware and Architecture	MM	24161	24200.2	55.3	-0.2	-0.71	0.239
	WW	517	588.2	22.8	-12.1	-3.12	< 0.001
Human-Computer Interaction	MM	9489	9235.9	56.5	2.7	4.48	< 0.001
	WW	1412	1535.1	47.4	-8.0	-2.60	0.005
Information Systems	MM	39409	39386.1	104.3	0.1	0.22	0.413
	WW	3297	3539.7	61.9	-6.9	-3.92	< 0.001
Signal Processing	MM	14525	14405.2	55.9	0.8	2.14	0.016
	WW	376	422.3	19.5	-11.0	-2.37	0.009
Software	MM	7318	7336.6	48.5	-0.3	-0.38	0.351
	WW	464	677.9	25.0	-31.6	-8.56	< 0.001

Table S10: Over/under-citation by all papers to papers by a gender category and venue type.

Type	Gender category	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
Conference	MM	221681	219533.3	226.9	1.0	9.47	< 0.001
	WW	11520	13012.1	117.6	-11.5	-12.69	< 0.001
Journal	MM	370678	368820.3	316.5	0.5	5.87	< 0.001
	WW	24367	25325.7	148.2	-3.8	-6.47	< 0.001

Table S11: Over/under-citation by all papers to papers by a gender category and subfield.

Rank	Gender category	n_{obs}	μ	σ	Over/under-citation (%)	Z score	p value
A*	MM	130750	129819.0	252.5	0.7	3.69	< 0.001
	WW	4391	5360.3	97.8	-18.1	-9.91	< 0.001
A	MM	55092	54469.0	150.5	1.1	4.14	< 0.001
	WW	3667	3759.5	82.0	-2.5	-1.13	0.130
B	MM	37248	36934.5	82.7	0.8	3.79	< 0.001
	WW	1633	1814.0	33.8	-10.0	-5.35	< 0.001
C	MM	14350	14169.3	54.6	1.3	3.31	< 0.001
	WW	1163	1184.6	28.0	-1.8	-0.77	0.220
Q1	MM	257718	256007.4	263.3	0.7	6.50	< 0.001
	WW	16138	17130.2	153.6	-5.8	-6.46	< 0.001
Q2	MM	70613	70598.2	125.3	0.0	0.12	0.453
	WW	6768	6748.6	83.5	0.3	0.23	0.408
Q3	MM	23349	23139.9	61.1	0.9	3.42	< 0.001
	WW	1827	1993.2	38.4	-8.3	-4.33	< 0.001
Q4	MM	3239	3238.2	16.6	0.0	0.05	0.481
	WW	300	301.6	9.1	-0.5	-0.18	0.430

Table S12: Comparison of over/under-citations in networks with and without self-citations.

		With self-citations			Without self-citations		
Made by	Received by	Over/under-citation (%)	Z score	p value	Over/under-citation (%)	Z score	p value
MM	MM	2.1	33.14	< 0.001	1.2	14.47	< 0.001
MM	MW	-6.2	-12.22	< 0.001	-2.0	-3.48	< 0.001
MM	WM	-7.4	-17.19	< 0.001	-3.5	-7.03	< 0.001
MM	WW	-15.8	-22.24	< 0.001	-11.4	-17.10	< 0.001
MW	MM	-3.3	-16.06	< 0.001	-0.3	-1.68	0.046
MW	MW	24.7	22.34	< 0.001	4.2	3.82	< 0.001
MW	WM	-0.6	-0.58	0.280	-0.2	-0.18	0.429
MW	WW	2.0	1.62	0.053	-1.5	-1.25	0.105
WM	MM	-3.1	-17.21	< 0.001	-0.6	-3.18	< 0.001
WM	MW	2.7	2.79	0.003	2.1	2.05	0.020
WM	WM	15.1	20.71	< 0.001	2.2	2.45	0.007
WM	WW	2.2	2.10	0.018	-0.2	-0.16	0.438
WW	MM	-6.4	-23.10	< 0.001	-2.7	-11.76	< 0.001
WW	MW	0.2	0.15	0.442	3.8	3.14	< 0.001
WW	WM	1.1	0.90	0.183	4.2	4.00	< 0.001
WW	WW	31.1	33.38	< 0.001	9.6	8.65	< 0.001
All	MM	0.8	11.50	< 0.001	0.7	8.90	< 0.001
All	MW	-1.4	-2.90	0.002	-0.5	-1.02	0.153
All	WM	-2.7	-6.97	< 0.001	-1.8	-4.33	< 0.001
All	WW	-5.0	-8.51	< 0.001	-6.4	-11.12	< 0.001

Table S13: Comparison of over/under-citations in networks with and without isolated papers.

		With isolated papers			Without isolated papers		
Made by	Received by	Over/under-citation (%)	Z score	p value	Over/under-citation (%)	Z score	p value
MM	MM	1.2	15.45	< 0.001	1.2	14.47	< 0.001
MM	MW	-1.4	-2.58	0.005	-2.0	-3.48	< 0.001
MM	WM	-3.7	-7.57	< 0.001	-3.5	-7.03	< 0.001
MM	WW	-12.5	-18.05	< 0.001	-11.4	-17.10	< 0.001
MW	MM	-0.4	-1.92	0.028	-0.3	-1.68	0.046
MW	MW	4.8	4.05	< 0.001	4.2	3.82	< 0.001
MW	WM	-0.0	-0.02	0.493	-0.2	-0.18	0.429
MW	WW	-1.9	-1.35	0.088	-1.5	-1.25	0.105
WM	MM	-0.7	-4.40	< 0.001	-0.6	-3.18	< 0.001
WM	MW	3.1	3.64	< 0.001	2.1	2.05	0.020
WM	WM	2.5	3.35	< 0.001	2.2	2.45	0.007
WM	WW	-0.7	-0.60	0.276	-0.2	-0.16	0.438
WW	MM	-3.1	-10.56	< 0.001	-2.7	-11.76	< 0.001
WW	MW	5.0	3.48	< 0.001	3.8	3.14	< 0.001
WW	WM	4.9	4.05	< 0.001	4.2	4.00	< 0.001
WW	WW	10.3	8.59	< 0.001	9.6	8.65	< 0.001
Any	MM	0.7	9.18	< 0.001	0.7	8.90	< 0.001
Any	MW	0.2	0.40	0.343	-0.5	-1.02	0.153
Any	WM	-1.9	-4.59	< 0.001	-1.8	-4.33	< 0.001
Any	WW	-7.2	-12.13	< 0.001	-6.4	-11.12	< 0.001

Table S14: Comparison of the over/under-citation made by MM papers versus WW papers.

Received by	Made by MM	Made by WW	t-statistic	p value
MM	1.24 ± 0.18	-2.27	194.7	< 0.001
MW	-1.13 ± 1.33	5.62	-50.6	< 0.001
WM	-2.40 ± 1.16	3.82	-53.6	< 0.001
WW	-10.69 ± 1.31	7.78	-141.1	< 0.001

Table S15: Comparison of the over/under-citation made by conference papers versus journal papers for MM and WW papers.

Made by	Received by	Conference	Journal	t-statistic	p value
MM	MM	1.63	1.10 ± 0.04	-117.8	< 0.001
	MW	-2.30	-3.14 ± 0.35	-24.1	< 0.001
	WM	-6.06	-3.84 ± 0.33	66.9	< 0.001
	WW	-18.30	-9.52 ± 0.45	194.2	< 0.001
MM	MM	-2.74	-2.79 ± 0.29	-1.6	0.114
	MW	2.09	7.63 ± 1.86	29.8	< 0.001
	WM	3.03	-0.43 ± 1.49	-23.2	< 0.001
	WW	13.59	11.68 ± 1.41	-13.5	< 0.001

Table S16: Comparison of the over/under-citation made by papers with prominent authors versus those without for MM and WW papers.

Made by	Received by	With prominent authors	Without prominent authors	t-statistic	p value
MM	MM	1.56	1.11 ± 0.10	-44.2	< 0.001
	MW	-3.86	-2.04 ± 0.70	26.0	< 0.001
	WM	-5.10	-4.36 ± 0.73	10.3	< 0.001
	WW	-19.17	-11.55 ± 0.95	79.9	< 0.001
WW	MM	-2.50	-4.97 ± 0.63	-39.4	< 0.001
	MW	17.96	8.61 ± 3.30	-28.3	< 0.001
	WM	4.97	7.74 ± 3.30	8.4	< 0.001
	WW	-2.77	18.66 ± 3.01	71.2	< 0.001

Table S17: Comparison of the over/under-citation made by papers with high MA_{or} values versus those with low MA_{or} values for MM and WW papers.

Made by	Received by	Top half of MA_{or}	Bottom half of MA_{or}	t-statistic	p value
MM	MM	1.11	1.66 ± 0.04	122.6	< 0.001
	MW	-0.97	-5.13 ± 0.37	-113.1	< 0.001
	WM	-4.08	-6.35 ± 0.34	-67.3	< 0.001
	WW	-10.87	-15.87 ± 0.47	-106.0	< 0.001
MM	MM	-3.56	-1.87 ± 0.42	40.6	< 0.001
	MW	5.02	5.52 ± 2.47	2.0	0.044
	WM	2.56	-3.34 ± 1.86	-31.7	< 0.001
	WW	13.51	16.10 ± 1.64	15.7	< 0.001

Table S18: Statistical significance of relationships among the paper's three categorical variables.

Gender category	Characteristic X	Characteristic Y	$\chi 2$-statistic	p value
MM	Venue type	Participation of prominent authors	4069.5	< 0.001
	Venue type	Local coauthorship network	568.8	< 0.001
	Participation of prominent authors	Local coauthorship network	924.2	< 0.001
WW	Venue type	Participation of prominent authors	270.1	< 0.001
	Venue type	Local coauthorship network	2.5	0.114
	Participation of prominent authors	Local coauthorship network	320.7	< 0.001