



Soft skills and good practices for doctoral supervision

Andrea Saltelli





**Co-funded by
the European Union**

This activity is funded by the project entitled Interdisciplinary International Training on ICT for Developing Societal Impact, Grant Agreement No. 101217250, funded by the European Commission.

Funded by the European Union. Views and opinions expressed are, however, those of the author(s) only and do not necessarily reflect those of the European Union. Neither the European Union nor the granting authority can be held responsible for them.



Soft skills and good practices for doctoral supervision

The transition mindset

Module 1 of 6



Source: ChatGPT, Claude's prompt

You now:
being supervised

You later:
supervising



Source: ChatGPT, Claude's prompt

Every topic in this series is
seen from both chairs

This image throughout the slides:

➔ a reminder of the ‘two chairs’, double dimensions (you today, you tomorrow) of the lecture



Janus Bifrons in the Vatican Museums,
source Wikimedia Commons

Reality checks to equip, not to discourage Supervision happens inside a research system under strain



Contents lists available at [ScienceDirect](#)

Futures

journal homepage: www.elsevier.com/locate/futures

What is science's crisis really about?

Andrea Saltelli^{a,b,*}, Silvio Funtowicz^a

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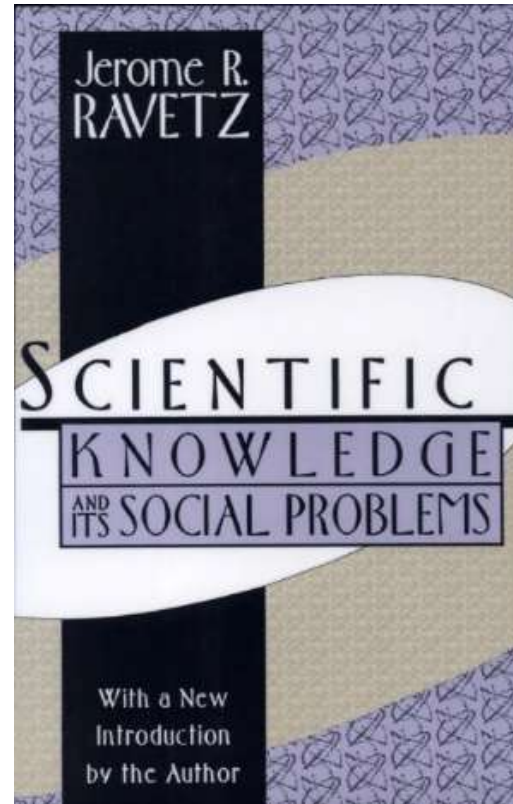
^b Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona, Spain



Philips Galle after Pieter Bruegel the Elder, *The Alchemist*, engraving, c. 1558, published by Hieronymus Cock. The Metropolitan Museum of Art, New York, 26.72.29. Public domain

p.22: “[...] The problem of quality control in science is at the centre of the social problems of the industrialized science of the present period”

1971



Jerome R. Ravetz
Source: Wikimedia Commons

Tacit knowledge and transmission of craft

Knowing when a result is too good to be true

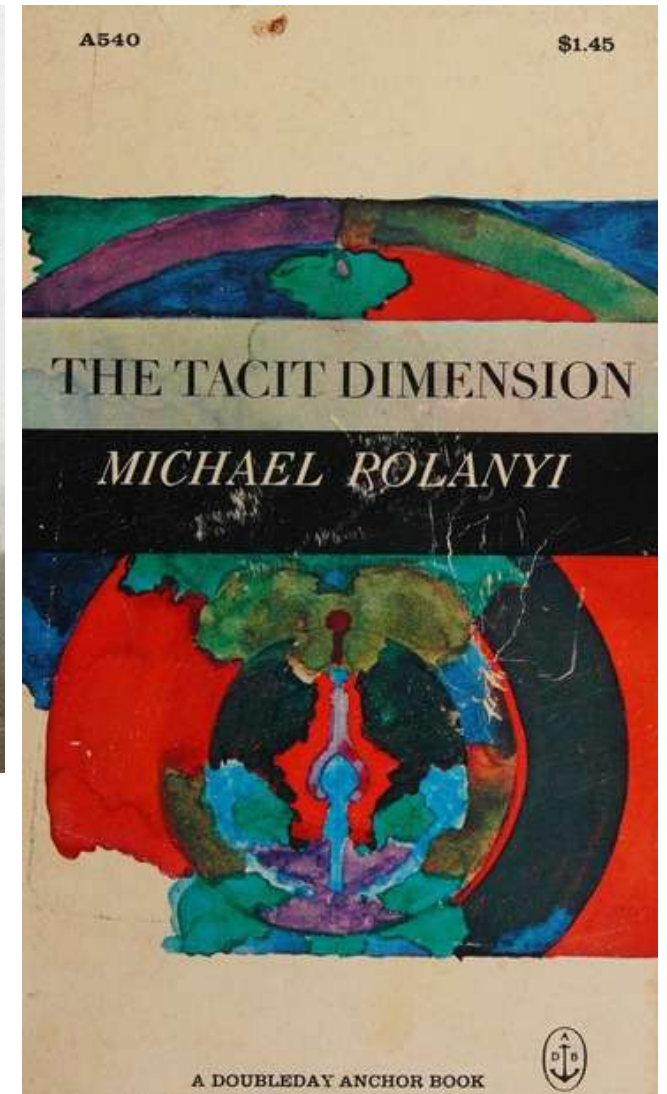
Poor inference: p-hacking, HARKing, ...

Retraction
Watch



Michael Polanyi
(1891–1976)

Source: Wikimedia Commons



Supervising as you were supervised

You may teach as you were taught



What if your own supervisor didn't supervise?

What is 'normal'?

Frontstage and backstage of a teacher

➔ Conservative pressure in education and, later, the workplace



[Volume 58, Issue 3](#)
[July 2004](#)

JOURNAL ARTICLE

The apprenticeship of observation FREE

[Michaela Borg](#)

ELT Journal, Volume 58, Issue 3, July 2004, Pages 274–276, <https://doi.org/10.1093/elt/58.3.274>

Published: 01 July 2004

PDF Split View Cite Permissions Share

Holding someone's academic future Responsibility: teaching to the image of science or to its reality?

nature materials

[nature](#) > [nature materials](#) > [editorials](#) > article

Editorial | Published: January 2005

The cost of salami slicing

[Nature Materials](#) **4**, 1 (2005) | [Cite this article](#)



Source: André Karwath aka Aka, Wikimedia Commons

Structural conflicts of interest about papers, names, and grants



Watson and Crick
won the Nobel
prize, she didn't

Hahn won, she didn't

Lise Meitner (1878-1968) and Otto Hahn (1879-1968), Dahlem, Germany, 1913. Source: Smithsonian Institution Archives



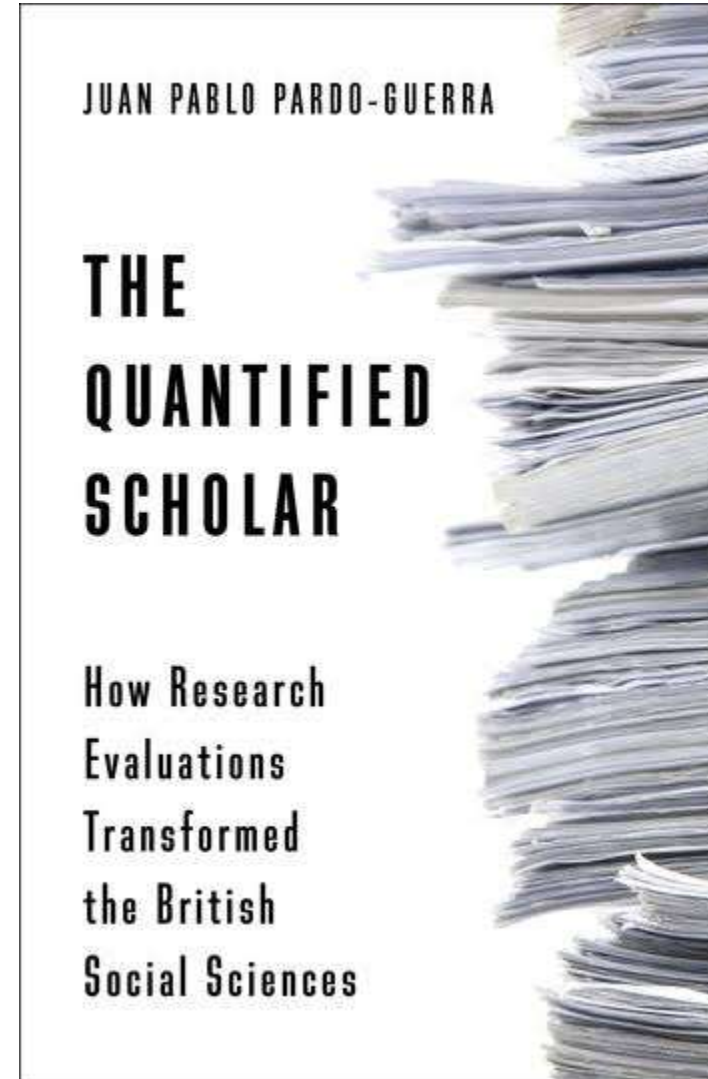
Rosalind Franklin at work in a London laboratory, photograph by Henry Grant, 1954. Source: <https://www.worldhistory.org/>

Evaluation by output versus evaluation by process

The side effects of a culture of evaluation

Teaching to the test

Epistemic sorting →



Homework:

- Three things from your own supervisor(s) you would keep
- One you would change
- Why?
- What would your supervisees say?



Next module → Knowing the
terrain: supervising
in a non-ideal system

Soft skills and good practices for doctoral supervision

Knowing the terrain: supervising in a non-ideal system

Module 2 of 6

Science's crisis is real ... and old



Futures

Volume 91, August 2017, Pages 5-11



What is science's crisis really about?

Andrea Saltelli ^{a, b} ✉, Silvio Funtowicz ^a

nature EDITORIAL | 01 July 2026

~10y

The complex truth about trust in science

Confidence in science has not collapsed, but scientists have urgent problems to address.



2005 First piece of Ioannidis

2013 The Economist cover about the crisis

...

2026 Science, trust and partisan politics
(e.g. vaccines)

~20y

The incentive landscape and the Darwinian fitness of malpractices

Downloaded from <http://rsos.royalsocietypublishing.org/> on September 23, 2016

ROYAL SOCIETY
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rsos.royalsocietypublishing.org

Research



Cite this article: Smaldino PE, McElreath R.

2016 The natural selection of bad science.

R. Soc. open sci. **3**: 160384.

<http://dx.doi.org/10.1098/rsos.160384>

Received: 1 June 2016

Accepted: 17 August 2016

The natural selection of bad science

Paul E. Smaldino¹ and Richard McElreath²

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 PES, 0000-0002-7133-5620; RME, 0000-0002-0387-5377

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for improvement, suggesting that they result from something more than just misunderstanding. The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for

As in the real world, successful labs produce more 'progeny,' such that their methods are more often copied and their students are more likely to start labs of their own. Selection for high output leads to poorer methods and increasingly high false discovery rates.

Improving the quality of research requires change at the institutional level.

Good intentions, perverse outcomes

Any measures necessarily involve a loss of information and distort behaviour

= Goodhart's law: ~ When a measure becomes a target, it ceases to be a good measure



Charles Goodhart

Source: Wikimedia Commons

Also known as Campbell's law (1976);

https://en.wikipedia.org/wiki/Goodhart%27s_law

TABLE 1. GROWING PERVERSE INCENTIVES IN ACADEMIA

<i>Incentive</i>	<i>Intended effect</i>	<i>Actual effect</i>
Reward more publications	Improve productivity	More substandard papers

Good intentions
going bad

Environmental Engineering Science

Mary Ann
Liebert



Impact Factor: **1.7** / 5-Year Impact Factor: **1.6**

Journal Homepa

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Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hypercompetition

[Marc A. Edwards](#) and [Siddhartha Roy](#) [View all authors and affiliations](#)

[Volume 34, Issue 1](#) | <https://doi.org/10.1089/ees.2016.0223> | [View correction](#)

Incentive

“Researchers rewarded for increased number of publications.”

Intended effect

“Improve research productivity,”
provide a means of evaluating
performance.

Actual effect

“Avalanche of” substandard, “incremental papers”; poor methods and increase in false discovery rates leading to a “natural selection of bad science” (Smaldino and McElreath, 2016); reduced quality of peer review



RESEARCH ARTICLE | 01 SEP 2016

The natural selection of bad science

Special Collection: Celebrating 10 years of Royal Society Open Science , Most popular Royal Society journal articles , Open science

Paul E. Smaldino   ; Richard McElreath 

+ Author & article information

R. Soc. Open Sci. (2016) 3 (9): 160384 .

<https://doi.org/10.1098/rsos.160384> **Article history** 

Incentive

Increase PhD student productivity

Intended effect

Higher school ranking and more
prestige of program.

Actual effect

Lower standards and create oversupply of
PhDs. Postdocs often required for
entry-level academic positions, and PhD
hired for work MS students used to do.

Good intentions
going bad

Environmental Engineering Science

MaryAnn Liebert ASSOCIATION OF ENVIRONMENTAL ENGINEERING AND SCIENCE PROFESSIONS

Impact Factor: **1.7** / 5-Year Impact Factor: **1.6** [Journal Home](#)

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[Marc A. Edwards](#) and [Siddhartha Roy](#) [View all authors and affiliations](#)

[Volume 34, Issue 1](#) | <https://doi.org/10.1089/ees.2016.0223> | [View correction](#)

Incentive

“Departments rewarded for increasing U.S. News ranking.”

Intended effect

“Stronger departments.”

Actual effect

Extensive efforts to reverse engineer, game, and cheat rankings.

Good intentions
going bad

Environmental Engineering Science

Mary Ann Liebert ASSOCIATION of ENVIRONMENTAL ENGINEERING and SCIENCE PROFESSORS Impact Factor: **1.7** / 5-Year Impact Factor: **1.6** [Journal Homepage](#)

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Academic Research in the 21st Century: Maintaining Scientific Integrity in a Climate of Perverse Incentives and Hypercompetition

[Marc A. Edwards](#)  and [Siddhartha Roy](#) [View all authors and affiliations](#)

[Volume 34, Issue 1](#) | <https://doi.org/10.1089/ees.2016.0223> | [View correction](#)

The publishing system: a state-funded triple pay



George Monbiot. Source: Wikimedia Commons

The state pays the researchers, the reviewers
and then buys most of the published product
(Deutsche Bank report 2005)

Tue 27 Jun 2017 07.00 CEST

The long read

 Share

Is the staggeringly profitable business of scientific publishing bad for science?

Elsevier profits 2010: a 36% margin

It is an industry like no other, with profit margins to rival Google – and it was created by one of Britain's most notorious tycoons: Robert Maxwell

By Stephen Buranyi

Predatory journals, hijacked journals, authorship for sale, paper mills

nature

Explore Content ▾ Journal Information ▾ Publish With Us ▾

NEWS • 08 FEBRUARY 2021

Hundreds of 'predatory' journals indexed on leading scholarly database

Scopus has stopped adding content from most of the flagged titles, but the analysis highlights how poor-quality science is infiltrating literature.

Dalmeet Singh Chawla



Credit: David Parkins, Nature,
<https://www.nature.com/articles/d41586-019-03759-y>,
with permission from the Author

Well positioned journals don't solicit

Dear xxx

... your eminent paper ... would very much fit our International, Global and Advanced journal

... review within 72 hours; a submission deadline 'this week only';

[An APC (Article Processing Charge) fee is mentioned only in the last line, or not at all]

...

Research Article | 2 February 2026



We Have No Voice, and We Must Scream: The Social Science Academic Journal Publication Model Is Systemically Broken, Predominantly Damaging Early-Career Researchers

Author: Nicholas Norman Adams  [AUTHOR INFORMATION AND AFFILIATIONS](#)

Publication: Journal of Scholarly Publishing • Volume 57, Number 1 • <https://doi.org/10.3138/jsp-2025-0061>



Edvard Munch, The Scream, 1893, tempera and crayon on cardboard. National Museum, Oslo. Public domain

Reviews stalled for over a year • unanswered emails • rejected papers "transferred" to fee-charging sister journals



Check submitted-to-published dates before choosing a journal · keep a log of follow-ups · after prolonged silence, withdraw · post a preprint

Research Article | 2 February 2026



We Have No Voice, and We Must Scream: The Social Science Academic Journal Publication Model Is Systemically Broken, Predominantly Damaging Early-Career Researchers

Author: Nicholas Norman Adams  [AUTHOR INFORMATION AND AFFILIATIONS](#)

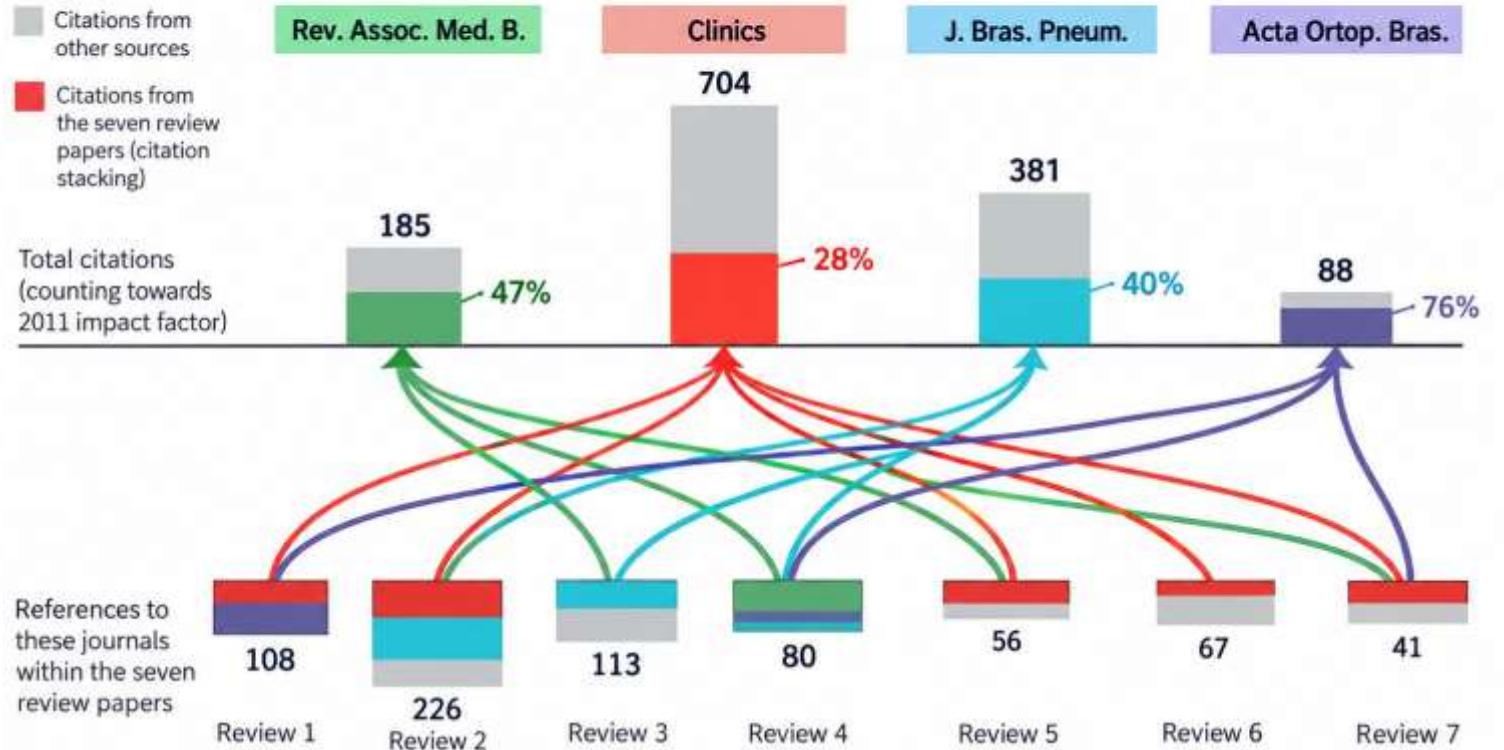
Publication: Journal of Scholarly Publishing • Volume 57, Number 1 • <https://doi.org/10.3138/jsp-2025-0061>

Citation games

From self-citation to citation cartels to citation stacking

How citation stacking works

In 2011, four Brazilian journals published seven review papers with hundreds of references to earlier papers in the same journals (2009–2010), which increased their 2011 impact factors.



Source: ChatGPT. Simplified from Richard Van Noorden, "Brazilian citation scheme ousted: Thomson Reuters suspends journals from its rankings for 'citation stacking'," *Nature*, 27 August 2013.

The career arithmetic



Research Note

Too Many PhD Graduates or Too Few Academic Job Openings: The Basic Reproductive Number R_0 in Academia

[Richard C. Larson](#), [Navid Ghaffarzadegan](#) ✉, [Yi Xue](#)

First published: 09 September 2013 | <https://doi.org/10.1002/sres.2210> | [VIEW METRICS](#)

Academic life is
a mad hazard



Max Weber
(1864–1920)

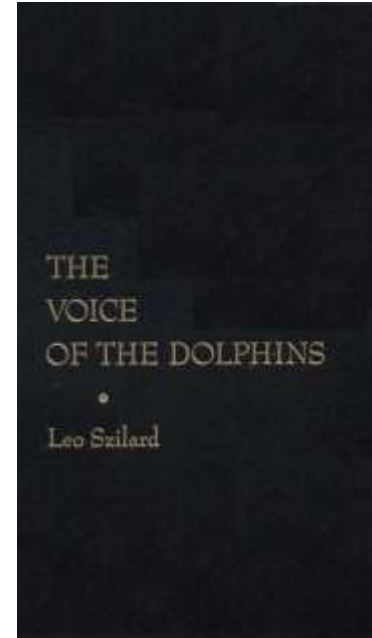


2019

Projectification: a perfect strategy to slow research down

Researchers spend inordinate amounts of time writing grant proposals

Satirised by Nobelist Leo Szilard as a recipe for slowing down the advancement of science by keeping scientists away from their labs.



The Mark Gable Foundation [written 1948]. In *The voice of the dolphins and other stories* (1961).



Leo Szilard
(1898–1964)

Projectification

CAREERS | EXPERIMENTAL ERROR

Another tenure-track scientist bites the dust

Science

19 JUL 2017 • BY [ADAM RUBEN](#)



Photo: Nikko Macaspac / Unsplash

A career can end for failing to secure a grant within a given time window

Grant blues: researchers spend too much of their time writing grant applications

Immense Opportunity Costs: Money lost to "ghost hours" greater than budget of the call



The screenshot shows the F1000Research website interface. At the top is an orange navigation bar with the F1000Research logo, a search bar, and links for BROWSE, GATEWAYS & COLLECTIONS, HOW TO PUBLISH, and ABOUT. Below the navigation bar is a breadcrumb trail: Home » Browse » Grant writing and grant peer review as questionable research practices. The main content area features a 'Check for updates' button and the text 'OPINION ARTICLE'. The article title is 'Grant writing and grant peer review as questionable research practices', with a 'REVISED' badge. Below the title is the text '[version 2; peer review: 2 approved]'. At the bottom, the authors are listed: Stijn Conix, Andreas De Block, and Krist Vaesen, each with an ORCID iD icon.

F1000Research

Search

BROWSE GATEWAYS & COLLECTIONS HOW TO PUBLISH ▾ ABOUT ▾

Home » Browse » Grant writing and grant peer review as questionable research practices

Check for updates

OPINION ARTICLE

REVISED Grant writing and grant peer review as questionable research practices
[version 2; peer review: 2 approved]

✉ Stijn Conix ¹, Andreas De Block ¹, Krist Vaesen²

The Matthew Effect: Grants to the already endowed
Strategic/opportunistic Gaming: By both evaluators and writers
Low Inter-Rater Reliability: Poor alignment of review panels



Science funders gamble on grant lotteries

A growing number of research agencies are assigning money randomly.



Source: ChatGPT

Would grant lotteries be better? What can one learn from the Health Research Council of New Zealand?



Research Policy

Volume 49, Issue 1, February 2020, 103831

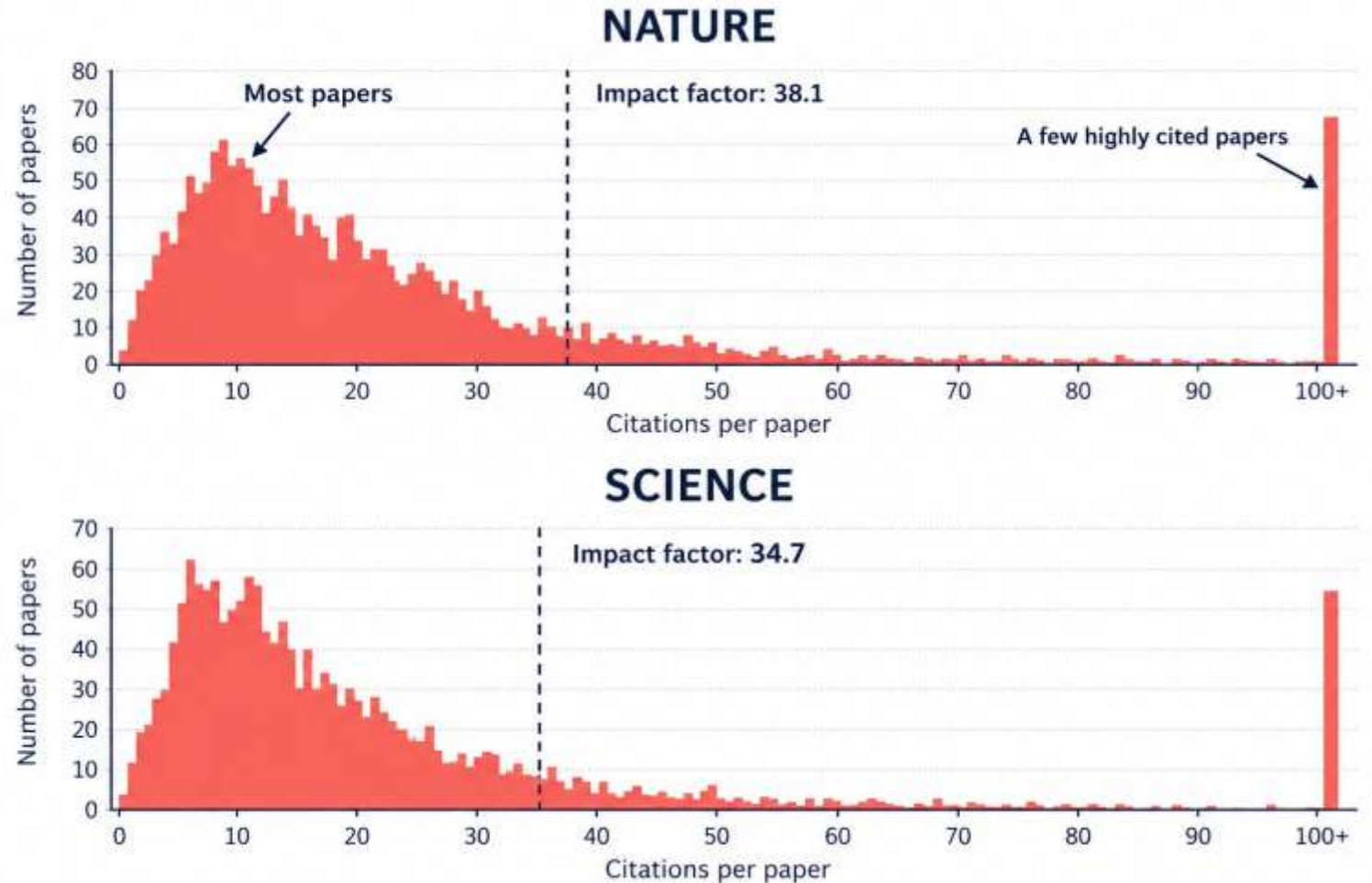


How to avoid borrowed plumes in academia

Margit Osterloh  , Bruno S. Frey 

The impact factor is a misleading measure
of the importance of an individual article.

The average paper is cited much less than the journal's impact factor



Source: ChatGPT. Simplified from E. Callaway (2016), "Publishing elite turns against impact factor," *Nature*, 535, 210–211.

How about Open Science?

Capitalism and Society

Volume 3, Issue 2

2008

Article 5

The Historical Origins of 'Open Science': An Essay on Patronage, Reputation and Common Agency Contracting in the Scientific Revolution

Paul A. David, *Stanford University & The University of
Oxford*

The Historical Origins of 'Open Science': An
Essay on Patronage, Reputation and Common
Agency Contracting in the Scientific
Revolution

Paul A. David, *Stanford University & The University of
Oxford*

Open science was always a fragile
social construction ...

... resulting from the movement away
from **secret** knowledge and princely
patronage toward state patronage,
academies, and other modern
institutions of science, taking place in
the period between the Renaissance
and the Industrial Revolution

What was before open science?

"Regarding the everyday duties, I shun only that type of prostitution consisting of having to expose my labour to the arbitrary prices set by every customer.

Instead, I will never look down on service a prince or a great lord or those who may depend on him, but, to the contrary, I will always desire such a position." (Galileo Galilei, 1564 – 1642)



Portrait by Justus Sustermans, 1635, Source: Wikimedia Commons

Capitalism and Society

Volume 3, Issue 2

2008

Article 5

The Historical Origins of 'Open Science': An
Essay on Patronage, Reputation and Common
Agency Contracting in the Scientific
Revolution

Paul A. David, Stanford University & The University of
Oxford

Open science lives a tension between:

Defending the existing ethos of the republic of science, Merton's CUDOS, "public knowledge"

Versus

Proprietary science, secrecy, visions of a knowledge economy

Capitalism and Society

Volume 3, Issue 2

2008

Article 5

The Historical Origins of 'Open Science': An
Essay on Patronage, Reputation and Common
Agency Contracting in the Scientific
Revolution

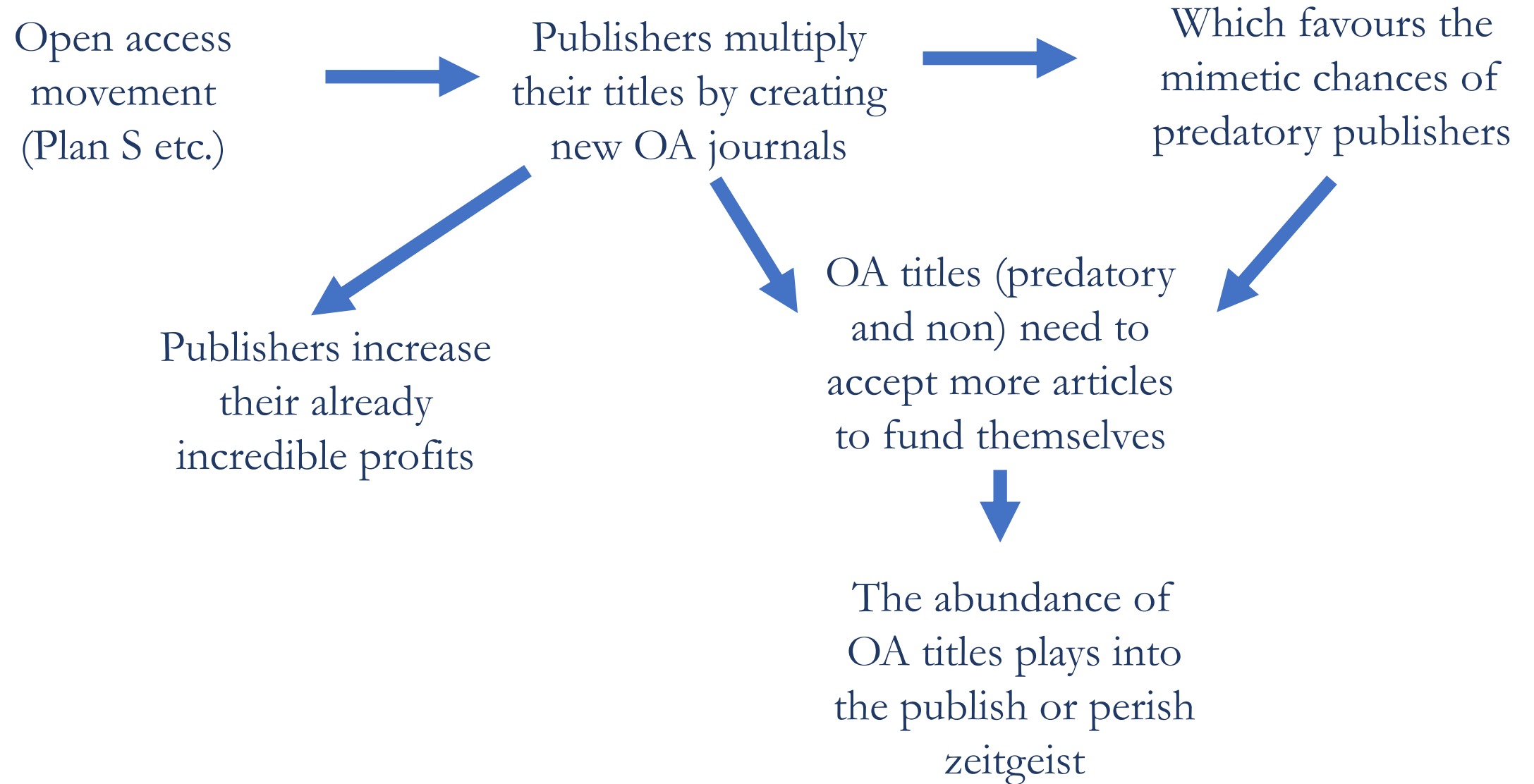
Paul A. David, *Stanford University & The University of
Oxford*

We already struggle with
“author–paid Article Publishing
Charges (APCs) that range from
\$500 to \$5,000 [Elsevier OA]”;

Corporate publishers have easily
assimilated open access into their
profit model



Source: ChatGPT

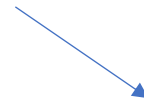


Other attempts at reform: CoARA (2022) after DORA (2012) [mentions of DORA-washing] and Hong Kong (2020)



- recognise the diversity of contributions, not just publications;
- base assessment primarily on qualitative judgment, + peer review - indicators;
- abandon inappropriate uses of journal- and publication-based metrics, such as the impact factor and the h-index;
- avoid using university rankings in assessing researchers

Criticised in



A way out? Preprint servers, but “for preprints to become more effective, institutions, funding bodies, and journals must recognize preprints as legitimate research outputs, reducing the pressures on early-career researchers to publish only in traditional journals”

We Have No Voice, and We Must Scream: The Social Science Academic Journal Publication Model Is Systemically Broken, Predominantly Damaging Early-Career Researchers

Author: Nicholas Norman Adams  [AUTHOR INFORMATION AND AFFILIATIONS](#)

Publication: Journal of Scholarly Publishing • Volume 57, Number 1 • <https://doi.org/10.3138/jsp-2025-0061>

Preprint servers

arXiv, SocArXiv, Zenodo and HAL are free

SSRN was bought by Elsevier in 2016

Generalist OSF Preprints suspended from 25 August 2025

→ Check who owns the server before you post



Compromise vs. complicity



Extricating oneself from metrics is “inconvenient for a mature established researcher and suicidal for one who is young and on a precarious career”



Futures

Volume 91, August 2017, Pages 5-11



What is science's crisis really about?

Andrea Saltelli ^{a, b}  , Silvio Funtowicz ^a

“... a quasi-market that constantly monitors scientists' ‘net worth’ through a range of metrics, scores and indicators: h-index, impact factors, peer contacts, network affiliations, and the like”



Article

The future(s) of open science

Philip Mirowski 

John J. Reilly Center, University of Notre Dame, Notre Dame, IN, USA

S|S|S

Social Studies of Science
2018, Vol. 48(2) 171–203

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DOI: 10.1177/0306312718772086

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The map and what to do with it



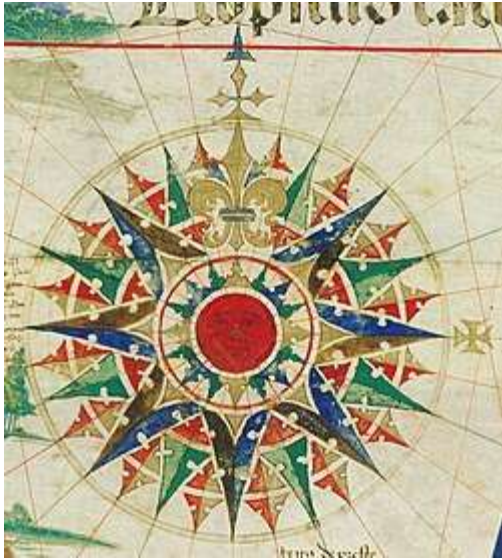
Cantino Planisphere, by anonymous Portuguese (1502) - Biblioteca Estense Universitaria, Modena, Italy, Public Domain,

Next module → Supervisory
relationships

Soft skills and good practices for doctoral supervision

Supervisory relationships break down due to
unspoken assumptions, not a lack of scientific
ability

Module 3 of 6



Cantino Planisphere, by anonymous Portuguese (1502) -
Biblioteca Estense Universitaria, Modena, Italy, Public
Domain. Detail, Wind Rose

Navigating a PhD project (as mentor or mentee)

- Working hours
- Communication channels
- Feedback turnaround
- Meeting rhythm

Tabled/Negotiated on day one



- Authorship rules
- Project preparation rules
- Ownership of data and code

What counts as a contribution



Journal of Scholarly
Publishing

Research Article | 2 February 2026



We Have No Voice, and We Must Scream: The Social Science Academic Journal Publication Model Is Systemically Broken, Predominantly Damaging Early-Career Researchers

Author: Nicholas Norman Adams | [AUTHOR INFORMATION AND AFFILIATIONS](#)

Publication: Journal of Scholarly Publishing • Volume 57, Number 1 • <https://doi.org/10.3138/jsp-2025-0061>

Nonstandard Errors

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MICHAEL KIRCHLER SEBASTIAN NEUSIL MICHAEL RAZEN UTZ WEITZEL DAVID ABAD DIAZ
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LAWRENCE R. GLOSTEN THOMAS GOMEZ ARSENY GORBENKO IDACHIM GRAMMIG
VINCENT GRÉGOIRE ULRIK GUCBILMEZ BORN HAGSTROMER JULIAN HAMBICKERS ERIK HAPNES
JEFFREY H. HARRIS LAWRENCE HARRIS SIMON HARTMANN JEAN-BAPTISTE HASSE NIKOLAUS HAUTSCH
XUE ZHONG (TONY) HE DAVIDSON HEATH SIMON HEDIGER TERRENCE HENDERSHOOT
ANN MARIE HIBBERT ERIK HJALMARSSON SETH A. HOELSCHER PETER HOFFMANN CRAIG W. HOLDEN
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THOMAS LINDNER OLIVER LINTON JACHENG LIU ANDI LIU GUILLERMO LLORENTE MATTHIS LOF
ARIEL LOHR FRANCIS LONGSTAFF ALEANDRO LOPEZ LIRA SHAWN MANKAD NICOLA MAND
ALEXIS MARCHAL CHARLES MARTINEAU FRANCESCO MAZZOLA DEBRAH MELOSO MICHAEL G. MI
ROXANA MIHET VINAY MOHAN SOPHIE MOINAS DAVID MOORE LIANGYU MU DMITRY MURAVYEV
DERMOT MURPHY GABRIEL NEURVEDA CHRISTIAN NEUMER ILF NEUSSON
MAHENDRABAHU NIMALENDRA SETH NOLTE LARS L. NORDEN PETER O'NEILL KHALED OBAID
BERNY A. ØDEGAARD PER ØSTBERG EMILIANO PAGNOTTA MARCUS PANTIER STEFAN PALAM
IMON I. PALIT ANDREAS PARK ROBERTO PASCUAL PAOLO PASQUARIELLO LUCIO PASTOR
VINAY PATEL ANDREW I. PATTON NEIL D. PEARSON LORIANA PELIZZON MICHELE PELLU
MATTHIAS PELSTER CHRISTOPHE PERIGNON CAMERON PFIFFER RICHARD PHILIP TOMÁS PUJAL
PUNEET PRAKASH OLIVER ALEXANDER PRESS TINA PRODOMOU MARCEL PROKOPCZUK
TALIS PUTNINS YA QIAN GAURAV RAIZADA DAVID RAKOWSKI ANGELO RANALOO LUCA REGIS
STEFAN REITZ THOMAS RENAULT BEX W. RENVE ROBERTO RENO STEVEN I. RIDGHOUGH KALLE RINNE
PAUL RINTAMÄKI RYAN RICHARD THOMAS RITTMANNBERGER IWAKI RODRIGUEZ LONGARELA
OTIMIR ROESCH LAURIA ROICHNE BRIAN ROSEMAN IDANID ROSS SARABH ROY
NICOLAS RUDDOLF STEPHEN R. RUPN KHALADDIN RZAYEV ALEXANDRA A. RZETNIK
ANTHONY SANFORD HARIKUMAR SANKARAN ASANI SARKAR LUCIO SARNO OLIVER SCHAULT
STEFAN SCHARNOWSKI KLAUS R. SCHENK-HOPPE ANDREA SCHERTLER MICHAEL SCHNEIDER
FLORIAN SCHROEDER NORMAN SCHURHOFF PHILIPP SCHUSTER MARCO A. SCHWARZ
MARK S. SEASHOLES NORMAN I. SEEGER DR SHACHAR ANDRIY SHILKO JESSICA SHUI MARIO SIKIC
GEORGIA SIMON LEE A. SMALES PAUL SODERLUND ELVIRA SOUL KONSTANTIN SOKOLOV
JANTIE SONKSEN LAIMA SPOKEVICHUTE DENITSA STEFANOVA MARTI G. SUBRAMANYAM
BARNABAS SZASZ OLEKSANDR TALAVERA YUEHUA TANG NICK TAYLOR WING WAH THAM
EKIR THEISEN JULIAN THIRME JAN TONIK HAI TRAM LUCA TRAPIN ANDERS B. TROILE
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SEBASTIAN VOGEL STEFAN VOIGT WOLF WAGNER THOMAS WALTHER PATRICK WEISS
MICHEL VAN DER WEL INGRID M. WERNER P. JOAKIM WESTERHOLM CHRISTIAN WESTHEIDE
HANS C. WIKKA EVERT WIPPLINGER MICHAEL WOLFF CHRISTIAN C. P. WOLFF LEONARD WOLK
WING-KEUNG WONG JIAN WRAPPELMAYER ZHEN XING WU SHUO XIA DACHENG XU KE XU
CAIHONG XU PRADEEP K. YADAV JOSE YAGUE CHENG YAN ANITI YANG WONGSUN YOO WENJIA YU
YIHE YU SHIHAI YU BART Z. YUESHEN DARYA YUFEROVA MARCIN ZAMOJSKI ABALFAZI ZARFEE
STEFAN M. ZEISBERGER LU ZHANG S. SARAH ZHANG XIAOYU ZHANG LU ZHAO ZHAO ZHONG
Z. IVY ZHOU CHEN ZHOU XINGU S. ZHU MARIUS ZOICAN REMCO ZWINKELS ... See fewer authors

First published: 17 April 2024 | <https://doi.org/10.1111/jofi.13337> | [VIEW METRICS](#)

The 343 authors of Menkveld et al. (2024). MENKVELD, A. J., (2024). Nonstandard Errors. The Journal of Finance 79 2339–2390. <https://doi.org/10.1111/jofi.13337>.

Authorship in practice: CRediT lists 14 contributor roles, from conceptualisation to funding acquisition

- Agree roles early;
- revisit at submission



NISO. (2022). ANSI/NISO Z39.104-2022, CRediT, Contributor Roles Taxonomy. National Information Standards Organization. <https://credit.niso.org/>

A screenshot of a Nature journal article page. The page features the 'nature' logo at the top left, followed by navigation links: 'Explore content', 'About the journal', and 'Publish with us'. Below these links is a breadcrumb trail: 'nature > comments > article'. The article title is 'Publishing: Credit where credit is due', published on 16 April 2014. The authors listed are Liz Allen, Jo Scott, Amy Brand, Marjorie Hlava, and Micah Altman. The article is from Nature 508, 312-313 (2014). It has 12k accesses, 311 citations, and 334 altmetric scores. A short bio snippet at the bottom states: 'Liz Allen, Amy Brand, Jo Scott, Micah Altman and Marjorie Hlava are trialling digital taxonomies to help researchers to identify their contributions to collaborative projects.'

Talking about evaluation:

What will you be judged on? Number of papers, which journals, a coherent thesis ...

Where does that differ from what you both think matters?



Cultural and cognitive empathy (1)

Neurodiversity: neurological differences as analogous to biodiversity (Judy Singer, 1998 in Odd People In (Singer's honours thesis). See also an article in The Guardian: The mother of neurodiversity: how Judy Singer changed the world, by John Harris, July 5 2023.)



Judy Singer
Source: Wikimedia Commons

Cultural and cognitive empathy (2)

Different learning paces

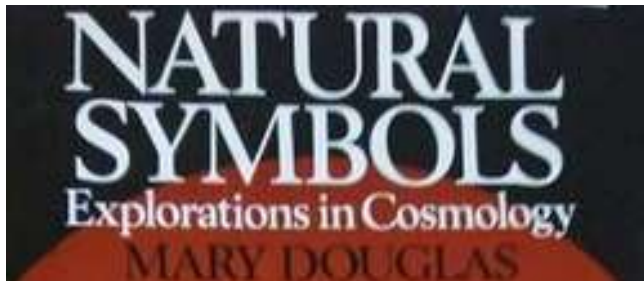
Make expectations explicit

Offer/schedule different channels for meetings and feedback

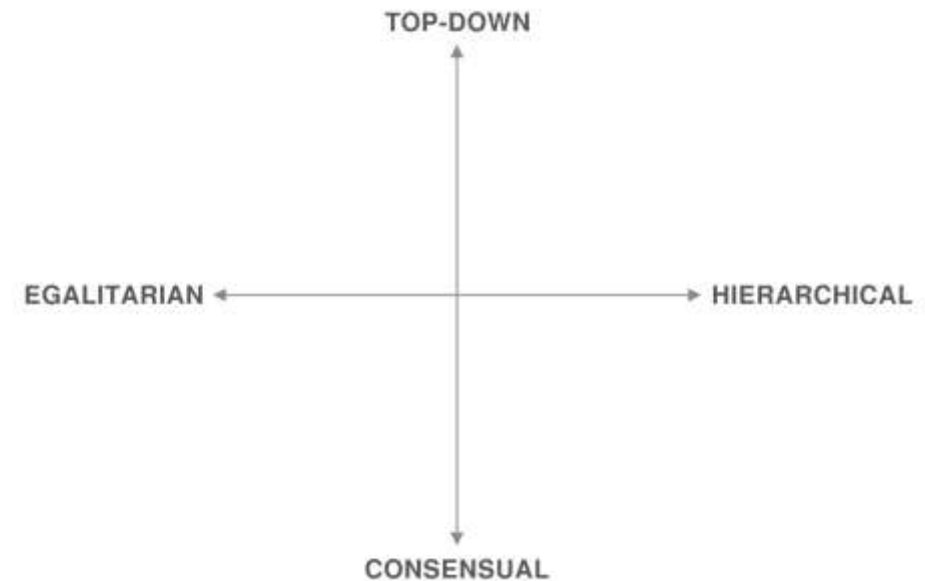
Break large deadlines into smaller steps

Don't diagnose; ask "what works for you?"

International students; different norms about hierarchy and disagreement



Compare with Mary Douglas' cultural risk theory



Axes redrawn, after Erin Meyer, Being the Boss in Brussels, Boston, and Beijing, 2017, Harvard Business Review

Structuring one-to-one meetings

- What moved
- What is stuck
- What decision is needed
- Next step

Problem-solving, not task-checking



Francis Picabia (1879–1953), *Machine Tournez Vite*, private collection, public domain

Leave a trace:
Succinct notes after each
meeting



Detail, Olivetti Lettera 22
Typewriter, Marcello Nizzoli.
Source: Wikimedia Commons

Wrapping up: Agreement, authorship, evaluation, meetings



Explicit beats implicit, but only if trust is established

‘Enculturation’ is a desired outcome, where the culture and the craft of the community are transmitted
(Collins, 1975)

Collins, Harry M. 1975. “The Seven Sexes: A Study in the Sociology of a Phenomenon, or the Replication of Experiments in Physics.” *Sociology* 9 (2): 205–24.

A supervisor's letter, read before the first meeting

- **Roles:** the supervisor encourages, challenges and navigates. The student drives the project and owns the outcome.
- **Rhythm:** meet weekly at the start, less often midway, and often again near the end. In person by default.
- **Preparation:** bring questions, visible progress and a rough timeline to every meeting.
- **Feedback:** on produced material (texts, figures, schemes). The draft is reviewed together at the midpoint, then the full draft is commented on before submission.
- **Criteria:** a clear goal, a well-defined problem, a transparent path to the solution, informative figures and consistent notation.
- **Timeline:** soft, because research goes wrong, but kept on track by the student. Report progress every 1–2 months.
- **To discuss together:** reactions to the letter, turned into shared agreements.

After a letter to Master's students by Gian Marco Melito, Institute of Mechanics at Graz University of Technology (TU Graz), courtesy of the author

Homework: a one-page agreement

Draft five questions you would want asked or answered on day one



Vilhelm Hammershøi, *White Doors* (also called *Open Doors*), 1905, David Collection, Copenhagen.
Source: Wikimedia Commons

Next module → Guiding the
research: project management
and integrity in practice



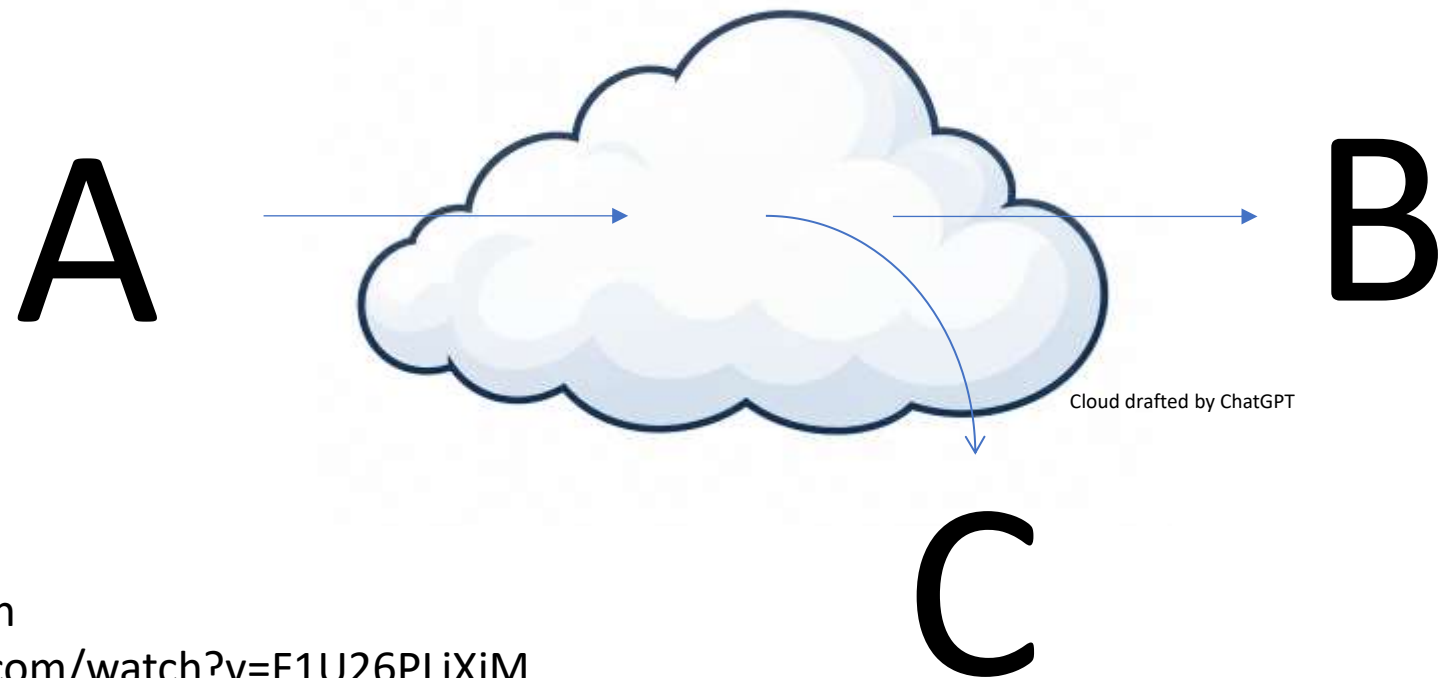
Soft skills and good practices for doctoral supervision

Guiding the research: project management and integrity in practice

Module 4 of 6

Deconstructing the mountain (PhD thesis)

A 3–4–year thesis → 3–month milestones,
reviewed each quarter, with slack built in for
what goes wrong



See TED talk by Uri Alon
<https://www.youtube.com/watch?v=F1U26PLiXjM>

Giving feedback: Argument, structure, methods, evidence; common errors and false discoveries; preventing disasters and eschewing rabbit holes



Source: ChatGPT

Errors are possible at every step

Example: traps in statistical work

nature human behaviour

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[nature](#) > [nature human behaviour](#) > [perspectives](#) > [article](#)

Perspective | [Open access](#) | Published: 10 January 2017

A manifesto for reproducible science

[Marcus R. Munafò](#) , [Brian A. Nosek](#), [Dorothy V. M. Bishop](#), [Katherine S. Button](#), [Christopher D. Chamber](#)
[Nathalie Percie du Sert](#), [Uri Simonsohn](#), [Eric-Jan Wagenmakers](#), [Jennifer J. Ware](#) & [John P. A. Ioannidis](#)

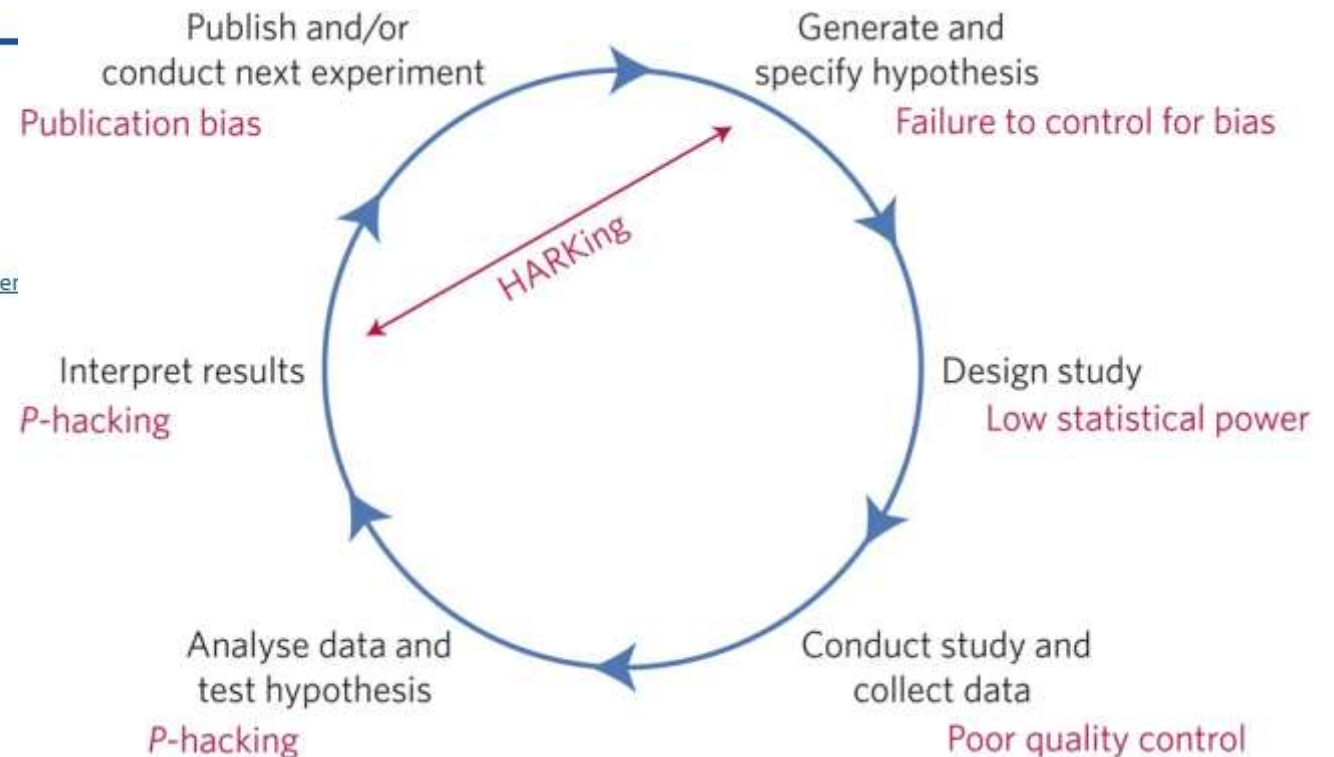
[Nature Human Behaviour](#) **1**, Article number: 0021 (2017) | [Cite this article](#)

Personality and Social Psychology Review

HARKing: Hypothesizing After the Results are Known

[Norbert L. Kerr](#) [View all authors and affiliations](#)

[Volume 2, Issue 3](#) | https://doi.org/10.1207/s15327957pspr0203_4



In every discipline, especially when modelling / simulation are involved, mind the challenges of uncertainty ... especially when **models** are involved

Mind the assumptions

Assess uncertainty and sensitivity

Mind the hubris

Complexity can be the enemy of relevance

Mind the framing

Match purpose and context

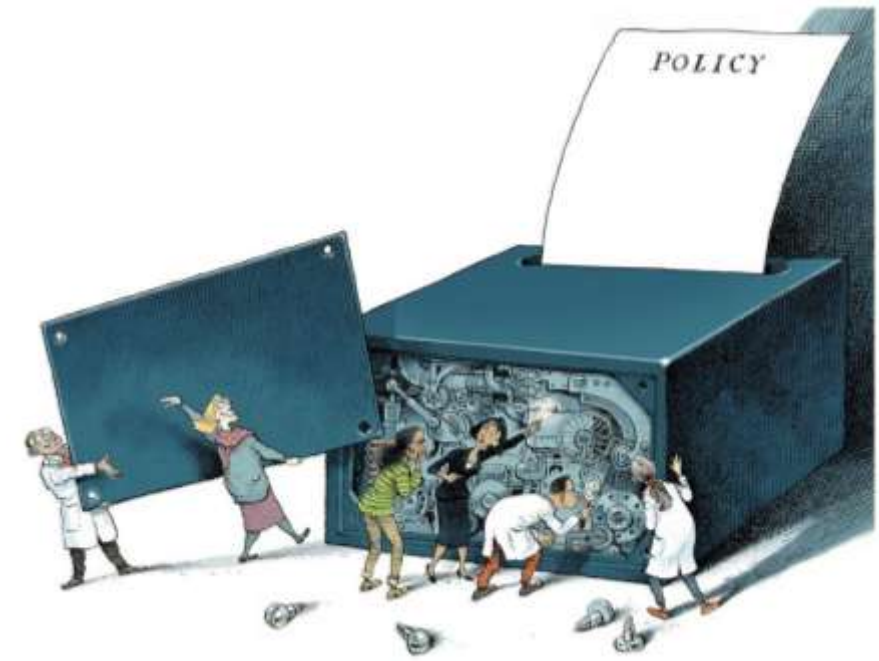
About models

Mind the consequences

Quantification can backfire.

Mind the unknowns

Acknowledge ignorance



Credit: David Parkins, Nature,
<https://www.nature.com/articles/d41586-020-01812-9> -,
with permission from the Author

A manifesto for reproducible science

[Marcus R. Munafò](#) , [Brian A. Nosek](#), [Dorothy V. M. Bishop](#), [Katherine S. Button](#), [Christopher D. Chambers](#),
[Nathalie Percie du Sert](#), [Uri Simonsohn](#), [Eric-Jan Wagenmakers](#), [Jennifer J. Ware](#) & [John P. A. Ioannidis](#)

Nature Human Behaviour **1**, Article number: 0021 (2017) | [Cite this article](#)

“we argue for the adoption of measures to optimize key elements of the scientific process: **methods**, reporting and dissemination, reproducibility, evaluation and incentives”

For discussion: no method is ever neutral

Conflicts of interpretation

- The mainstream interpretation of the root causes of the crisis (perverse incentive, too many papers) is insufficient.
- The crisis is due to a transformed role: from emancipation and betterment of mankind to instrument of profit and growth
- Scientists cannot resolve the problem alone and have high stakes in the preservation of the status quo.
- Institutions are in denial pretending that current predicaments of science do not weaken its privileged role in governance.



Futures
Volume 91, August 2017, Pages 5-11

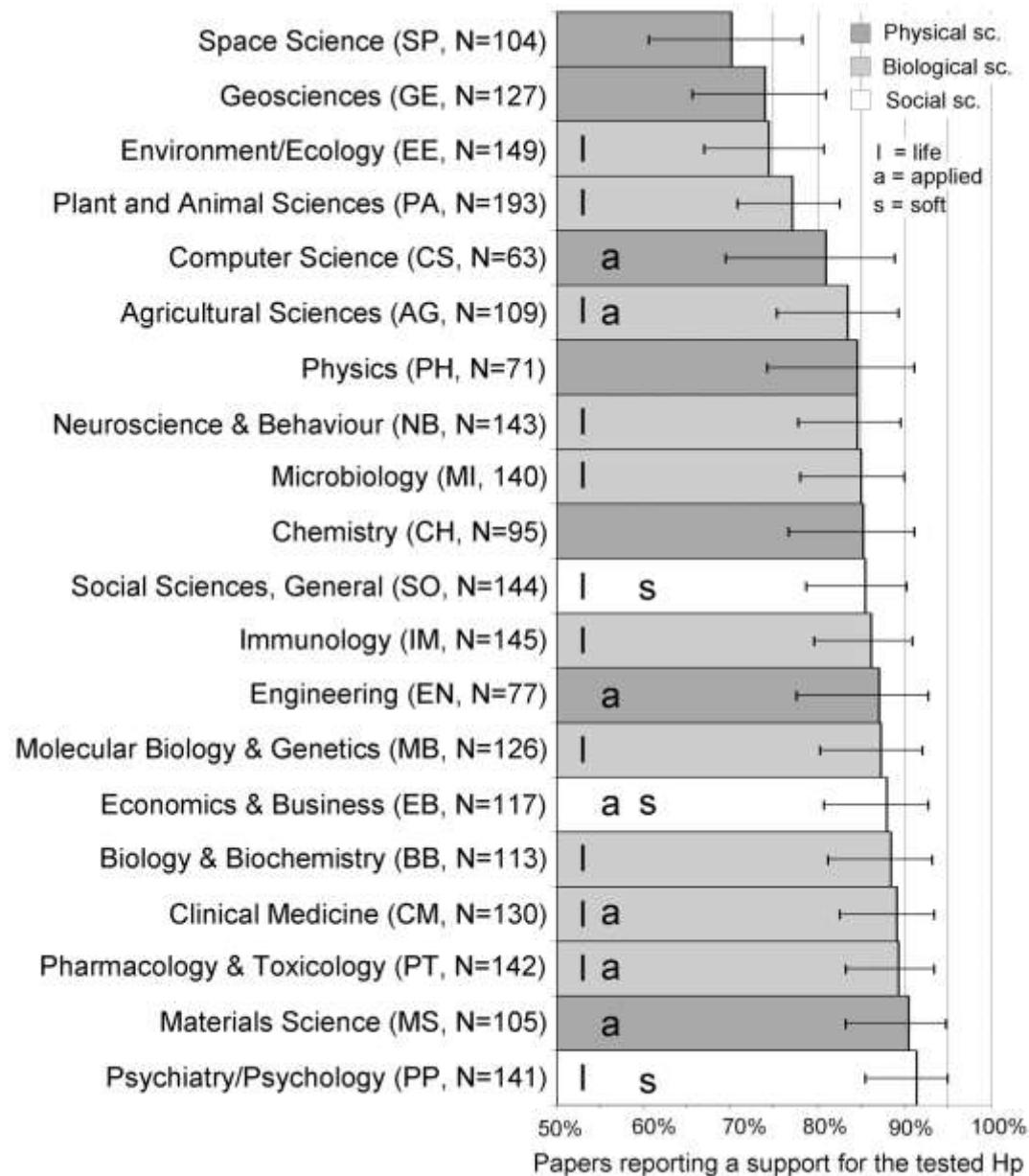


What is science's crisis really about?

Andrea Saltelli ^{a,*}, 孙永强, Silvio Funtowicz ^a

2017

Differences among disciplines



“Positive” Results Increase Down the Hierarchy of the Sciences

Daniele Fanelli

Published: April 7, 2010 • <https://doi.org/10.1371/journal.pone.0010068>



“odds of reporting a positive result ~5 times higher among papers in the disciplines of Psychology and Psychiatry and Economics and Business than Space Science”



Definition of *integrity*

1 : firm adherence to a code of especially moral or artistic values : incorruptibility

As in ‘a person of a remarkable integrity’

The ethos of open science: CUDOS, by R.K. Merton, a system of universal norms



Robert K. Merton

Source: ChatGPT

R. Merton, The sociology of science: Theoretical and empirical investigations, 1973.

Communalism – the common ownership of scientific discoveries; scientists give up intellectual property rights in exchange for recognition and esteem

Universalism – according to which claims to truth are evaluated in terms of universal or impersonal criteria, and not on the basis of race, class, gender, religion, or nationality;

Disinterestedness – according to which scientists are rewarded for acting in ways that outwardly appear to be selfless;

Organized Skepticism – all ideas must be tested and are subject to rigorous, structured community scrutiny

The same R.K. Merton realized later in life that norms have corresponding counter norms

Mitroff, I. I. 1974, Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists: A Case Study of the Ambivalence of Scientists, American Sociological Review, 39, 579–595.

NORMS AND COUNTER-NORMS IN A SELECT GROUP OF THE APOLLO MOON SCIENTISTS: A CASE STUDY OF THE AMBIVALENCE OF SCIENTISTS*

IAN I. MITROFF

American Sociological Review 1974, Vol. 39 (August): 579-595

This paper describes a three and a half year study conducted over the course of the Apollo lunar missions with forty-two of the most prestigious scientists who studied the lunar rocks.

Three-and-a-half-year study conducted over the course of the Apollo lunar missions with forty-two of the most prestigious scientists who studied the lunar rocks

The concept of **sociological ambivalence:**
social institutions reflect potentially conflicting sets of norms

- Solitariness (secrecy, miserism) is often used to keep findings secret in order to be able to claim patent rights...

Instead of Communalism

- Particularism [...] a real issue, particularly when you consider the ratio of researchers in rich countries compared with those in poor countries

Instead of Universalism

- Interestedness arises because scientists have genuine interests at stake in the reception of their research...
Instead of Disinterestedness
- Dogmatism because careers are built upon a particular premise (theory) being true...
Instead of Organized
Skepticism

Journal of Empirical Research on Human Research Ethics

Normative Dissonance in Science: Results from a National Survey of U.S. Scientists

Melissa S. Anderson, Brian C. Martinson, Raymond De Vries

First Published December 1, 2007 | Research Article | [Find in PubMed](#)

<https://doi.org/10.1525/jer.2007.2.4.3>

survey responses from 3,247 mid- and early-career scientists who had research funding from the U.S. National Institutes of Health

Source: Anderson et al., 2007

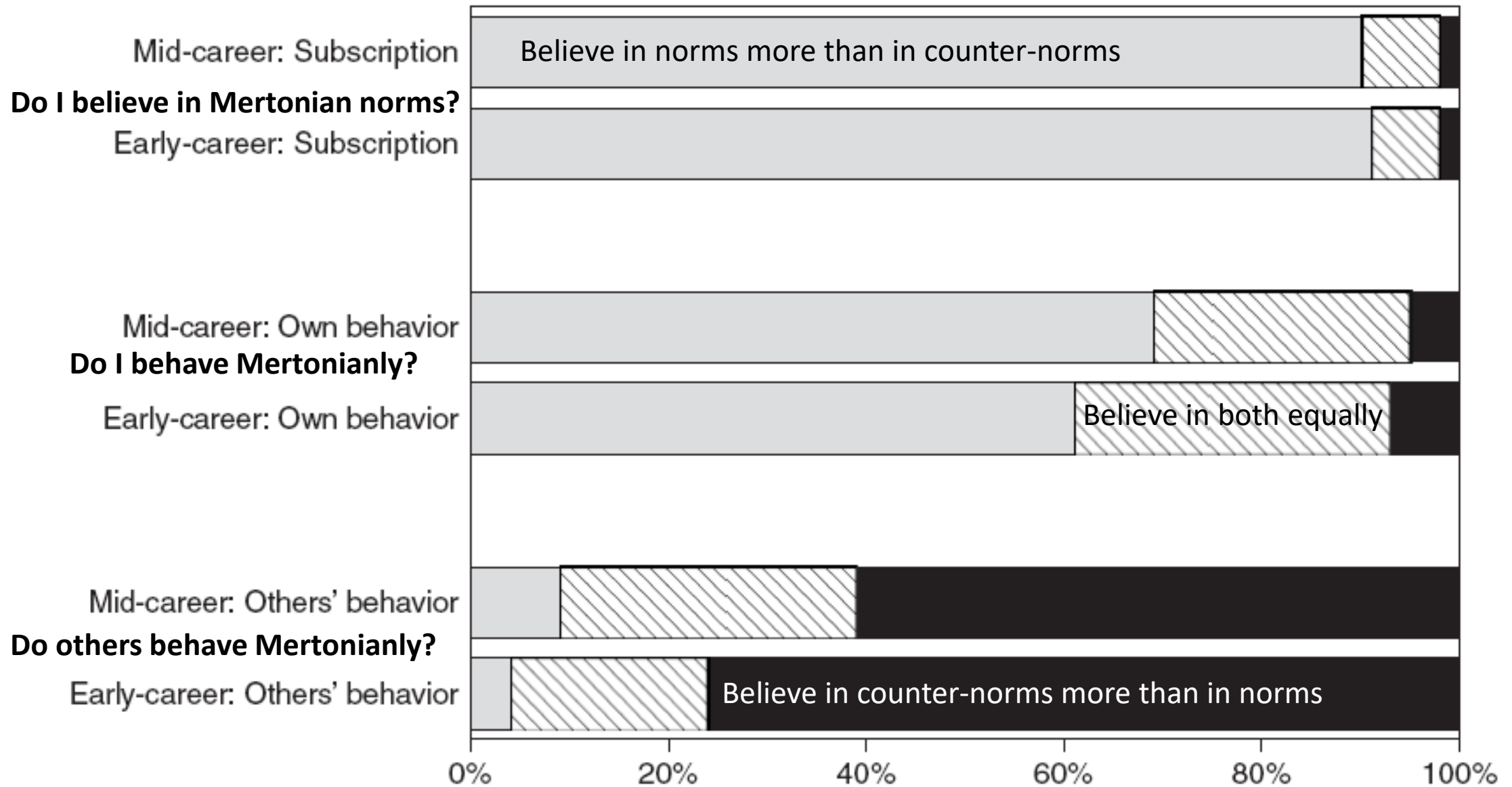
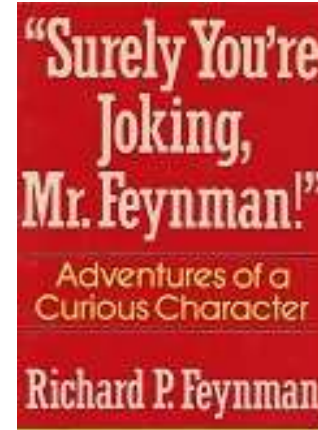


FIG. 3. Norm versus Counternorm Scores: Percent with Norm > Counternorm (dotted), Norm = Counternorm (striped), Norm < Counternorm (solid). Source: Anderson et al., 2007

Caltech's
commencement
address (1974)

Richard Feynman
on what organised
scepticism is
about

<https://calteches.library.caltech.edu/51/2/CargoCult.htm>



Richard Feynman
(1918–1988)

Source: Wikimedia Commons

“In the South Seas there is a cargo cult of people. During the war they saw airplanes land with lots of good materials, and they want the same thing to happen now ...

So they've arranged to imitate things like runways, ... they wait for the airplanes to land”

Cargo Cult Science

by RICHARD P. FEYNMAN

Some remarks on science, pseudoscience, and learning how to not fool yourself. Caltech's 1974 commencement address.

...but they're missing something essential, because the planes don't land



Source: ChatGPT



Cargo Cult Science

by RICHARD P. FEYNMAN

Some remarks on science, pseudoscience, and learning how to not fool yourself. Caltech's 1974 commencement address.

A warning against Cargo Cult science

“[...] there is one feature I notice that is generally missing in cargo cult science. That is the idea that we all hope you have learned in studying science in school [...]



“It's a kind of scientific integrity, a principle of scientific thought that corresponds to a kind of utter honesty – a kind of leaning over backwards. [...] Details that could throw doubt on your interpretation must be given, if you know them. [...] give all of the information to help others to judge the value of your contribution”

The difficult equilibrium among binaries

- Reckless versus innovative
- Bold versus sloppy
- Ambitious versus unviable
- Virtuous versus self-defeating
- Elegant versus relevant



The challenge of artificial intelligence

- Why write code if AI codes better?
- Why my prose if AI's is better?
- I read a few books; AI has read them all
- How can I use AI without AI doing all the work (and being caught)?

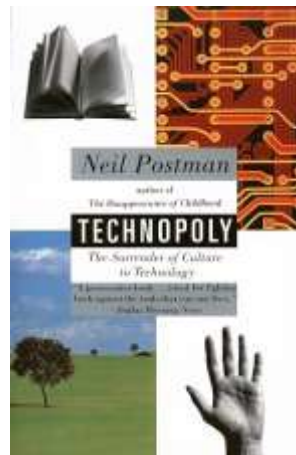


Illustration of Der Zauberlehrling. From: German book, "Goethe's Werke", 1882, drawing by Ferdinand Barth (Künstler) (1842–1892). Source: Wikipedia Commons

AI today versus writing for Plato (370 BC)

King Thamus warns the god Theuth that his invention, writing, will give people “the show of wisdom without the reality.” They “will appear to be omniscient and will generally know nothing” (Phaedrus, Plato)

The story is told well here: →



Source: ChatGPT, Claude's prompt

Next module ➔ The emotional
landscape

Soft skills and good practices for doctoral supervision

The emotional landscape

Module 5 of 6

Running a PhD marathon

- Distress is possible and not a sign of weakness
- The relationship with one's mentor: cause or solution?



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Work organization and mental health problems in PhD students

Katia Levecque^{a b} , Frederik Anseel^{a b c} , Alain De Beuckelaer^{d e a} , Johan Van der Heyden^{f g} , Lydia Gisle^f [Show more ↗](#)

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10.1016/j.respol.2017.02.008 ↗

Research Policy

Article

Recommended articles

Cited by (970)

Metrics

- One in two PhD students experiences psychological distress; one in three is at risk of a common psychiatric disorder.
- The prevalence of mental health problems is higher in PhD students than in the highly educated general population, highly educated employees and higher education students.
- Work and organizational context are significant predictors of PhD students' mental health.



including the supervisor's leadership style

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Work organization and mental health problems in PhD students

Katia Levecque^{a b} , Frederik Anseel^{a b c} , Alain De Beuckelaer^{d e a} , Johan Van der Heyden^{f g} , Lydia Gisle^f  [Show more](#)

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Research Policy Article Recommended articles Cited by (970) Metrics

… but don't psychologise a structural problem

- Naming and voicing the problem
- What is in your control, and what is not?



Research Article | 2 February 2026



We Have No Voice, and We Must Scream: The Social Science Academic Journal Publication Model Is Systemically Broken, Predominantly Damaging Early-Career Researchers

Author: [Nicholas Norman Adams](#)  [AUTHOR INFORMATION AND AFFILIATIONS](#)

Publication: Journal of Scholarly Publishing • Volume 57, Number 1 • <https://doi.org/10.3138/jsp-2025-0061>

Leave the door open to irony



“There is only one argument for doing something; the rest are arguments for doing nothing” (§7)

“... nothing is ever done until every one is convinced that it ought to be done, and has been convinced for so long that it is now time to do something else” (§1)

The impostor syndrome

- Having it or not: what is normal?
- Foremost: not a mental disorder
- Admit having had it (if the case) to your students



[Journal Information](#)
[Journal TOC](#)

APA PsycArticles: Journal Article

The imposter phenomenon in high achieving women: Dynamics and therapeutic intervention.

Clance, P. R., & Imes, S. A. (1978). The imposter phenomenon in high achieving women: Dynamics and therapeutic intervention. *Psychotherapy: Theory, Research & Practice*, 15(3), 241–247. <https://doi.org/10.1037/h0086006>

→ Not just women, not just high-achieving

What does psychological safety mean?

- **Team** psychological safety **stems from** learning behaviour
- Learning behaviour **stems from** asking for help, admitting errors, seeking feedback and discussing problems

Administrative Science Quarterly



Restricted access | Research article | First published June 1999

Psychological Safety and Learning Behavior in Work Teams



Borrowed from manufacturing context

[Amy Edmondson](#) [View all authors and affiliations](#)

[Volume 44, Issue 2](#) | <https://doi.org/10.2307/2666999>

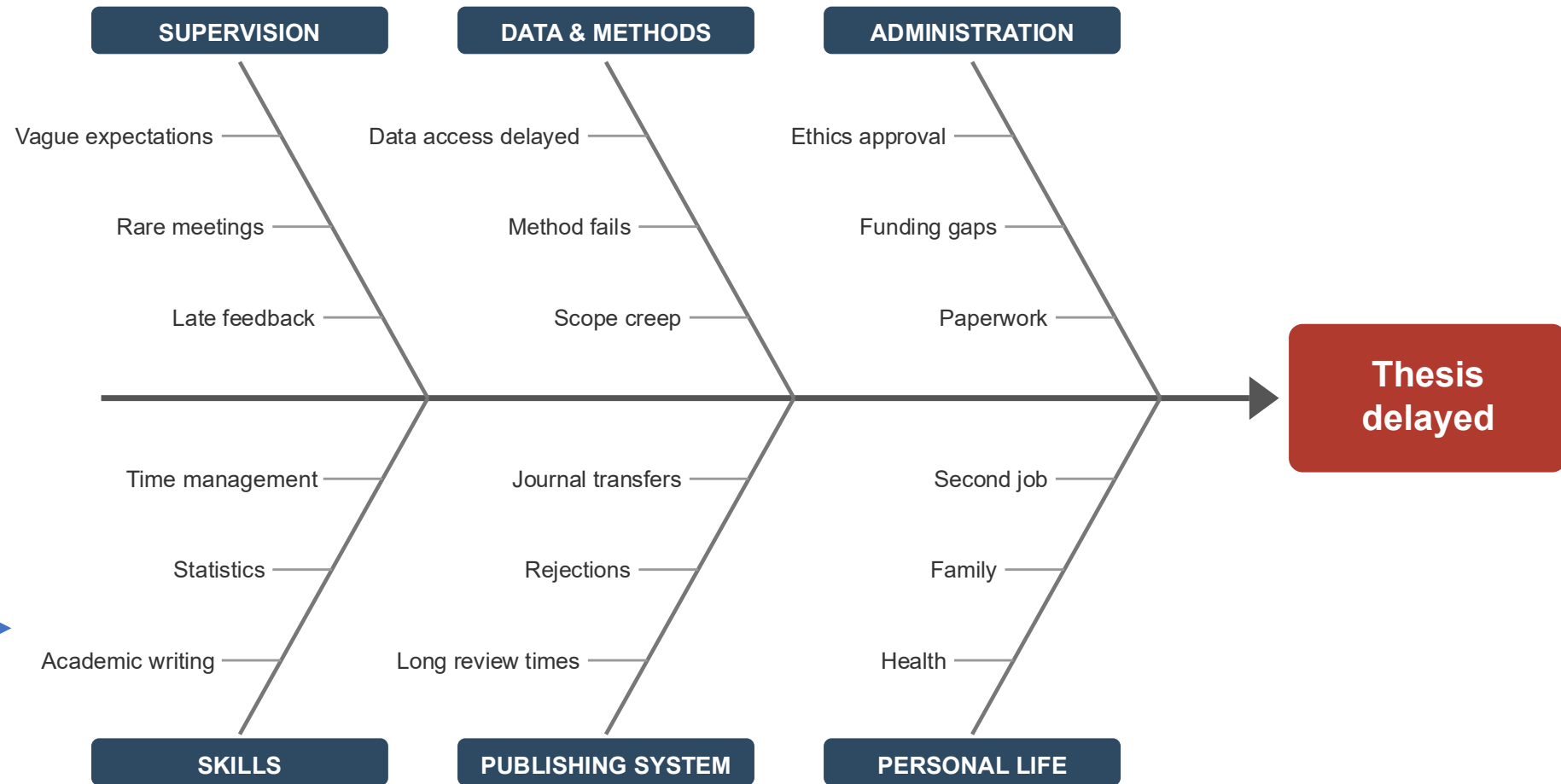
Useful comparison with W. Edwards Deming's and Kaoru Ishikawa's quality circles and total quality management work



W. Edwards Deming
(1900–1993)

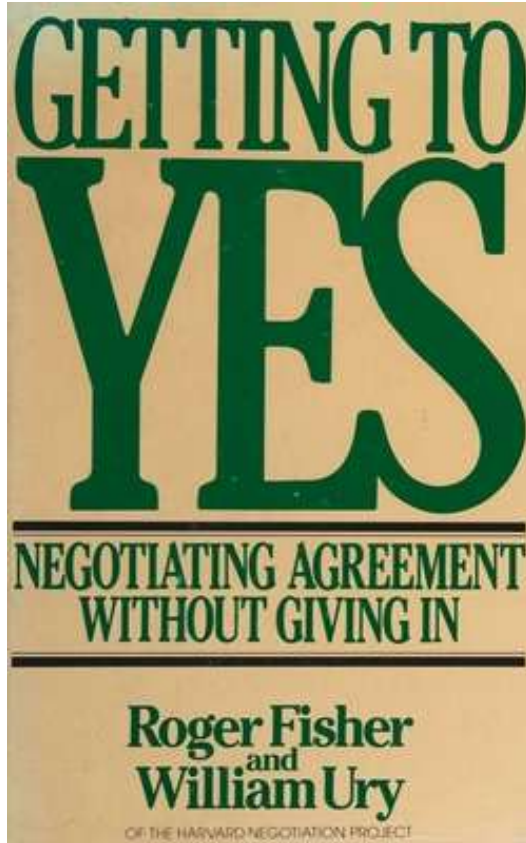
Source: Wikimedia Commons

Cause-and-effect
fishbone diagram after
Kaoru Ishikawa (1915–
1989)



Source: Claude Opus 5.5

Managing conflicts with and without power differentials



Separate the people from the problem, focus on interests rather than positions, and invent options for mutual gain



BATNA, the Best Alternative To a Negotiated Agreement

Generally easy for the supervisor, possibly disastrous for the mentee

Serious misconduct

EDITORIAL 23 May 2023

nature

Encourage whistle-blowing: how universities can help to resolve research's mental-health crisis

Low pay, job insecurity, bullying and harassment all contribute to academic researchers reporting above-average levels of anxiety and depression. Institutions can improve working environments by looking at best practice elsewhere.

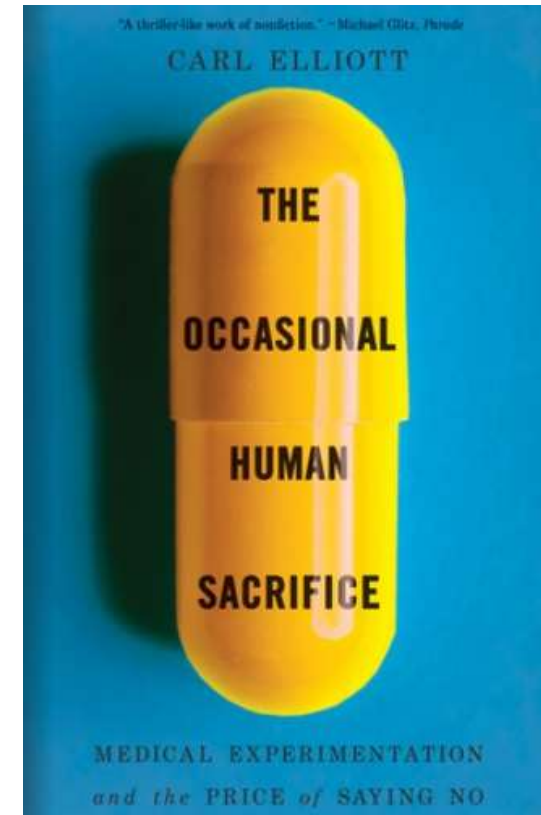


A difficult path, but one that needs to be taken for cases of bullying, harassment or abuse of power



How the Karolinska protected Paolo Macchiarini — and whistleblowers paid the price

<https://retractionwatch.com/2024/05/17/how-the-karolinska-protected-paolo-macchiarini-and-whistleblowers-paid-the-price/>



Know your role and limits

- A mentor is not a therapist
- Issues may be outside the control of both mentor and mentee



Next module ➔ Toward maturity

Soft skills and good practices for doctoral supervision

Toward maturity

Module 6 of 6



Definition of *integrity*

1 : firm adherence to a code of especially moral or artistic values : incorruptibility

2 : an unimpaired condition: soundness; not broken

3 : the quality or state of being complete or undivided : completeness; not missing parts

Incorruptibility and soundness
were covered already; How about

3 : the quality or state of being complete or
undivided : completeness

As in ‘the manuscript
came down to us in its
integrity’



*Lorsch Pharmacopoeia (Msc.Med.1), opened at fols. 18v–19r. Staatsbibliothek Bamberg.
Source: UNESCO, Memory of the World, Lorsch Pharmacopoeia, Staatsbibliothek
Bamberg, Msc.Med.1.*

Has the ‘manuscript’ of science arrived in its integrity?

If not, what has been lost?

- 1) Science as (small) communities of peers
- 2) Science as a self-ruled republic

The university as an institution?

The mission of universities has
experienced significant changes in
the last ~40y ...



IMPLAUSIBLE DREAM



JAMES H. MITTELMAN



... challenging the three
‘historic/foundational’ missions of
higher education

- Cultivating democratic citizenship
- Fostering critical thinking
- Protecting academic freedom



IMPLAUSIBLE DREAM



JAMES H. MITTELMAN



Causes: globalization, neoliberal revolution of the 80's, new public management theories applied to public sector, international rankings ...



IMPLAUSIBLE DREAM



JAMES H. MITTELMAN



Cultivating
democratic
citizenship

Fostering
critical
thinking

Protecting
academic
freedom



IMPLAUSIBLE DREAM



JAMES H. MITTELMAN



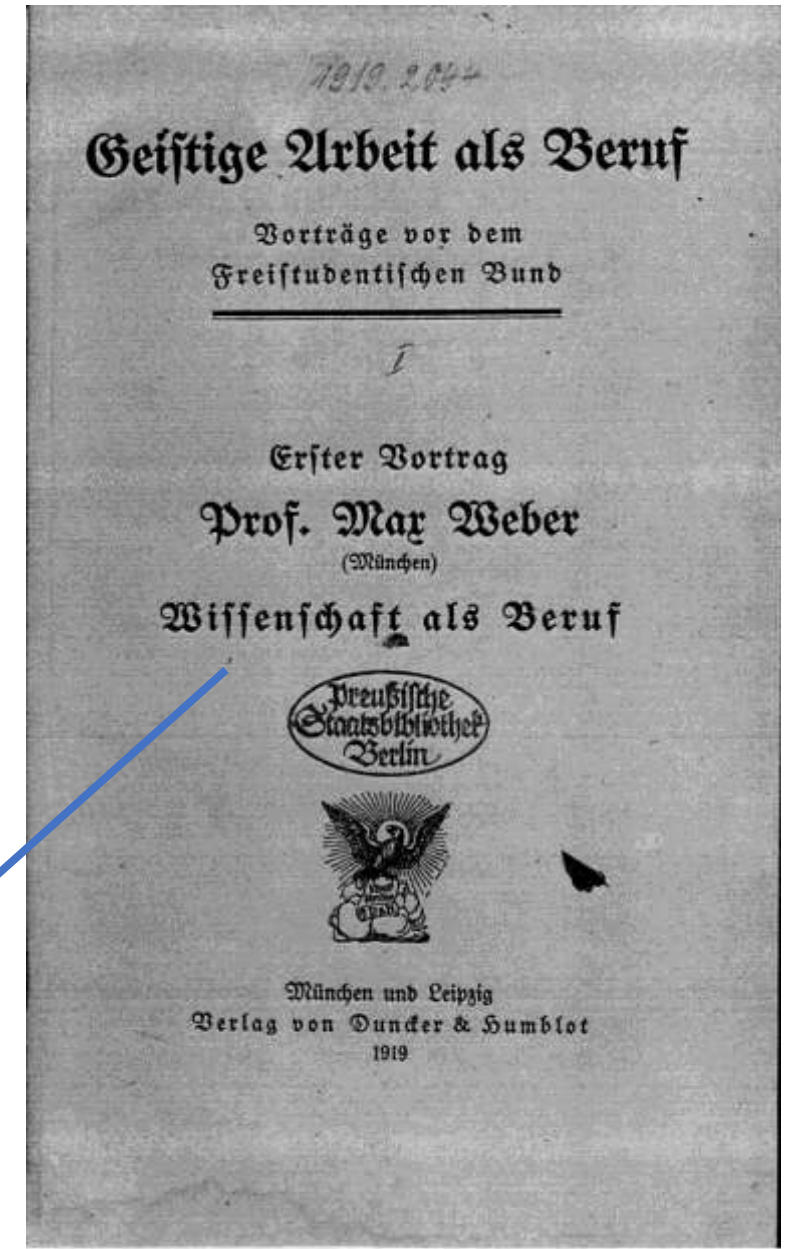
Sharing a reflection on academic
freedom with mentees

Freedom of whom from what[or
from whom], and to do what?



Max Weber: professors
should not use their chairs to
colonize young minds with
their own political ideas
(1917)

Wissenschaft



Science is divided: the Sokal affair (1996)



The birth of 'scholarly hoax'

↙
"Transgressing the
Boundaries: Towards a
Transformative Hermeneutics
of Quantum Gravity"

The hoax generated soul searching in the community of science and technology studies

DID THE SOKAL AFFAIR DESTROY POSTMODERNISM?

<https://medium.com/the-humanities-in-transition/part-1-sokals-hoax-371af59bde3f>

Part 1. Sokal's Hoax

Medium

The ploy was cleverly simple



Flannery Wilson



Follow

3 min read · Jun 16, 2020

Beryl L. Crowe: “two insular scientific communities – the natural and the social–between which there is very little communication and a great deal of envy, suspicion, disdain, and competition for scarce resources”

**The Tragedy of the
Commons Revisited**

28 November 1969, Volume 166, Number 3909

SCIENCE

… which brings us to …

3 : the quality or state of being complete or undivided : completeness

Science is not in ‘one piece’
➔How is science taught?

“It is a narrow and rigid education [in physics/science], probably more so than any other except perhaps in orthodox theology”

Thomas Kuhn, *The Structure of Scientific Revolutions*, Chapter XIII



Thomas Kuhn
(1922–1996)

Source: Wikimedia Commons

The two-culture wars pale against today's science wars
Science between party lines → vaccine compliance
Scientists between defensive and reflexive lines

EDITORIAL | 01 July 2026

The complex truth about trust in science



Confidence in science has not collapsed, but scientists have urgent problems to address.

The polarization of trust in science is a complex phenomenon shaped by—and increasingly also shaping—American political identities.

◀ VOL. XLI, NO. 3, SPRING 2025

The Strange New Politics of Science

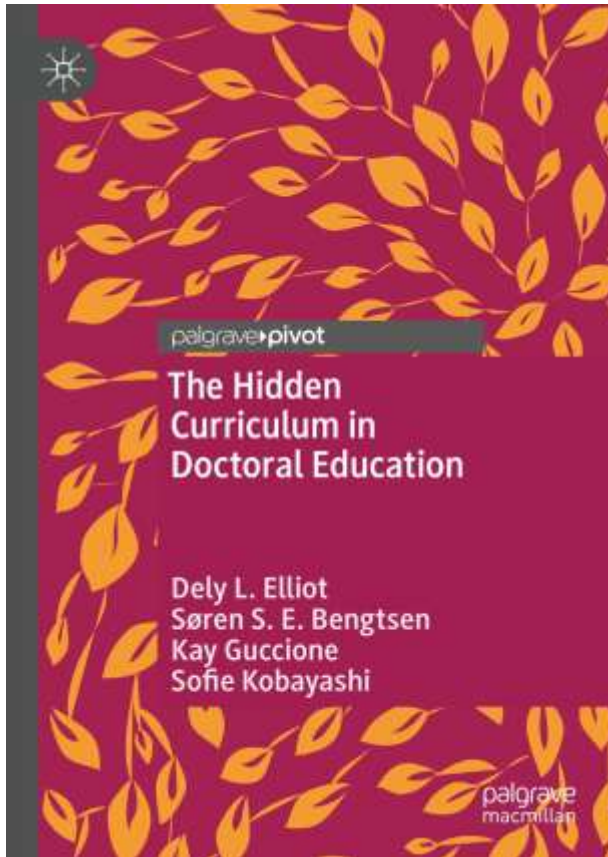
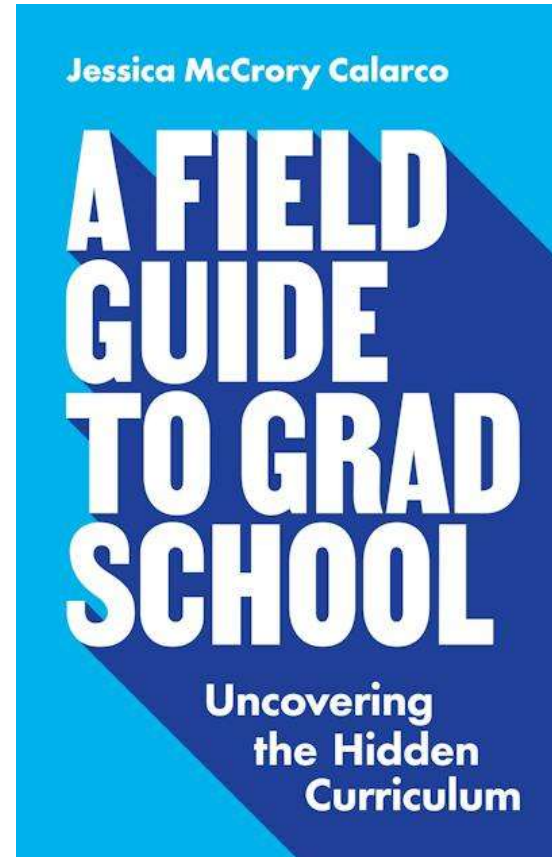
BY M. ANTHONY MILLS, PRICE ST. CLAIR



Over the course of a PhD

- Mentor / conductor becomes coach
- Mentee becomes a member of the craft/community

Absorbing the ‘hidden curriculum’



Both 2020; How to approach people at conferences, how peer review actually works, how to read reviewer comments; grant and job applications

... but beware AI's tide

After the PhD defence: leaving the lab

- Now (as a student): what will be mine when I leave?
Ask it early, and put it in the day-one agreement from Module 3
- Later (as a supervisor):
the goal of supervision
is to make yourself
obsolete



Source: ChatGPT, Claud's prompt

Stay or change?

A research life calls for compromises between vocation and survival under a system of evaluation

Contradictions are lived more than resolved



Career choices

Careers outside academia are not a consolation prize

Why does leaving feel like losing?

Losses weigh more than gains (loss aversion); years already invested seem wasted (sunk cost); staying looks like the default (status quo bias)



Caspar David Friedrich, *Woman at a Window* (1822). Source: Wikimedia Commons

CHANGE

Principles of
PROBLEM FORMATION
and
PROBLEM RESOLUTION

Paul Watzlawick, Ph.D., John Weakland, Ch.E.,
and Richard Fisch, M.D.
Foreword by Milton H. Erickson, M.D.

(1974)

First-order change happens inside the system: trying harder, doing more of the same

Second-order change alters the frame itself

Individual: stepping outside the frame, leaving;

Systemic: redefining success; DORA (2012), Hong Kong Principles (2020), CoARA (2022): changing the rules of evaluation, redefining the role of preprints...

But even systemic change happens because of committed researchers, today's PhD students



We addressed these



Definition of *integrity*

1 : firm [adherence](#) to a code of especially moral or artistic values : [incorruptibility](#) → person

2 : an unimpaired condition: [soundness](#); not broken → vessel

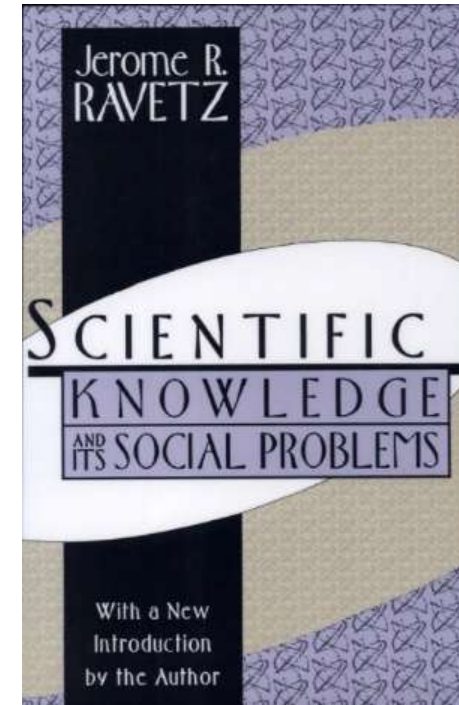
3 : the quality or state of being complete or undivided : [completeness](#); not missing parts → manuscript



Supervision touches all three; mentors and mentees live through them during a PhD timeframe

Supervision is where the spoken and unspoken traits of the craft of science are passed on;
For Ravetz, the health of research passes through “essential ethical elements operating through the interpersonal channel of communication” (p. 179)

➔ For supervision, this is the task ahead



Jerome R. Ravetz

Source: Wikimedia Commons

Soft skills and good practices for doctoral supervision

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