Lecture 2
Authorship and Research Integrity

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Authorship matters!

Authorship confers **credit** and has important academic, social and financial implications; Authorship implies **accountability** and **responsibility** for published work.

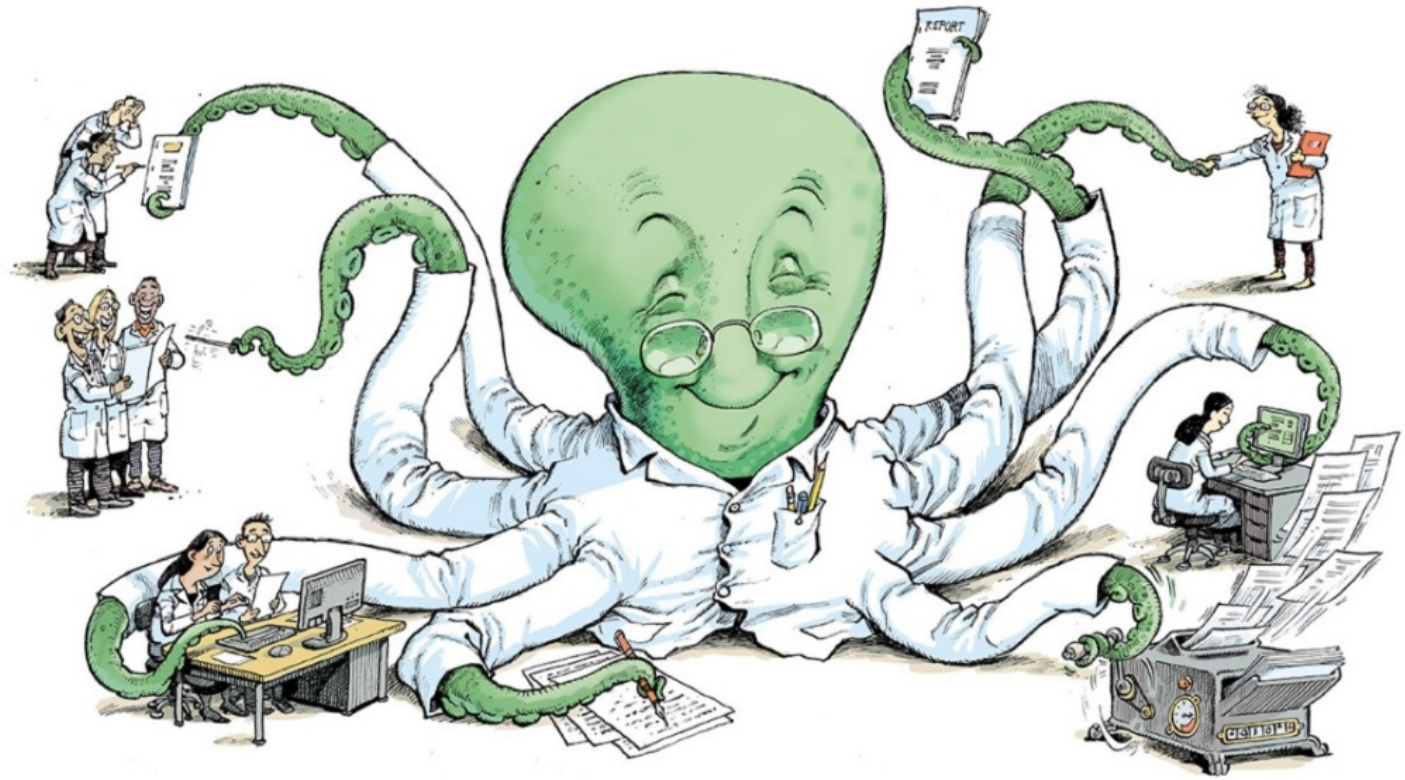


Illustration by David Parkins

Who qualifies as an author?

International Committee of Medical Journal Editors recommends authors meeting **all** the following criteria:

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;
- Drafting the work or revising it critically for important intellectual content;
- Final approval of the version to be published;
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

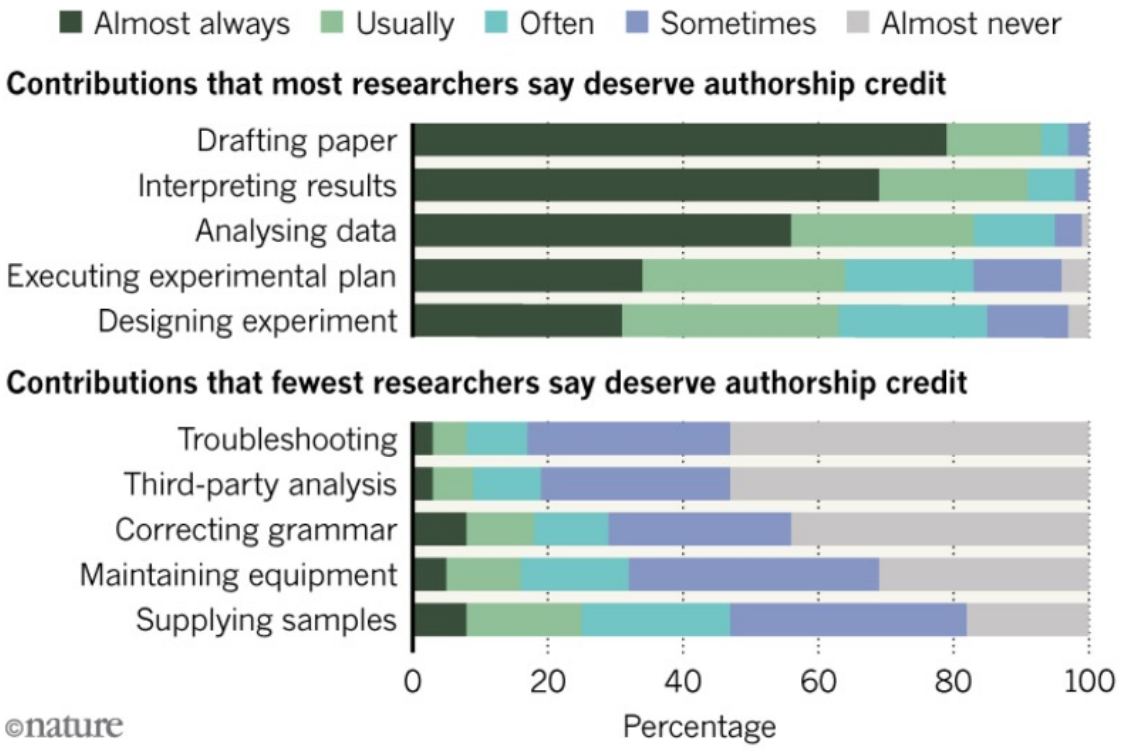
Who qualifies as an author?

Ecological Society of America suggests that the authorship could be legitimately claimed if the researcher:

- conceived the ideas or experimental design;
- participaed actively in the execution of the study;
- analyzed and interpreted the data;
- wrote the manuscript.

Who qualifies as an author?

Although there are general guidelines, authorship rules are not always clear-cut and opinions vary:



(Guglielmi 2018, Nature; based on data from Patience et al 2018, PLOS One)

Who qualifies as an author?

In general, an author should satisfy the following four criteria:

- substantial contribution to the study;
- participation in writing and revising the manuscript;
- approval of the version of manuscript submitted;
- being responsible for the content published.

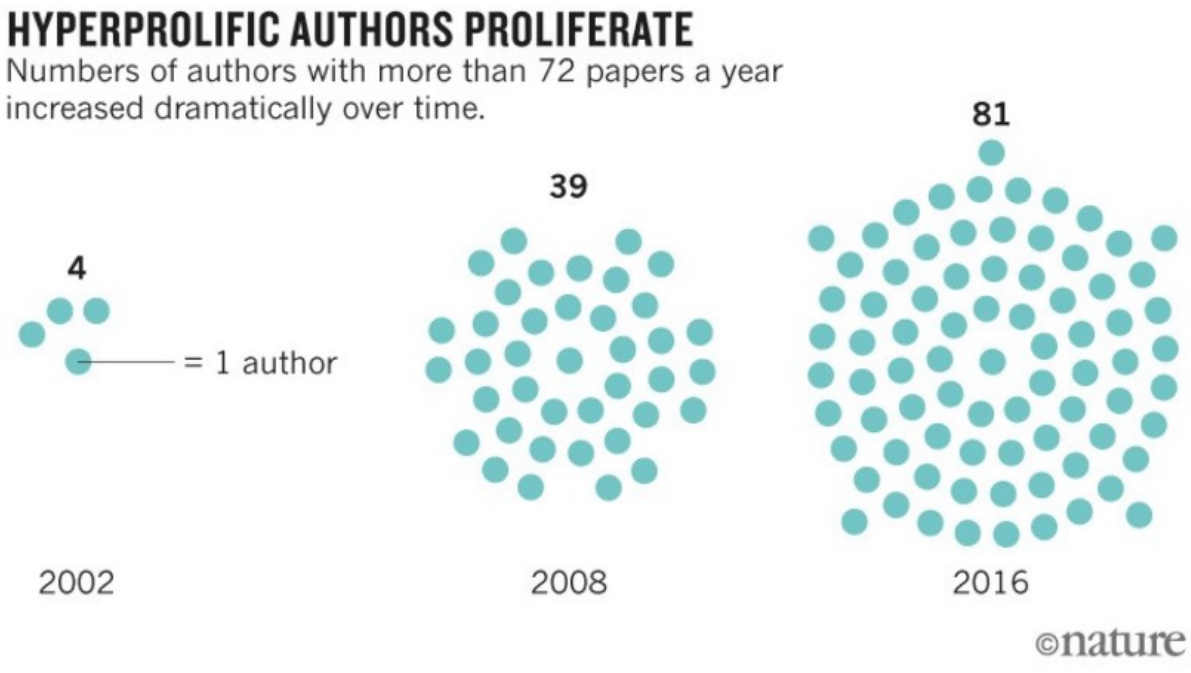
Common issues in authorship

Common detrimental authorship practices (McNutt et al. 2018, PNAS):

- **Ghost authorship:** authors who contributed to the work but are not listed, generally to hide a conflict of interest form reviewers, and readers.
- **Guest/gift/honorific authorship:** individuals given authorship credit who have not contributed in any substantive way to the research but are added to the author list by virtue of their stature in the organization;
- **Orphan authorship** authors who contributed materially to the work but are omitted from the author list unfairly by the drafting team;
- **Forged authorship:** unwitting authors who had no part in the work but whose names are appended to the paper without their knowledge to increase the likelihood of publication.

Common issues in authorship

Number of authors who publish more than 72 papers a year, i.e., one paper every five days on average, has increased dramatically over time.



(Ioannidis et al, 2018, Nature)

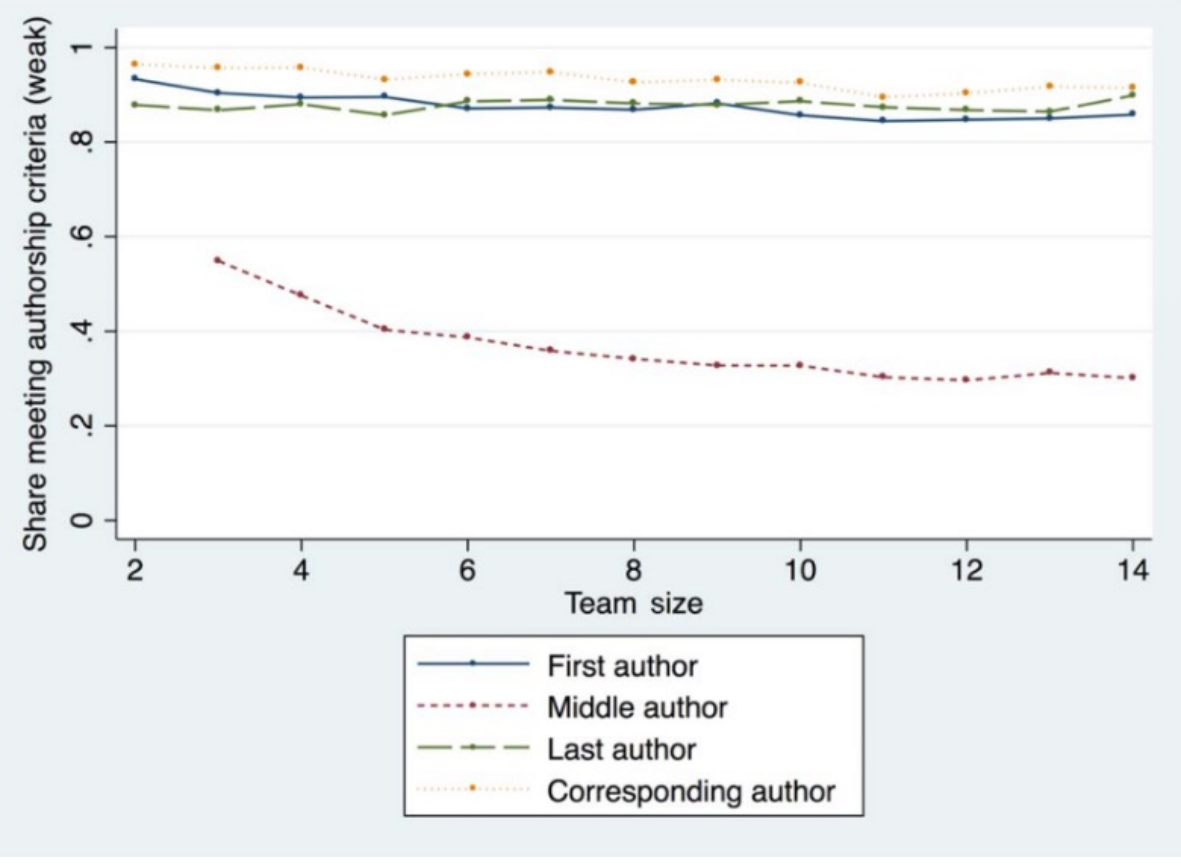
Authorship order

Authorship order often indicates the magnitude of contribution to the paper:

- **First author** is typically the person who carried out the research and wrote and edited the paper;
- **Corresponding author** is the author to whom correspondence should be sent to. It usually signified seniority and supervision of the work;
- First and corresponding authors are thus much valued in academic performance evaluation globally.

Authorship order

In ecology and most other field, **first author** and **corresponding author** are perceived to contribute most to the work and are thus valued most.



(Sauermann and Haeussler 2017, Science Advances)

# Equal contribution

A paper can list multiple first authors or authors with equal contribution. This phenomenon is increasing over time.

TABLE 1. Number of original research articles with authors given equal credit and annual prevalence

Year	NEJM	JAMA	Annals	Lancet	BMJ
2000	3/362 (<1%)	0/349 (0%)	0/200 (0%)	4/795 (<1%)	0/579 (0%)
2001	1/362 (<1%)	1/364 (<1%)	1/204 (<1%)	7/716 (1.0%)	1/586 (<1%)
2002	7/372 (1.9%)	8/357 (2.2%)	0/176 (0%)	16/637 (2.5%)	3/590 (<1%)
2003	20/361 (5.5%)	5/372 (1.3%)	1/196 (<1%)	21/531 (4.0%)	1/643) (<1%)
2004	11/299 (3.7%)	5/340 (1.5%)	5/180 (2.8%)	18/498 (3.6%)	1/623 (<1%)
2005	20/306 (6.5%)	5/307 (1.6%)	5/178 (2.8%)	15/396 (3.8%)	4/514 (<1%)
2006	19/283 (6.7%)	9/257 (3.5%)	3/159 (1.9%)	10/330 (3.0%)	3/333 (<1%)
2007	17/338 (5.0%)	10/229 (4.4%)	3/158 (1.9%)	13/326 (4.0%)	1/292 (<1%)
2008	19/328 (5.8%)	9/211 (4.3%)	4/156 (2.6%)	18/311 (5.8%)	4/260 (1.5%)
2009	29/336 (8.6%)	17/226 (7.5%)	7/186 (3.8%)	10/279 (3.6%)	5/525 (1.0%)
Total	146/3347 (4.4%)	69/3012 (2.3%)	29/1793 (1.6%)	132/4819 (2.7%)	23/4945 (<1%)
Trend	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p < 0.001$

NEJM = *New England Journal of Medicine*; JAMA = *Journal of the American Medical Association*; Annals = *Annals of Internal Medicine*; BMJ = *British Medical Journal*.

(Akhabue et al 2010, Annals of Epidemiology)

# Equal contribution

Designation of co-first authors or co-corresponding authors can be abused because of too much emphasis given to these roles.

中　国　科　学　院

科发监审函字〔2022〕1号

中国科学院科研道德委员会办公室关于规范学术论著署名问题负面行为清单的通知

院属各单位、院机关各部门：

科研诚信是科技创新的基石。维护科研诚信、开展负责任创新，既是全院科研人员从事科学研究、推进科技创新的基本原则，也是我院作为国家战略科技力量主力军定位的基本要求。我国《著作权法》规定“著作权属于作者”，明确了署名的法律责任和义务。我院2018年发布《关于在学术论文署名中常见问题或错误的诚信提醒》，旨在倡导在科研实践中的诚实守信行为，进一步重申了学术论文署名中的基本规范。

学术论著署名规范一般由学术界长期形成的惯例自行确定，根据学科、领域甚至不同的科技期刊均可能有不同的规范要求。制定出适用于不同场景的统一署名规范较为困难。经研究，现提出我院学术论著署名问题的负面行为清单如下：

一、禁止冒用作者署名、虚构作者署名。

二、禁止无实质性贡献的人员参与署名。禁止荣誉性、馈赠性、利益交换性署名或夹带署名。

三、禁止未经所有作者一致同意就确定署名顺序（学科和期刊另有规定的除外）。论著被期刊编辑部通知接收后，所有作者不得再任意修改署名顺序。

四、不得违反署名第一作者或通讯作者时的必要性原则而罗列过多的第一作者或通讯作者，也不得因为有多个第一作者或通讯作者而拒绝承担对整篇论文的责任。

五、不得因作者所属机构变化而随意变更论著工作主要完成机构。不得虚构、伪造作者所属机构，不得把论著非完成机构作为署名单位。

六、不得使用非正式联系方式作为论著作者的联系方式，例如使用公众邮箱等社会通讯方式作为联系方式。

七、不得故意排斥有重要贡献的科研工作者参与署名。不得侵害直接实施科学实验的研究生的基本署名权。不得为均衡其他非学术利益而随意调整学生的署名及其署名位置。

为落实“零容忍”要求，凡我院科研人员出现上述清单所列行为时，将由相应第一责任单位按照科发函字〔2020〕71号文的相关规定开展调查，并根据具体事实和相关情节予以认定和处理，对严重违背科研诚信要求的行为终身追责。

中国科学院科研道德委员会办公室

（代章）

2022年2月13日

（此件主动公开）

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How do I determine authorship order?

First and corresponding authors should take the initiative to determine authorship order. Consensus on authorship order should be reached among all authors before submission.

Ways to determine authorship order:

- magnitude of contribution;
- alphabetical order;
- random order;
- combination of the above.

Authorship order: a case study

First and last author were most involved in designing and performing the work. Other authors ordered based on amount of involvement in the work.

Ecology, 101(12), 2020, e03184

An assessment of statistical methods for nonindependent data in ecological meta-analyses

CHAO SONG [1,3], SCOTT D. PEACOR [1], CRAIG W. OSENBERG [2], AND JAMES R. BENCE [1]

[1]*Department of Fisheries and Wildlife, Michigan State University, East Lansing, Michigan 48824 USA*
[2]*Odum School of Ecology, University of Georgia, Athens, Georgia 30602 USA*

Authorship order: a case study

Authors made more substantial contributions are given prominent positions.
Other authors are ordered alphabetically.

nature geoscience

ARTICLES

https://doi.org/10.1038/s41561-018-0125-5

Continental-scale decrease in net primary productivity in streams due to climate warming

Chao Song[1*], Walter K. Dodds[2], Janine Rüegg[2,3], Alba Argerich[4,5], Christina L. Baker[6], William B. Bowden[7], Michael M. Douglas[8], Kaitlin J. Farrell[1,9], Michael B. Flinn[10], Erica A. Garcia[11], Ashley M. Helton[12], Tamara K. Harms[6], Shufang Jia[2], Jeremy B. Jones[6], Lauren E. Koenig[12,13], John S. Kominoski[1,14], William H. McDowell[13], Damien McMaster[11], Samuel P. Parker[7], Amy D. Rosemond[1], Claire M. Ruffing[2,6], Ken R. Sheehan[13,15], Matt T. Trentman[2,16], Matt R. Whiles[17], Wilfred M. Wollheim[13] and Ford Ballantyne IV[1]

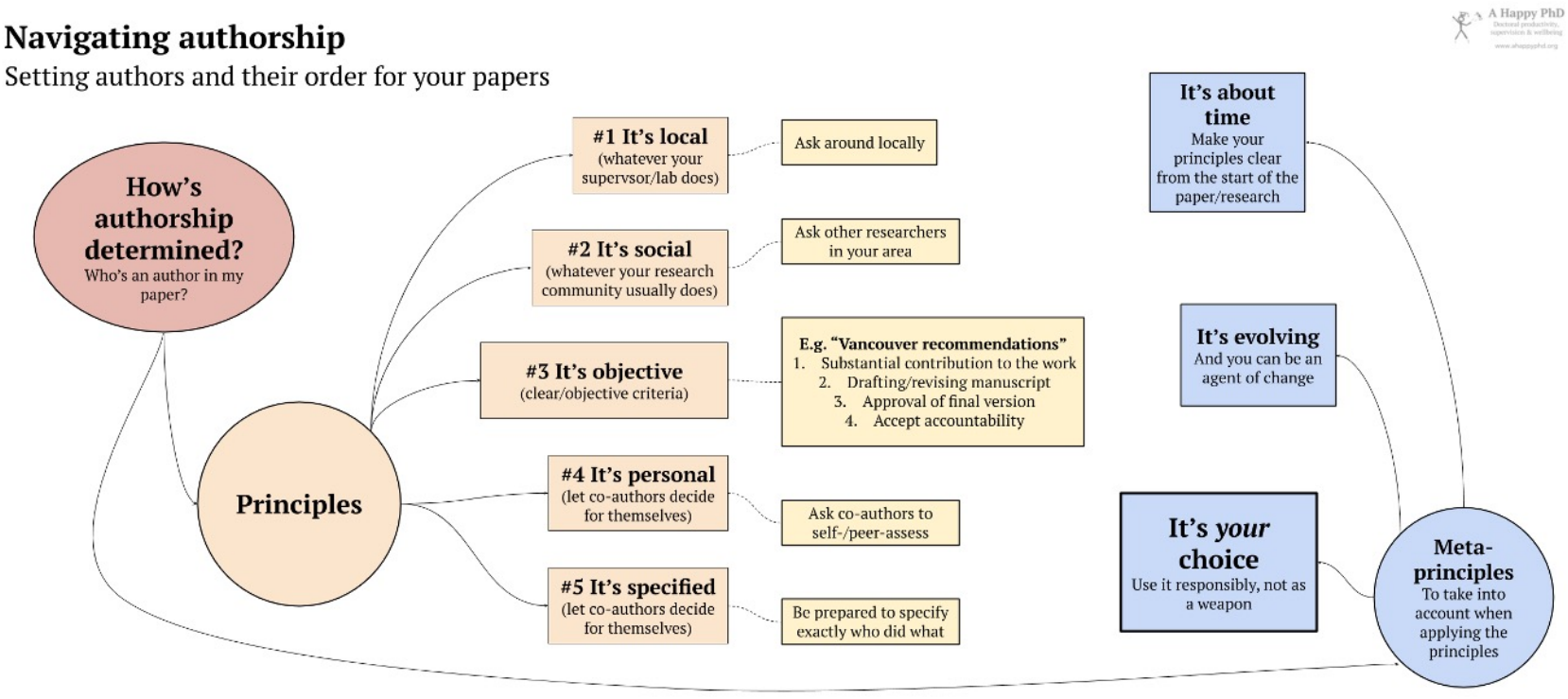
Navigate authorship issues

Some general recommendations on dealing with authorship:

- Initiate discussions on authorship expectations early;
- Consult guidelines but don't be constrained by them;
- Document contributions and communicate frequently;
- Transparency and open scholarship can help;
- Responsible inclusion in scholarly authorship;
- Value diverse contributions;
- Seek external input;
- Authorship norms vary and some perspectives are ingrained.

(Adapted from Cooke et al 2021, FACETS)

Navigate authorship issues



(Figure by Luis Prieto)

Research integrity

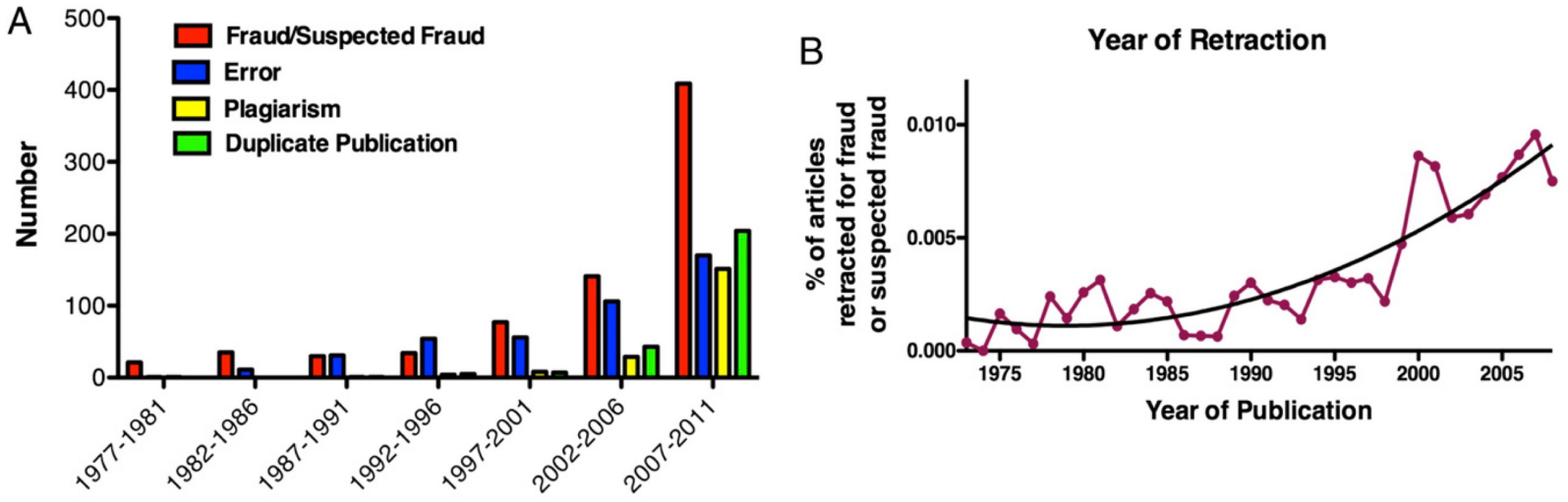
Misconduct in research damages the scientific enterprise, is a misuse of public funds, and undermines the trust in science; They include:

- **Falsification**: changing or omission of research results to support claims, hypotheses, other data;
- **Fabrication**: construction and/or addition of data, observations, or characterizations that never occurred in the gathering of data or running of experiments;
- **Plagiarism**: representation of another author's language, thoughts, ideas, or expressions as one's own original work.

Misconduct and publication

Expression of concern: a notice issued by a publisher against a particular publication, warning that it may contain errors or be otherwise untrustworthy;

Retraction: withdrawals of previously published articles.



(Fang et al 2012, PNAS)

Misconduct and publication

Jonnathan Pruitt, a prominent animal behavior ecologist, was found to fabricate data in his dissertation and publications. As of 2023, he has 15 papers retracted and 11 with an expression of concern.

pre-treatment						Post treatment	
Bold1	Bold2	Bold3	Bold4	Bold5		Bold6	Bold7
297.91	356.56	600	160.66	600		160.66	600
600	600	600	77.56	313.32		477.56	313.32
600	600	600	335.09	212.22		335.09	412.22
103.5	442.25	241.34	339.63	119.72		139.63	119.72
600	600	600	178.41	68.57		463.77	441.23
561.71	600	600	257.62	124.72		257.62	124.72
600	281.46	600	562.01	183.25		562.01	183.25
600	600	259.94	600	452.7		492.23	452.7
600	170.13	58.75	435.60	28.22		35.21	28.22
600	90.56	43.48	600	276.63		58.75	233.51
600	277.53	63.77	600	165.58		600	165.58
600	600	107.37	349.00	327.22		349.00	327.22
264.59	600	583.78	600	209.16		482.35	409.16
600	600	475.82	600	419.38		600	600
35.72	137.59	100.26	113.47	312.17		13.54	19.5
403.03	234.66	554.88	31.72	76.66		31.72	76.66
83.00	170.56	600	518.31	600		518.31	600
600	600	305.85	153.53	358.66		453.53	358.66
600	600	600	91.91	590.41		591.91	590.41
35.06	114.27	404.35	600	600		600	155.42
252.47	600	600	262.83	194.62		262.83	194.62
600	600	143.37	404.35	233.00		404.35	233.00
110.53	600	600	600	600		495.56	577.45
581.03	600	600	600	600		600	600
23.06	600	183.28	552.25	181.06		552.25	181.06
600	337.74	171.75	184.65	452.09		184.65	452.09
600	600	598.62	237.40	91.79		237.40	91.79
600	449.44	600	285.47	262.85		285.47	262.85
251.06	600	600	600	198.57		512.23	398.57
42.21	600	96.00	600	191.54		600	232.1
471.34	600	146.53	201.83	260.09		201.83	260.09
600	403.25	317.35	298.59	191.54		298.59	191.54
600	84.53	600	600	348.88		600	348.88
600	600	600	94.72	570.93		594.72	570.93

Pruitt and the first problematic data set noticed by his coauthor Katie Lakowski

On plagiarism

Under no circumstances should you directly use other people's language as your own original work; you should not reuse your own words from previously published texts, as this is **self-plagiarism**.

To avoid plagiarism, you could:

- **Quote**: putting the words in quotation marks if you need to use another author's specific words;
- **Paraphrase**: taking the words of another source and restating them, using your own vocabulary, e.g.,changing the sentence structure or using synonyms.

Example of paraphrase

Original

Like drought, excess rainfull and flooding can also contribute to epidemics of waterborne infectious diseases, in this case due to poor sanitation resulting from runoff from overwhelmed sewage lines or the contamination of water by livestock.

Use synonyms

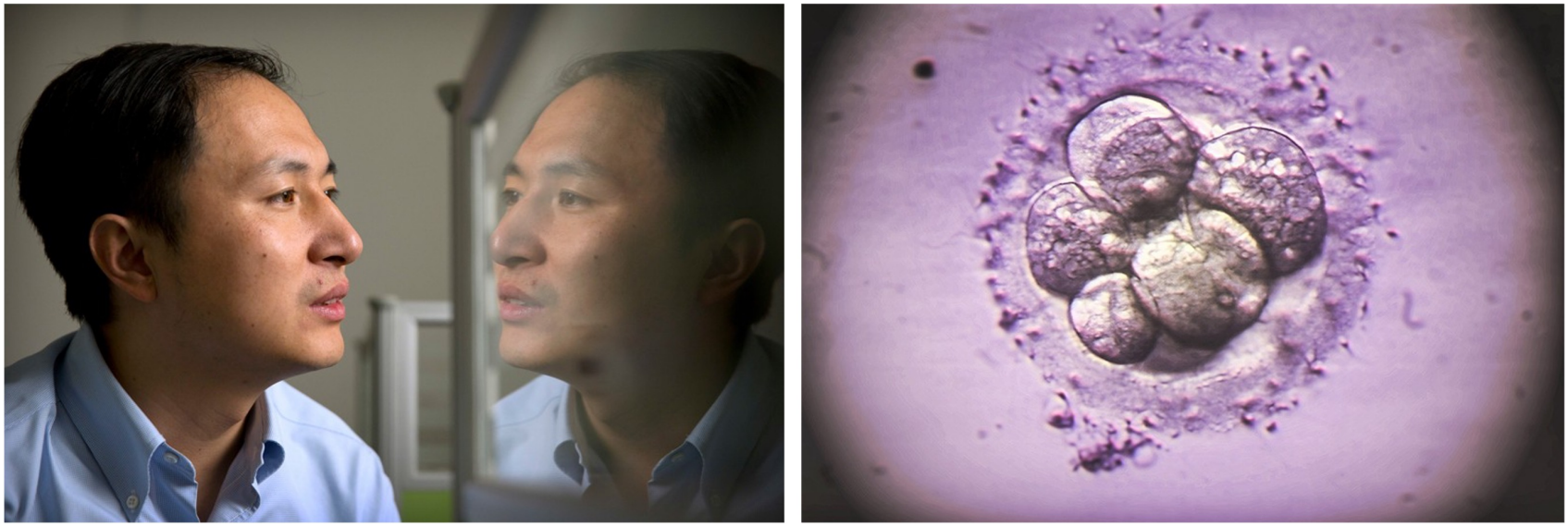
An overabundance of rainfull can also be a factor in spreading infectious disease carried by water, usually as a result of overflowing sewers and pollution from farm animals.

Change sentence structure

When there is overabundance of rainfull, two situations can occur: sewers can overflow and water can become polluted by the presence of livestock, both of which can lead to outbreaks of waterborne diseases.

Research ethics

Appropriate steps should be taken to protect the rights and welfare of humans and animals involved in a research study. **Approval** from Institutional Review Board (IRB) or Independent Ethics Committee (IEC) is required **prior to** conducting research involving human or animals.



Jiankui He’s gene-edited babies sparked discussion in research ethics globally

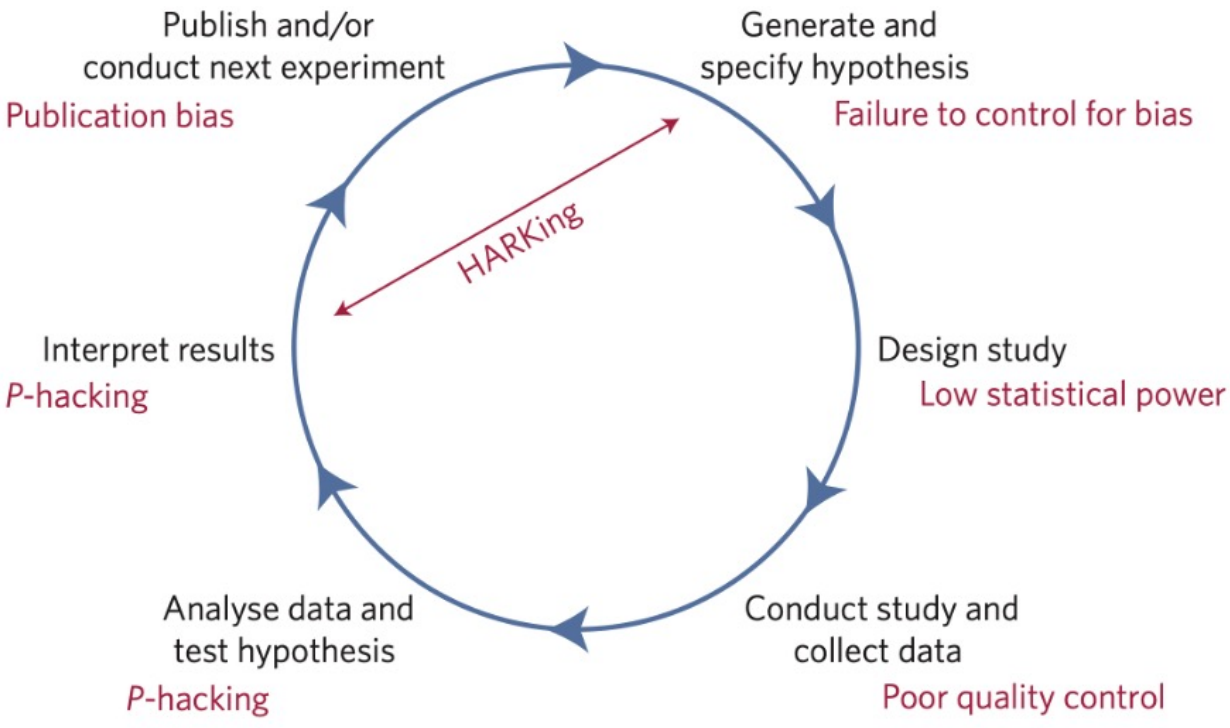
Simultaneous submission

Simultaneous submission: sending work to multiple venues at once is generally considered unethical because it breaches the authors' promise of originality and that the work has never been openly published before.

- submiting a paper or portions of his or her own paper that has been previously published to another journal, without disclosing prior submission;
- paraphrasing or text-recycling previous papers without acknowledgement of the original work;
- translating a published paper into another language without acknowledgement of the original paper.

Reproducibility

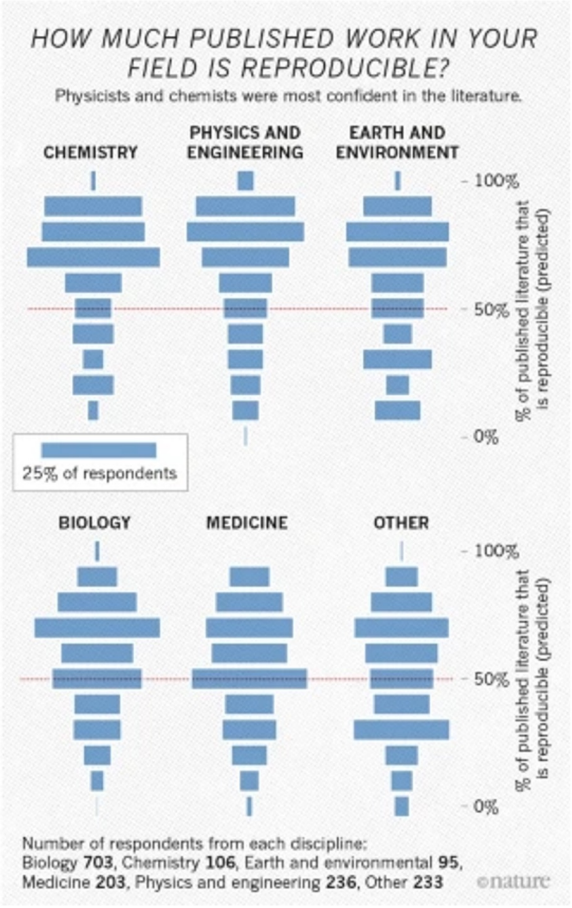
Reproducibility means that a study can be achieved again with a high degree of reliability. Reproducibility is why science is credible and useful. But many questionable practices in research exist.

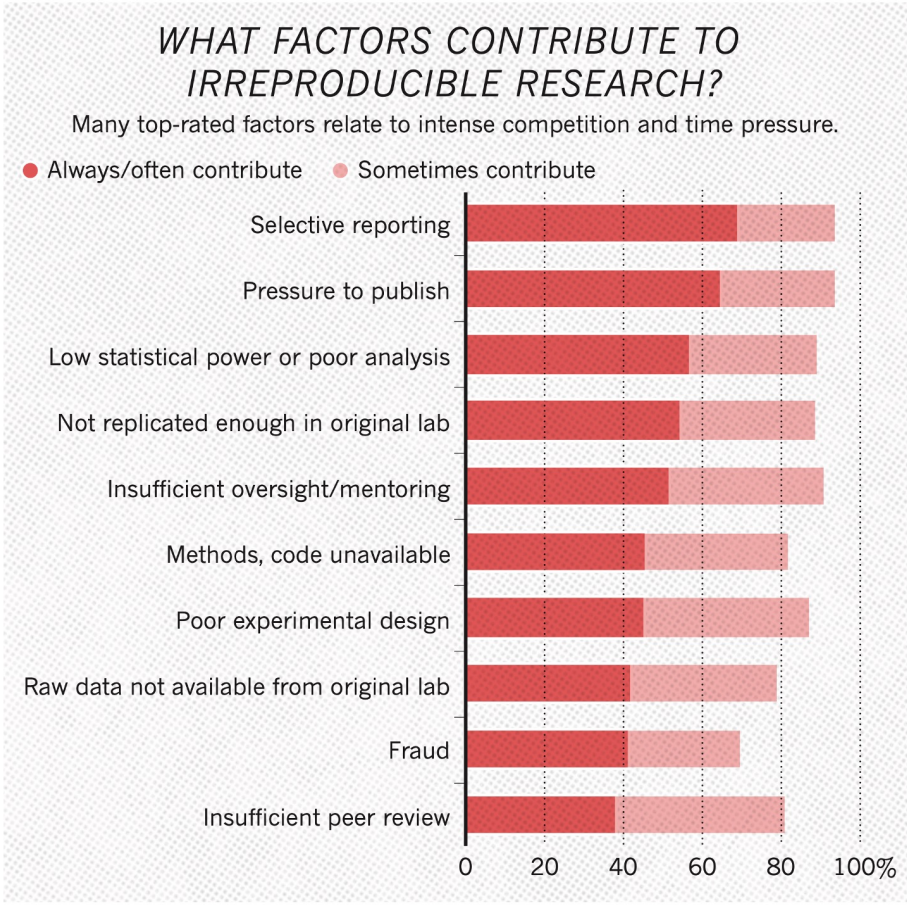


(Munafò et al 2017, Nature Human Behavior)

Reproducibility crisis

Perceived reproducibility varies among fields. Many factors contributes to irreproducible research.

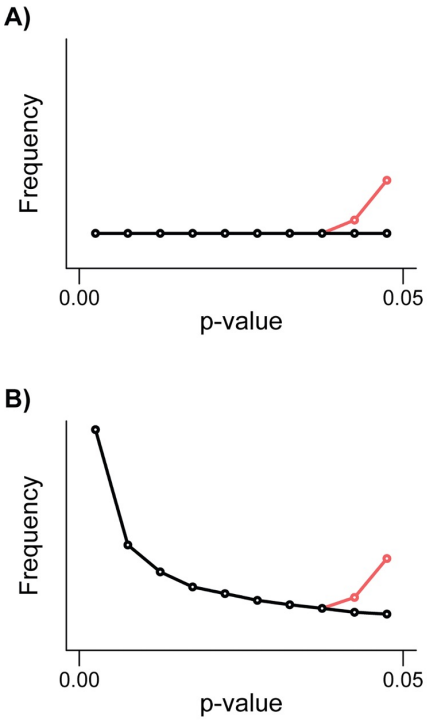


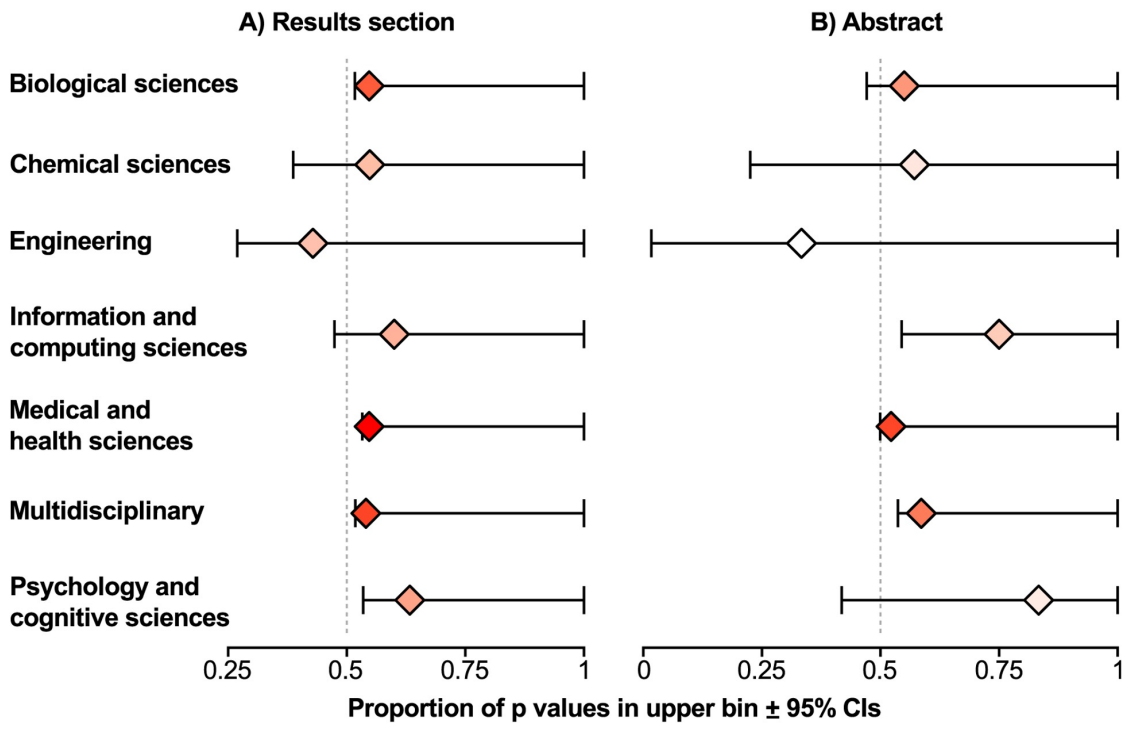


(Baker 2016, Nature)

P–hacking

P-hacking occurs when researchers try out several statistical methods or data eligibility specifications and then selectively report those that produce significant results.

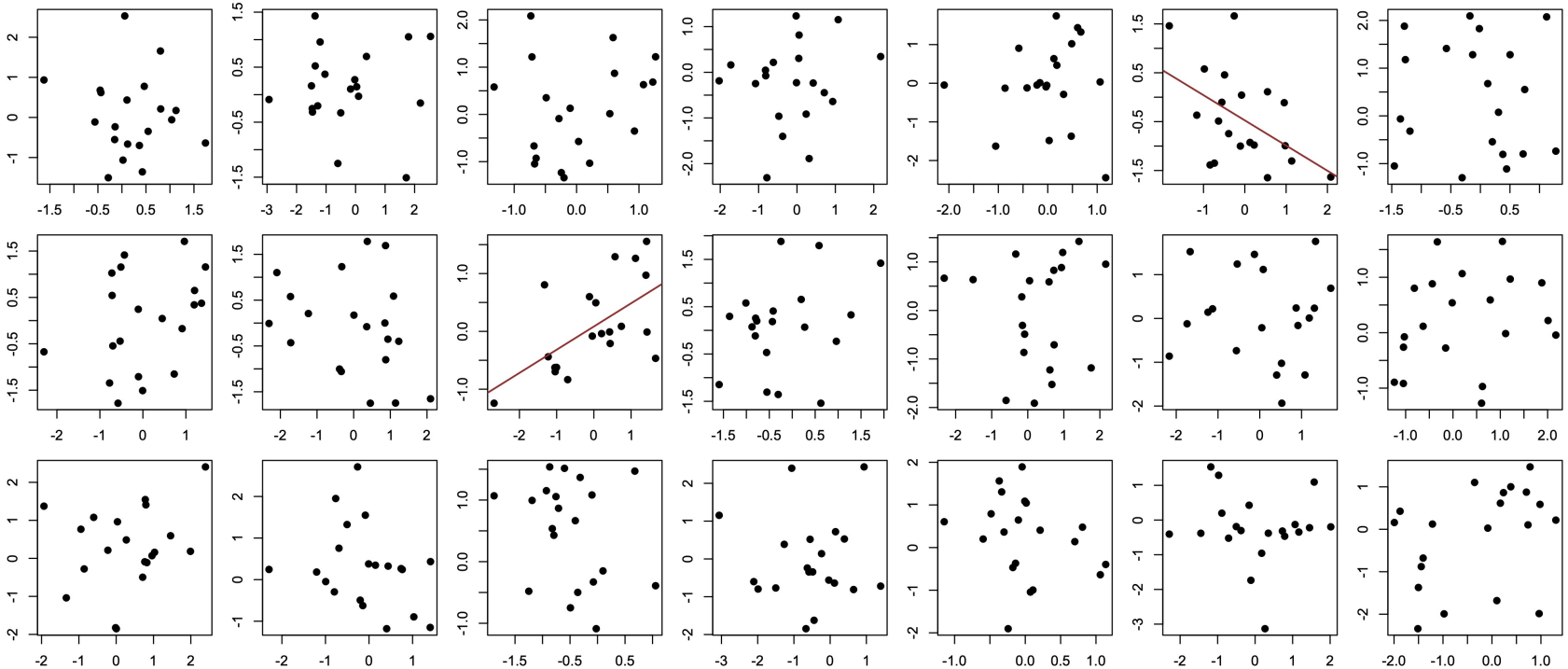




(Head et al 2015, PLOS Biology)

Fishing expedition

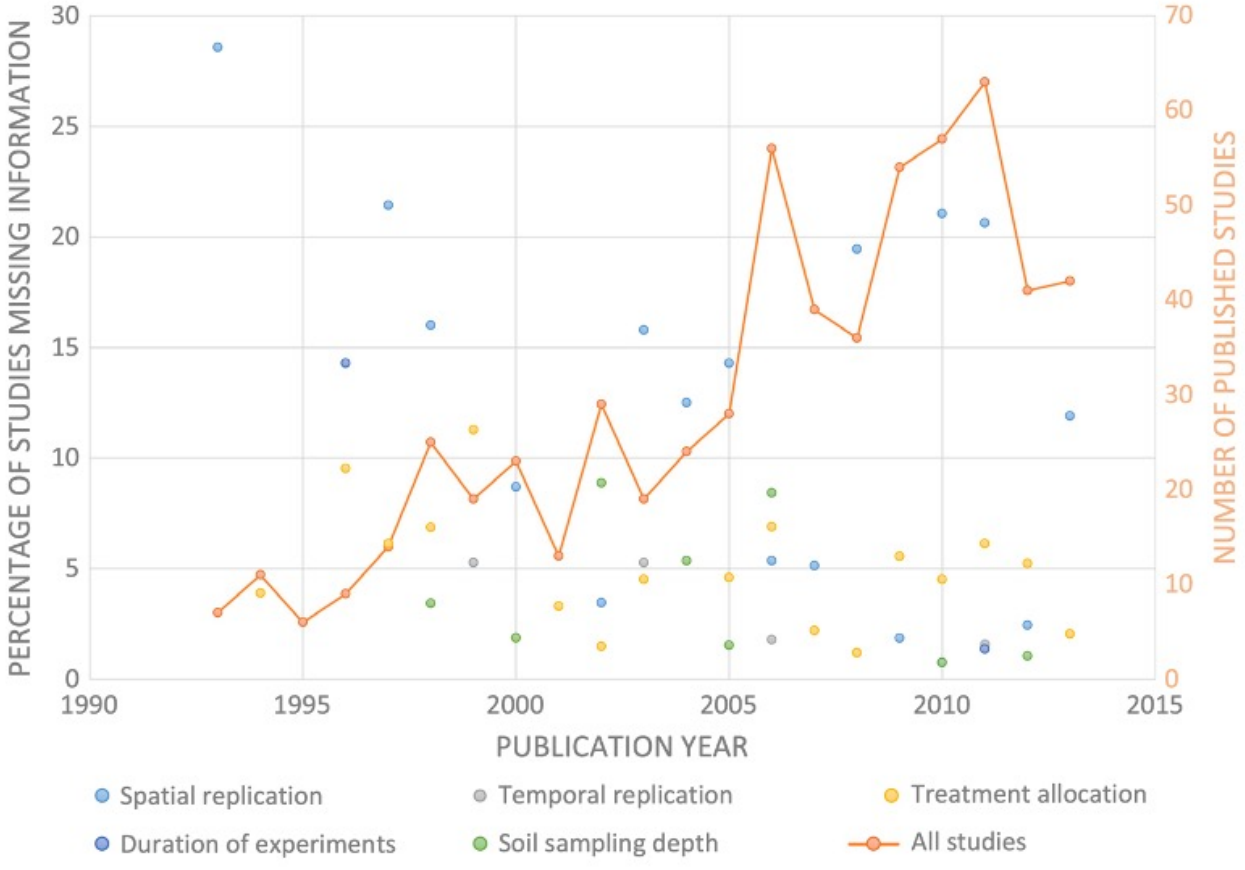
Fishing expedition refers to the misuse of data analysis by performing many statistical tests on the data and only reports those with significant results.



A simulation experiment where variables were randomly drawn from the standard normal distribution. Significant relationship can occur by chance.

Poor reporting

Many published papers miss critical informations in the methods, making it impossible to reproduce the results.



(Haddaway and Verhoeven 2015, Ecology and Evolution)

Recommended practices

Make data and code available

- Provide data and code as supplemental materials;
- Use data repository: Dryad, figshare, Zenodo, Open Science Frame;

Share research

- Preprint server: ArXiv, bioRxiv, EcoEvoRxiv;

Document data and code well

- Always provide metadata;
- Follow good coding style, e.g., R coding style;

Make data and code accessible

- Use non-proprietary file format, e.g., .zip vs .rar file;
- Ensure consistent appearance, e.g., use PDF, embed font.

Recommended practices

Table 1 | A manifesto for reproducible science.

Theme	Proposal	Examples of initiatives/potential solutions (extent of current adoption)	Stakeholder(s)
Methods	Protecting against cognitive biases	All of the initiatives listed below (* to ****) Blinding (**)	J, F
	Improving methodological training	Rigorous training in statistics and research methods for future researchers (*) Rigorous continuing education in statistics and methods for researchers (*)	I, F
	Independent methodological support	Involvement of methodologists in research (**) Independent oversight (*)	F
	Collaboration and team science	Multi-site studies/distributed data collection (*) Team-science consortia (*)	I, F
Reporting and dissemination	Promoting study pre-registration	Registered Reports (*) Open Science Framework (*)	J, F
	Improving the quality of reporting	Use of reporting checklists (**) Protocol checklists (*)	J
	Protecting against conflicts of interest	Disclosure of conflicts of interest (***) Exclusion/containment of financial and non-financial conflicts of interest (*)	J
Reproducibility	Encouraging transparency and open science	Open data, materials, software and so on (* to **) Pre-registration (**** for clinical trials, * for other studies)	J, F, R
Evaluation	Diversifying peer review	Preprints (* in biomedical/behavioural sciences, **** in physical sciences) Pre- and post-publication peer review, for example, Publons, PubMed Commons (*)	J
Incentives	Rewarding open and reproducible practices	Badges (*) Registered Reports (*) Transparency and Openness Promotion guidelines (*) Funding replication studies (*) Open science practices in hiring and promotion (*)	J, I, F

Estimated extent of current adoption: *, <5%; **, 5–30%; ***, 30–60%; ****, >60%. Abbreviations for key stakeholders: J, journals/publishers; F, funders; I, institutions; R, regulators.

(Munafò et al 2017, Nature Human Behavior)