Mobilising open scholarship in psychology

Dr William Ngiam
Lecturer at the University of Adelaide

Flinders Colloquium
17th August 2025

My goal for this talk is to inspire ***you*** to **take action and improve science**

- Share my journey as an early-career researcher in the Open Science movement
- Convince you that you can lead the movement to bring transparency and rigour to science

A brief introduction to me

- **Lecturer** in the School of Psychology at the University of Adelaide
  - Started just over a year ago – still early-ish!

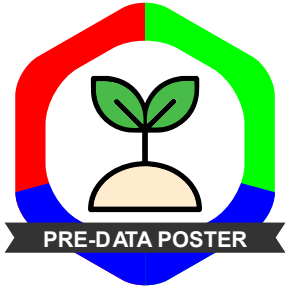
A brief introduction to me

- Learnt about open science from my PhD supervisor, Alex Holcombe
  - Participated in the *Reproducibility Project: Psychology* as a research assistant

WORKING MEMORY SYMPOSIUM

- Organised a free virtual conference for early-career researchers to present their work when in-person conferences shut down due to the pandemic

OPEN SCIENCE: A VISION FOR A FAIR AND EQUITABLE SCIENCE
William X. Q. Ngiam, PH.D.
Postdoctoral Researcher, University of Chicago



Pre-Data-Collection Poster Session

2022 Open Science Workshop on Preregistration

NEUROSCIENCE
2023

Doing Our Part to Change the Culture of Science: Becoming a Champion for Rigor

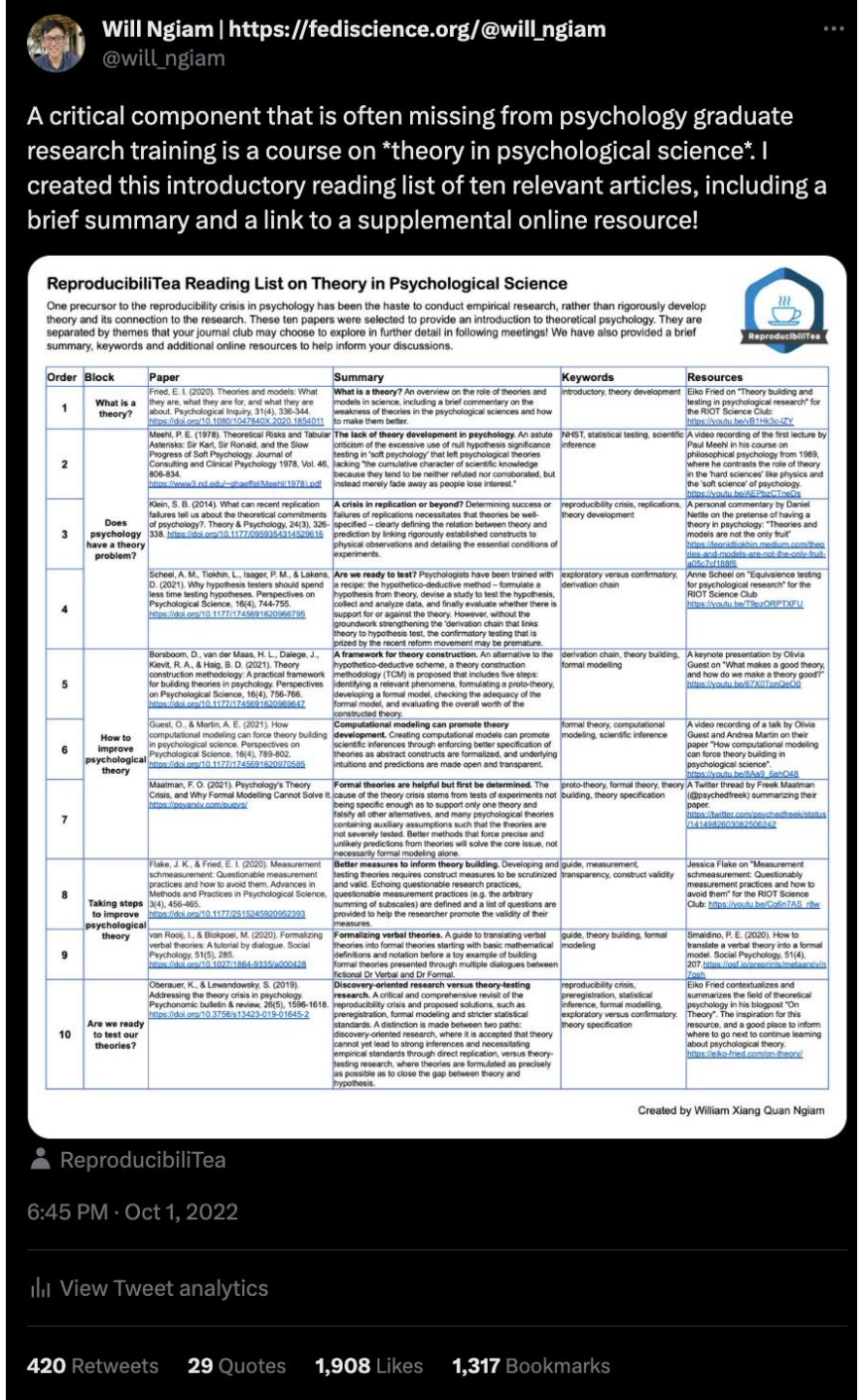
Organizer/Moderator: Devon Crawford
Speaker: Lique Coolen, Sandra Hewett, Brielle Ferguson, Nafisa Jadavji, Michael Dougherty, Shai Silberberg, William Ngiam
Date & Time: Saturday, November 11, noon–2 p.m.
Location: WCC 207B
Track: Research Skills

- Created introductory reading lists on Open Science, preregistration and theory in psychological science – hosted at https://rpt-rl.netlify.app

ReproducibiliTea Introductory Reading List

These are our recommendations for the papers to cover in the first term of your new ReproducibiliTea journal club! These ten papers were selected to provide an overview of the reproducibility crisis and introduction to the many aspects of Open Science. They are separated by themes that your journal club may choose to explore in further detail in following meetings! We have also provided a summary, keywords and online resources to help inform your discussions.

Order	Block	Paper	Summary	Keywords	Resources
1	The 'issues' that lead to the reproducibility crisis	Ioannidis JPA (2005). Why most published research findings are false. PLoS Med 2(8): e124. https://doi.org/10.1371/journal.pmed.0020124	**Defining the issue.** By simulating at various levels of statistical power, across different pre-study odds, the accumulation of significant results is shown to be potentially false positives predominantly. The paper introduces concepts like the positive predictive value and how it is related to the *p*-value, and how important having high statistical power is for the rigor of research.	*p*-values, positive predictive values, false positives, statistical power	Summary video (by William Ngiam): https://www.youtube.com/watch?v=C7N_-XanpTI
2		Smaldino, P. E., & McElreath, R. (2016). The natural selection of bad science. Royal Society open science, 3(9), 160384. https://doi.org/10.1098/rsos.160384	**The myth of self-correction.** Estimates of statistical power historically in science appears to be extremely low. In addition to that, due to publication bias (the view that positive results are more likely to be published) and the incentives to publish, simulations suggest that a high false-discovery rate is 'naturally selected' for and that replications are ineffective at correcting that rate.	statistical power, replication	Summary video (by William Ngiam): https://www.youtube.com/watch?v=EdLDE2Y4exM
3		Simmons, J. P., Nelson, L. D., & Simonsohn, U. (2011). False-Positive Psychology: Undisclosed Flexibility in Data Collection and Analysis Allows Presenting Anything as Significant. Psychological Science, 22(11), 1359–1366. https://doi.org/10.1177/0956797611417632	**The problem of analytic flexibility.** A demonstration of how decisions made by researchers in statistical analysis, such as dropping conditions or adding observations after a non-significant test, can easily produce a false positive result.	analytic flexibility, researcher degrees of freedom, questionable research practices	Summary video (by William Ngiam): https://www.youtube.com/watch?v=bf3GqyBRgzY
4	The extent of the 'issues'	John, L. K., Loewenstein, G., & Prelec, D. (2012). Measuring the Prevalence of Questionable Research Practices With Incentives for Truth Telling. Psychological Science, 23(5), 524–532. https://doi.org/10.1177/0956797611430953	**The prevalence of questionable research practices.** With an incentive for honest reporting, psychologists were surveyed about engaging in questionable research practices and the proportion that admitted to doing so may be surprisingly high.	questionable research practices	
5		Open Science Collaboration. (2015). Estimating the reproducibility of psychological science. Science, 349(6251). https://doi.org/10.1126/science.aac4716	**The Reproducibility Project: Psychology.** A large-scale, collaborative replication effort of 100 published psychological findings showed the majority of findings did not reproduce, and those that do replicate mostly produced a smaller effect-size. This project provided an initial estimate of the reproducibility in science and brought attention for the need of methodological reform.	reproducibility, replication	Brian Nosek in an interview about the results and implications of the Reproducibility Project: Psychology https://www.youtube.com/watch?v=iD1MWkDghLM
6	Perspectives on the reproducibility crisis	Vazire, S. (2018). Implications of the credibility revolution for productivity, creativity, and progress. Perspectives on Psychological Science, 13(4), 411-417. https://doi-org/10.1177%2F1745691617751884	**The credibility revolution.** A reframing of the 'reproducibility crisis' that highlights the scientific reforms that have occurred with the Open Science movement, and their potential impacts on the productivity, creativity and progress of scientists.	credibility revolution, commentary, summary	Presentation by Simine Vazire at OSC 2019: https://www.youtube.com/watch?v=Yf1Ovx-OixE
7		Yarkoni, T. (2018), Not its not The Incentives - it's you. Yarkoni Blog - [citation needed]: https://www.talyarkoni.org/blog/2018/10/02/no-its-not-the-incentives-its-you/	**Dealing with the Incentives.** A blogpost arguing that the responsibility for reproducible science rests with the individual, and that the Incentives are not a good reason to be absolved of that responsibility	incentives, commentary	
8	Getting started with Open Science	Kathawalla, U. K., Silverstein, P., & Syed, M. (2021). Easing into open science: A guide for graduate students and their advisors. Collabra: Psychology, 7(1). https://doi.org/10.1525/collabra.18684	**Easing into Open Science.** A very accessible guide for graduate students (and their advisors) on some of the different ways to engage with the reproducibility movement. They are given difficulty ratings (easy, medium or difficult) and potential worries are also addressed.	early-career researchers, guide, introductory, pre-registration	Presentation by Priya Silverstein at RIOT Science Club: https://www.youtube.com/watch?v=owJaD3UiseQ
9		Munafò, M. R., Nosek, B. A., Bishop, D. V. M., Button, K. S., Chambers, C. D., Percie Du Sert, N., Simonsohn, U., Wagenmakers, E. J., Ware, J. J., & Ioannidis, J. P. A. (2017). A manifesto for reproducible science. Nature Human Behaviour, 1(1), 1–9. https://doi.org/10.1038/s41562-016-0021	**A manifesto for reproducible science.** A general overview of the goals of various reproducibility measures and how they can be implemented.	guide, reproducibility	
10		Crüwell, S., van Doorn, J., Etz, A., Makel, M. C., Moshontz, H., Niebaum, J. C., ... & Schulte-Mecklenbeck, M. (2019). Seven easy steps to open science. Zeitschrift für Psychologie. http://dx.doi.org/10.1027/2151-2604/a000387	**Where to next?** An annotated reading list of papers from seven topics: open access, open data, preregistration, reproducible analyses, replications and teaching open science in an attempt to make those practices more understandable and actionable for readers	transparency, meta-science	



Framework for Open and Reproducible Research Training

FORRT

nature human behaviour

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nature > nature human behaviour > comment > article

Comment | Published: 21 February 2022

A community-sourced glossary of open scholarship terms

Home > Research Integrity and Peer Review > Article

A guide for social science journal editors on easing into open science

Commentary | Open access | Published: 16 February 2024

Volume 9, article number 2, (2024) Cite this article

Research Integrity and Peer Review

aps | ASSOCIATION FOR PSYCHOLOGICAL SCIENCE

Observer > 2022 > January/February > Fully Credited: Making Publishing More Equitable

FEATURED

Fully Credited: Making Publishing More Equitable

A new model of "contributorship" addresses the marginalization of early-career researchers in scientific publications.

William X.Q. Ngiam

December 29, 2021

TAGS: APS JOURNALS | CAREER | CAREER PATH | FEATURE | INCLUSIVITY | PUBLISHING | WRITING

BRAIN COMMUNICATIONS

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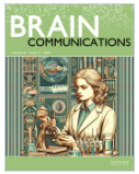


Volume 6, Issue 3
2024

JOURNAL ARTICLE

Catalyzing communities of research rigour champions

Audrey C Brumback, William X Q Ngiam, Dana M Lapato, David B Allison, Christin L Daniels, Michael Dougherty, Haley F Hazlett, Kara L Kerr, Susan Pusek, Melissa L Rethlefsen ... Show more

Brain Communications, Volume 6, Issue 3, 2024, fcae120, https://doi.org/10.1093/braincomms/fcae120

A brief introduction to me

- **Lecturer** in the School of Psychology at the University of Adelaide
  - Started just over a year ago – still early-ish!
- **An active advocate** for early-career researchers and open scholarship
  - I served on the steering committee of *ReproducibiliTea* for three years

- I think **a lot is at stake**
  - I worry about an anti-science society – one where scientific research is no longer considered ***credible***
  - I think the Open Science movement has a major role in ensuring science is supported and continues to bring positive changes to society

Why do we need open science?

The reproducibility crisis

- Also known as the replicability crisis
  - Sometimes the generalizability crisis, or the methodological crisis

- The **current** collective concern that many scientific studies are difficult to reproduce or do not replicate
  - The psychological sciences (and biomedical sciences) have high-profile controversies at the start of the 2010s
  - There have been concerns about the lack of replications in the past!
    - e.g. Paul Meehl, Jacob Cohen and others were sounding the alarm in the 1970s

Romero, F. (2019). Philosophy of science and the replicability crisis. *Philosophy Compass*, *14*(11), e12633.

Failures to replicate in psychology

- 39% of studies (36 of 97 that had positive findings) published in high-ranking psychology journals replicated (*Reproducibility Project: Psychology*; Open Science Collaboration, 2015)
- 14 of 28 psychology findings replicated with massive sample sizes (*Many Labs 2*; Klein, 2018)
- 3 of 10 psychology findings replicated across many participant pools (*Many Labs 3*; Ebersole et al., 2016)
- 13 of 21 social science experiments in *Nature* and *Science* between 2010 and 2015 replicated (Camerer, et al., 2018)

Open Science Collaboration. (2015). Reproducibility Project: Psychology. OSF. doi:10.17605/OSF.IO/EZCUJ

Klein, R. A., Vianello, M., Hasselman, F., Adams, B. G., Adams Jr, R. B., Alper, S., ... & Batra, R. (2018). Many Labs 2: Investigating variation in replicability across samples and settings. *Advances in Methods and Practices in Psychological Science*, *1*(4), 443-490

Ebersole, C. R., Atherton, O. E., PhD, Belanger, A. L., Skulborstad, H. M., Allen, J., Banks, J. B., … Nosek, B. A. (2016, August 17). Many Labs 3: Evaluating participant pool quality across the academic semester via replication. https://doi.org/10.31234/osf.io/q4emc.

Camerer, C. F., Dreber, A., Holzmeister, F., Ho, T. H., Huber, J., Johannesson, M., ... & Wu, H. (2018). Evaluating the replicability of social science experiments in Nature and Science between 2010 and 2015. Nature Human Behaviour, 2(9), 637-644.

Low statistical power

- A lot of potential false positives in the literature may be due to low statistical power
  - ~24% across science in the past 60 years (Smaldino & McElreath, 2016)
  - ~8-31% across neuroscience disciplines (Button et al., 2013)
  - ~36% across all areas of psychological research (Stanley, Carter & Doucouliagos, 2018)
  - ~44% for medium sized effects in psychology and cognitive neuroscience literature (Szucs & Ioannidis, 2017)

Smaldino, P. E., & McElreath, R. (2016). The natural selection of bad science. *Royal Society open science*, *3*(9), 160384.
Button, K. S., Ioannidis, J. P., Mokrysz, C., Nosek, B. A., Flint, J., Robinson, E. S., & Munafò, M. R. (2013). Power failure: why small sample size undermines the reliability of neuroscience. Nature reviews neuroscience, 14(5), 365-376.
Stanley, T. D., Carter, E. C., & Doucouliagos, H. (2018). What meta-analyses reveal about the replicability of psychological research. Psychological bulletin, 144(12), 1325.
Szucs, D., & Ioannidis, J. P. (2017). Empirical assessment of published effect sizes and power in the recent cognitive neuroscience and psychology literature. PLoS biology, 15(3), e2000797.

Exponential growth of scientific publications

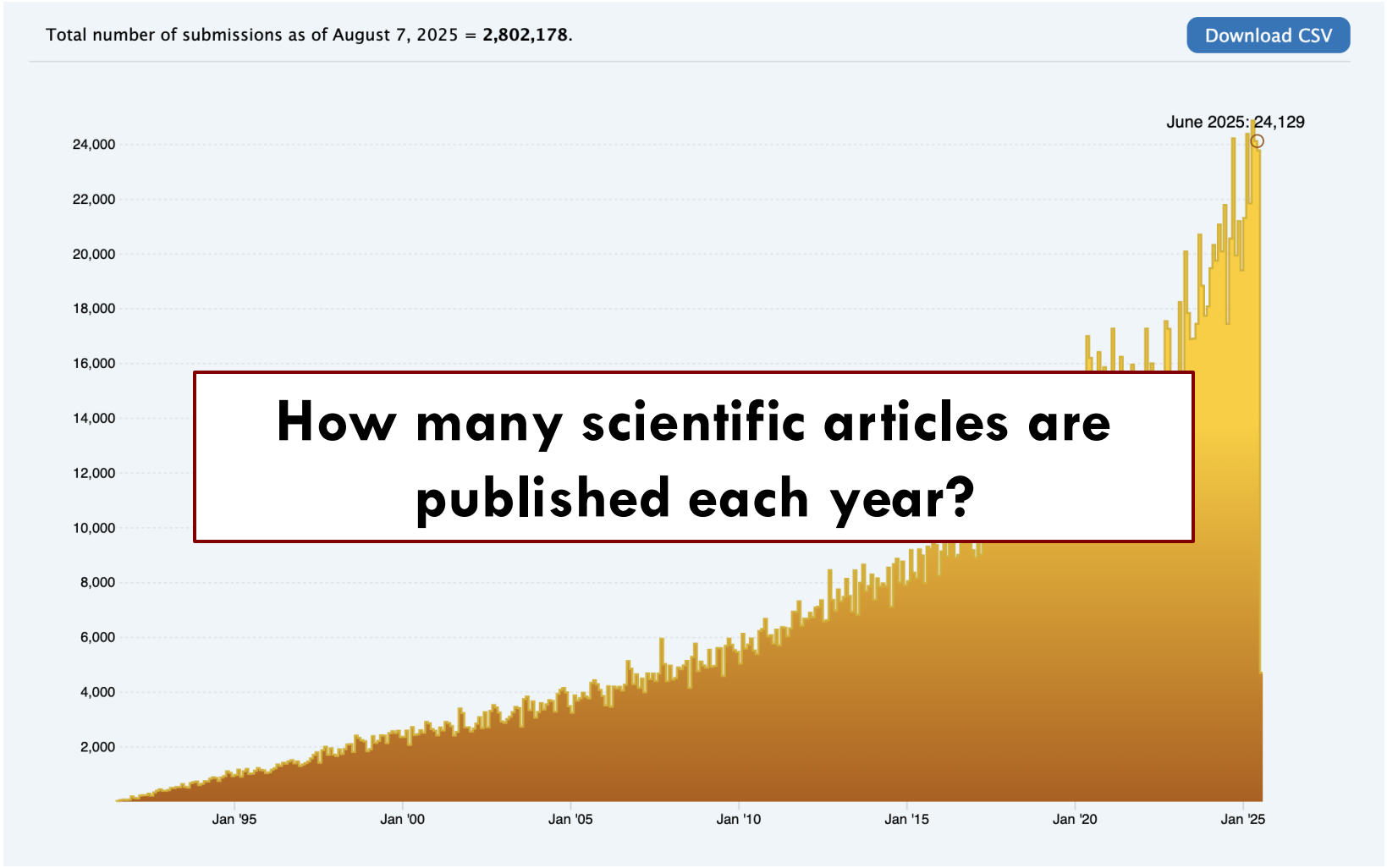


Figure taken from arxiv.org on the number of submissions over time. https://arxiv.org/stats/monthly_submissions

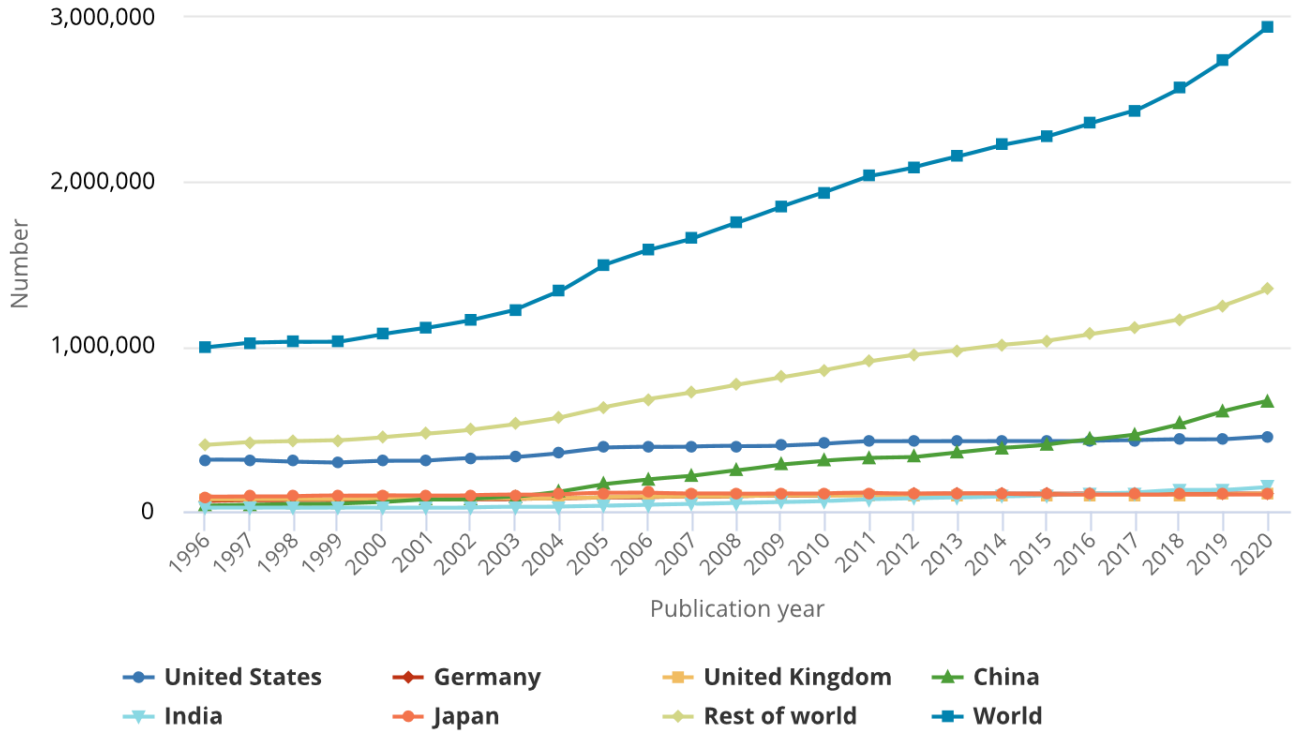
Exponential growth of scientific publications

- Estimated to have reached 2.9 million articles in 2020 (National Science Board, National Science Foundation)
- Increasing by approximately 4% each year (Pan, Petersen, Pammolli and Fortunato, 2016)

National Center for Science and Engineering Statistics | NSB-2021-4

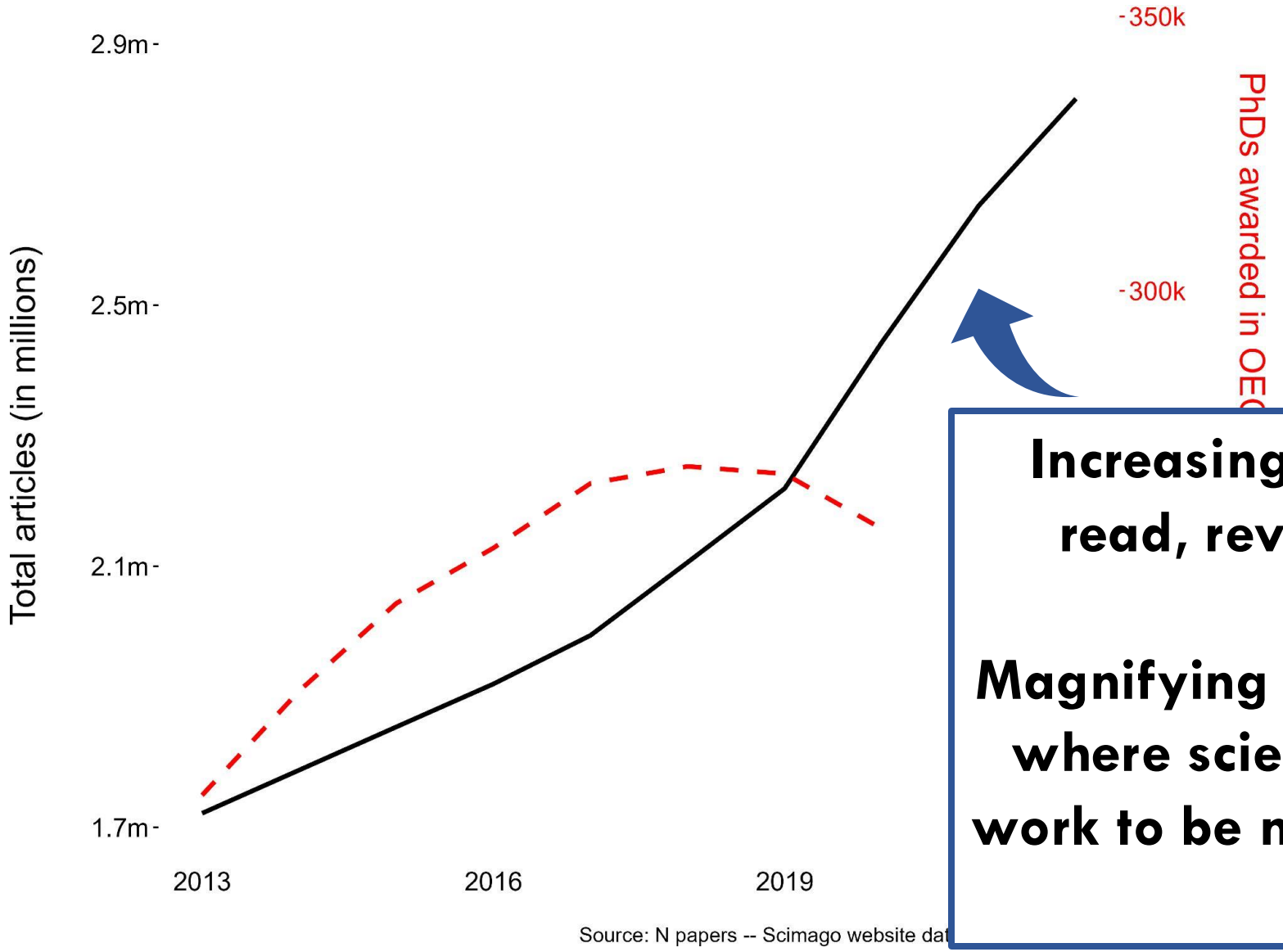
Figure PBS-2

S&E articles, by selected region, country, or economy and rest of world: 1996–2020



Review by National Center for Science and Engineering Statistics. https://ncses.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field

Pan, R. K., Petersen, A. M., Pammolli, F., & Fortunato, S. (2018). The memory of science: Inflation, myopia, and the knowledge network. *Journal of Informetrics*, *12*(3), 656-678. https://arxiv.org/abs/1607.05606



Increasing strain on scientists to read, review and co-ordinate.

Magnifying an "attention economy" where scientists compete for their work to be noticed and have impact.

Figure copied from https://bsky.app/profile/hansonmark.bsky.social/post/3kajeqzv3nt2b
Hanson, Barreiro, Crosetto and Brockington (2023). The strain on scientific publishing. *ArXiv.* https://arxiv.org/abs/2309.15884

The decline of negative results

- The proportion of papers reporting a positive result has been increasing from

Does having more papers (mostly with positive findings) mean faster scientific progress?

I say not really.

- In the recent psychology literature, this proportion is estimated to be ~95% (Scheel, Schijen and Lakens, 2021)

Figure from Fanelli, D. (2012). Negative results are disappearing from most disciplines and countries. *Scientometrics*, *90*(3), 891-904.

Scheel, A. M., Schijen, M. R., & Lakens, D. (2021). An excess of positive results: Comparing the standard Psychology literature with Registered Reports. Advances in Methods and Practices in Psychological Science, 4(2), 25152459211007467.

Aczel, B., Szaszi, B., & Holcombe, A. O. (2021). A billion-dollar donation: estimating the cost of researchers' time spent on peer review. *Research Integrity and Peer Review*, *6*(1), 1-8.

Profit margins of scientific publishing companies

- Elsevier made an operating profit of £982 million in 2019, £1,021 million in 2020, £1,001 million in 2021, £1.3 billion in 2022, £1.79 billion in 2023, at an operating margin of ~31-37% according to their annual reports.

Profit	Company	Industry
10%	BMW	automobiles
23%	Rio Tinto	mining
25%	Google	search
29%	Apple	premium computing
35%	**Springer**	**scholarly publishing**
37%	**Elsevier**	**scholarly publishing**

RELX Annual Report and Financial Statements accessed via https://www.relx.com/investors/annual-reports/2021
https://markets.ft.com/data/announce/detail?dockey=1323-16333416-4LUAGTEE271HMCQHV3723NQ9NR
Figure courtesy of Alex Holcombe's blogpost "Scholarly publisher profit update" https://alexholcombe.wordpress.com/2015/05/21/scholarly-publisher-profit-update/.

Is the goal of science just to publish?

2024-8-13

The AI Scientist: Towards Fully Automated Open-Ended Scientific Discovery

Chris Lu[1,2,*], Cong Lu[3,4,*], Robert Tjarko Lange[1,*], Jakob Foerster[2,†], Jeff Clune[3,4,5,†] and David Ha[1,†]
[*]Equal Contribution, [1]Sakana AI, [2]FLAIR, University of Oxford, [3]University of British Columbia, [4]Vector Institute, [5]Canada CIFAR AI Chair, [†]Equal Advising

One of the grand challenges of artificial general intelligence is developing agents capable of conducting scientific research and discovering new knowledge. While frontier models have already been used as aids to human scientists, e.g. for brainstorming ideas, writing code, or prediction tasks, they still conduct only a small part of the scientific process. This paper presents the first comprehensive framework for fully *automatic scientific discovery*, enabling frontier large language models (LLMs) to perform research independently and communicate their findings. We introduce THE AI SCIENTIST, which generates novel research ideas, writes code, executes experiments, visualizes results, describes its findings by writing a full scientific paper, and then runs a simulated review process for evaluation. In principle, this process can be repeated to iteratively develop ideas in an open-ended fashion and add them to a growing archive of knowledge, acting like the human scientific community. We demonstrate the versatility of this approach by applying it to three distinct subfields of machine learning: diffusion modeling, transformer-based language modeling, and learning dynamics. Each idea is implemented and developed into a full paper at a meager cost of less than $15 per paper, illustrating the potential for our framework to democratize research and significantly accelerate scientific progress. To evaluate the generated papers, we design and validate an automated reviewer, which we show achieves near-human performance in evaluating paper scores. THE AI SCIENTIST can produce papers that exceed the acceptance threshold at a top machine learning conference as judged by our automated reviewer. This approach signifies the beginning of a new era in scientific discovery in machine learning: bringing the transformative benefits of AI agents to the *entire* research process of AI itself, and taking us closer to a world where *endless affordable creativity and innovation* can be unleashed on the world's most challenging problems. Our code is open-sourced at https://github.com/SakanaAI/AI-Scientist.

My impression is that their attention is misplaced on the incentives, and lacks a considered philosophy of science.

Does producing more papers lead to more knowledge? Solutions to world's problems? Progress in society?

via Carl Bergstrom, evolutionary biologist (@carlbergstrom.com on BlueSky)
https://bsky.app/profile/carlbergstrom.com/post/3kzmxr3a2wz2a

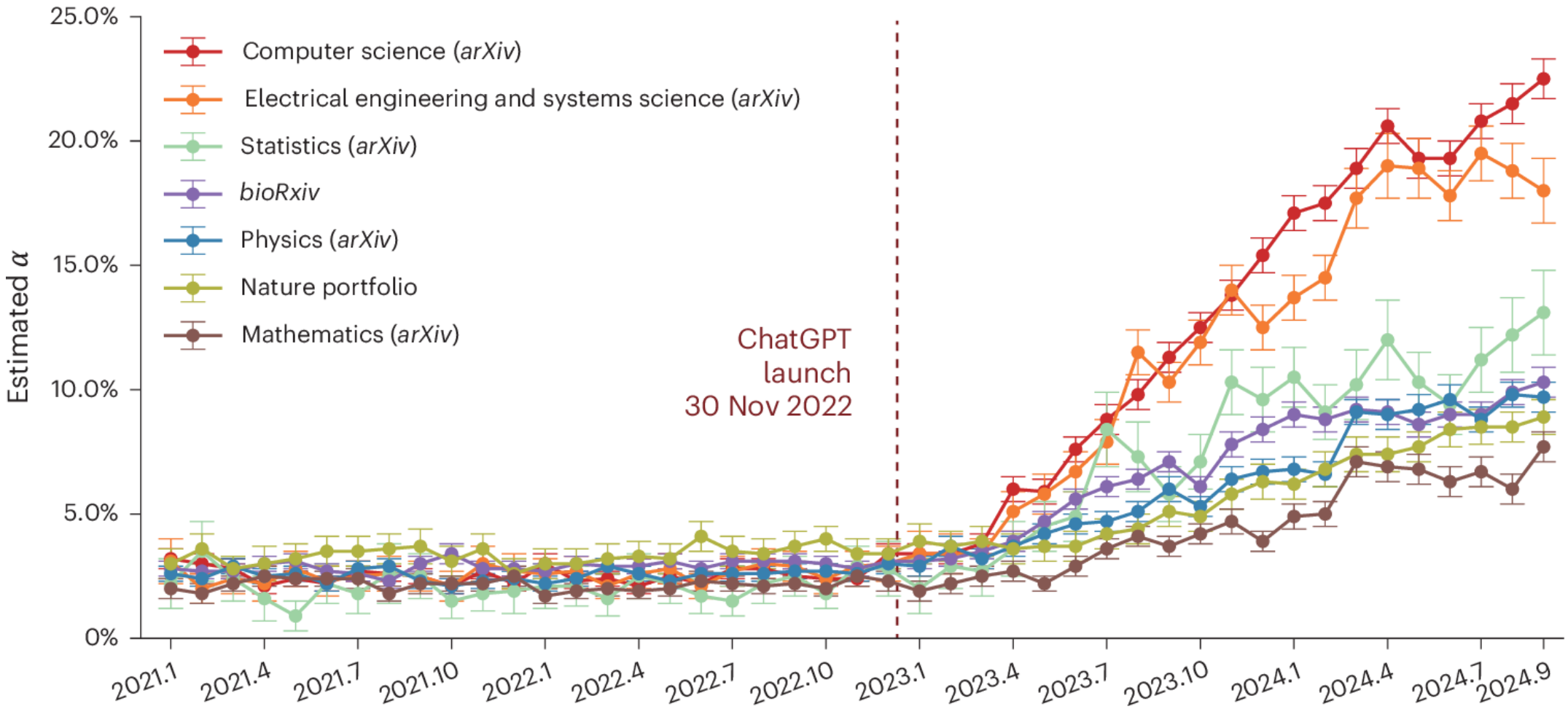
nature human behaviour

Article | Published: 04 August 2025

Quantifying large language model usage in scientific papers

Weixin Liang, Yaohui Zhang, Zhengxuan Wu, Haley Lepp, Wenlong Ji, Xuandong Zhao, Hancheng Cao, Sheng Liu, Siyu He, Zhi Huang, Diyi Yang, Christopher Potts, Christopher D. Manning & James Zou

Nature Human Behaviour (2025) | Cite this article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Computer science (arXiv)
Electrical engineering and systems science (arXiv)
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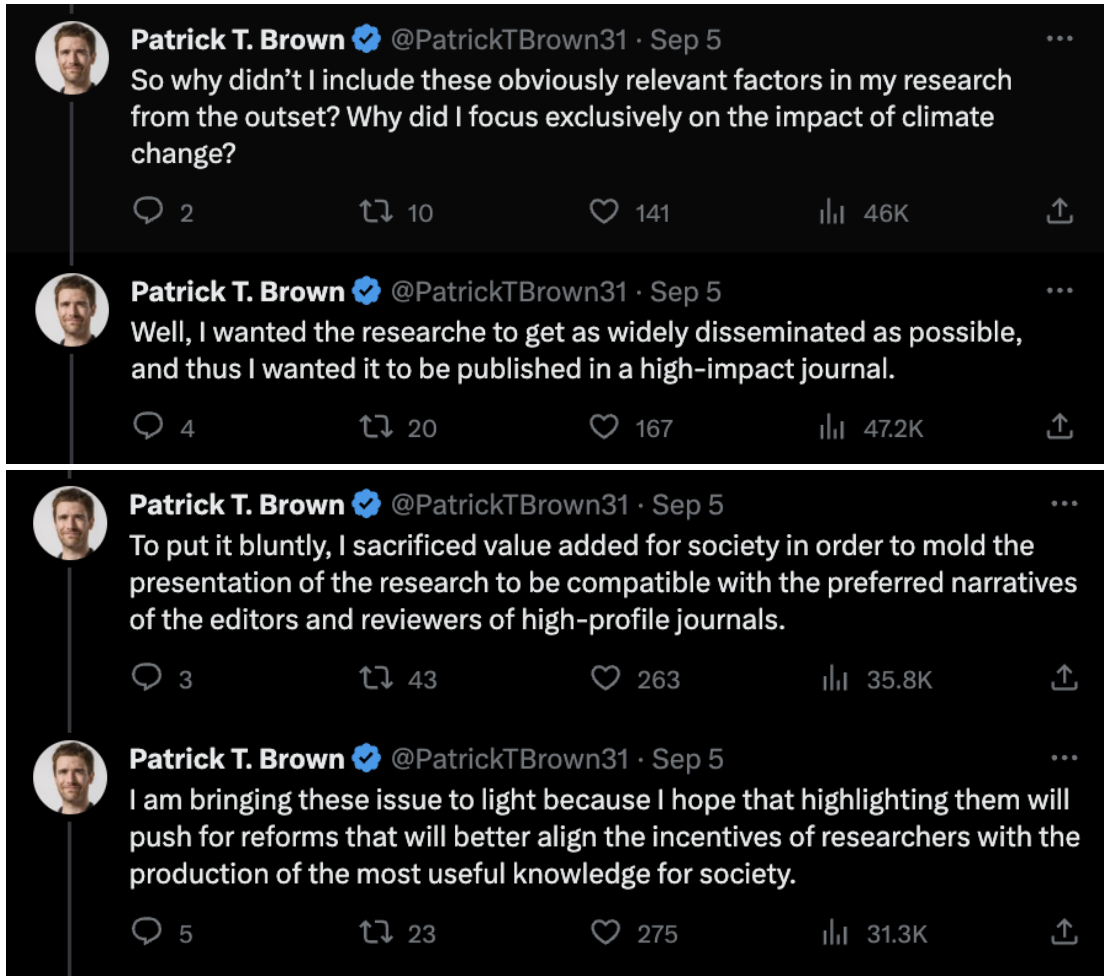
What comes at the cost of scientific rigour

Climate warming increases extreme daily wildfire growth risk in California

Patrick T. Brown, Holt Hanley, Ankur Mahesh, Colorado Reed, Scott J. Strenfel, Steven J. Davis, Adam K. Kochanski & Craig B. Clements

Nature **621**, 760–766 (2023) | Cite this article

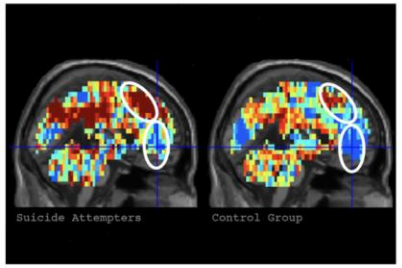
Is this appropriate scientific communication?



Screenshots from https://twitter.com/PatrickTBrown31/status/1699016555844035045

How a now-retracted study got published in the first place, leading to a $3.8 million NIH grant

The scientific paper inspired international headlines with its bold claim that the combination of brain scans and machine learning algorithms could identify people at risk for suicide with 91% accuracy.



August 29, 2018

Carnegie Mellon, Pitt Receive $3.8M NIMH Grant To Diagnose Suicidal Thinking Using Brain Imaging

The promise of the work garnered lead author Marcel Adam Just of Carnegie Mellon University in Pittsburgh and co-author David Brent of the University of Pittsburgh a five-year, $3.8 million grant from the National Institute of Mental Health to conduct a larger follow-up study.

Retraction Watch

Tracking retractions as a window into the scientific process

One of the reviewers was not impressed, because the main analysis still focused on 34 participants "cherry-picked" from an original pool of 79, the reviewer wrote.

The authors retracted the paper this year after Timothy Verstynen of Carnegie Mellon University and Konrad Paul Kording of the University of Pennsylvania submitted a Matters Arising, a paper detailing their unsuccessful attempts to replicate the 2017 work with the code and data the authors had made available, and their concerns about bias in the model.

This was received by Nature in September 2020, and published on 6th April, 2023 with retraction of the original article 6 years later.

https://retractionwatch.com/2023/06/09/how-a-now-retracted-study-got-published-in-the-first-place-leading-to-a-3-8-million-nih-grant/

Verstynen, T., & Kording, K. P. (2023). Overfitting to 'predict' suicidal ideation. *Nature Human Behaviour*, *7*(5), 680-681.

Fraudulent Scientific Papers Are Rapidly Increasing, Study Finds

A statistical analysis found that the number of fake journal articles being churned out by "paper mills" is doubling every year and a half.

RESEARCH ARTICLE | SOCIAL SCIENCES |

The entities enabling scientific fraud at scale are large, resilient, and growing rapidly

Reese A. K. Richardson, Spencer S. Hong, Jennifer A. Byrne, +1, and Luís A. Nunes Amaral Authors Info & Affiliations

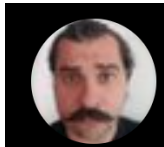
Edited by Daniel Acuña, University of Colorado Boulder, Boulder, CO; received September 30, 2024; accepted March 18, 2025 by Editorial Board Member Mark Granovetter

August 4, 2025 | 122 (32) e2420092122 | https://doi.org/10.1073/pnas.2420092122

Carl Zimmer. (2025, August 4) *New York Times* https://www.nytimes.com/2025/08/04/science/04hs-science-papers-fraud-research-paper-mills.html
Richardson, R. A., Hong, S. S., Byrne, J. A., Stoeger, T., & Amaral, L. A. N. (2025). The entities enabling scientific fraud at scale are large, resilient, and growing rapidly. Proceedings of the National Academy of Sciences, 122(32), e2420092122.

Taken from Repeat After Me by Maki Naro. Published by The Nib. https://thenib.com/repeat-after-me/

How do we respond?



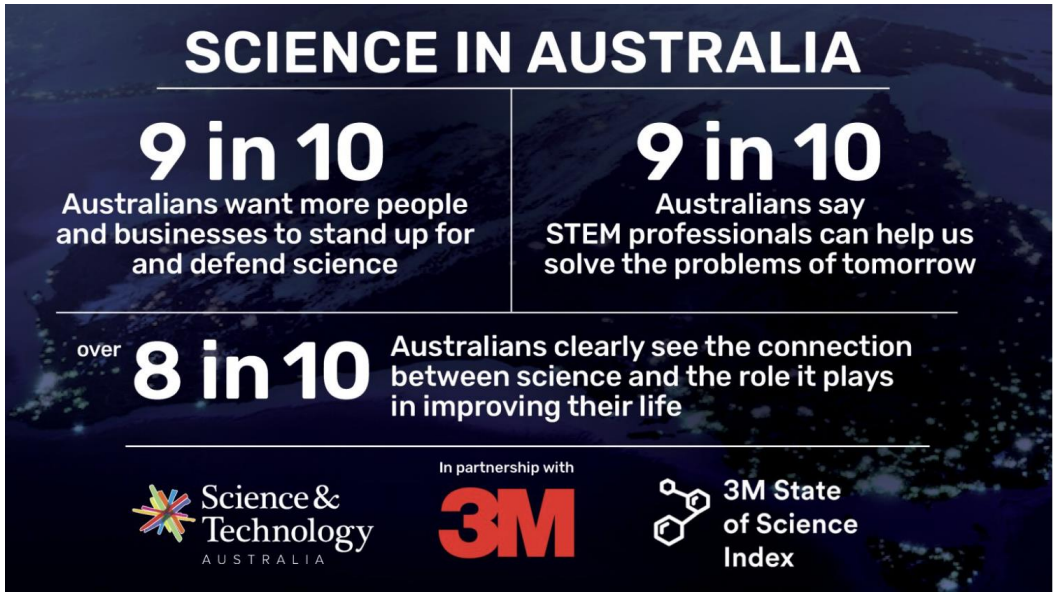
James Heathers
@jamesheathers

"Science is self-correcting" - sure, *when we correct it*, not because of Magical Progress (tm).

12:57 PM · Mar 25, 2017 · Twitter Web Client

Trust in science remains (but needs defending)

- 93% of Australians believe positive outcomes can be achieved if people stand up for and defend science.
- 92% want business to take action to defend science.
- 92% of Australians say STEM professionals can help us solve the problems of tomorrow.
- 93% of Australians believe positive outcomes can be achieved if people stand up for and defend science. 92% want business to take action to defend science.



Science and Technology Australia (2023). https://scienceandtechnologyaustralia.org.au/australians-urge-business-to-back-science/

The response? The Open Science movement

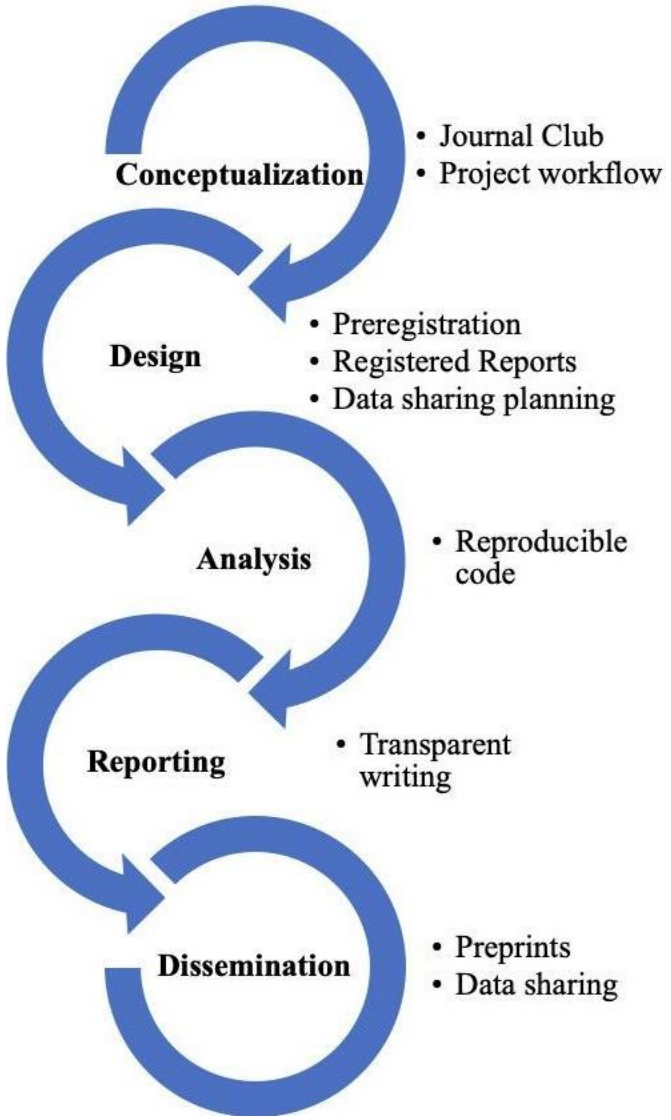
- "An umbrella term used to refer to the concepts of openness, transparency, rigor, reproducibility, replicability, and accumulation of knowledge, which are considered fundamental features of science" (Crüwell et al., 2018)
- A rapidly growing and evolving movement that is changing (*improving?*) how science is being done!
  - Open sharing of code, data and research materials
  - More replications and re-analyses
  - Preprints and open access publishing
  - Preregistration and registered reports

Crüwell, S., van Doorn, J., Etz, A., Makel, M. C., Moshontz, H., Niebaum, J. C., Orben, A., Parsons, S., & Schulte-Mecklenbeck, M. (2018). 7 Easy Steps to Open Science: An Annotated Reading List. https://doi.org/10.31234/osf.io/cfzyx
Allen, C., & Mehler, D. M. (2019). Open science challenges, benefits and tips in early career and beyond. PLoS biology, 17(5), e3000246.

Where to begin?

- Open Science is not all or nothing – treat it like a "buffet" (coined by Christina Bergmann)
  - These are research skills that take time to develop!

- Some easy Open Science practices to adopt:
  - Open sharing of code, data and research materials
  - More replications and re-analyses
  - Preprints and open access publishing
  - Preregistration and registered reports



Kathawalla, U. K., Silverstein, P., & Syed, M. (2021). Easing into open science: A guide for graduate students and their advisors. *Collabra: Psychology*, *7*(1).
McKiernan, E. C., Bourne, P. E., Brown, C. T., Buck, S., Kenall, A., Lin, J., ... & Yarkoni, T. (2016). Point of view: How open science helps researchers succeed. elife, 5, e16800.

Preregistration and

- Preregistration involves publicly posting the research question, hypotheses, design, planned analysis before the data is collected (or examined)
  - Hosted on AsPredicted.org or Open Science Framework and others!
  - Brings transparency to the researchers' design and analysis decisions, combating researcher bias, analytical flexibility and p-hacking

nature human behaviour

Perspective

https://doi.org/10.1038/s41562-022-01497-2

Reducing bias, increasing transparency and calibrating confidence with preregistration

Received: 23 April 2021

Accepted: 9 November 2022

Tom E. Hardwicke & Eric-Jan Wagenmakers

Hardwicke, T. E., & Wagenmakers, E. J. (2023). Reducing bias, increasing transparency and calibrating confidence with preregistration. Nature Human Behaviour, 7(1), 15-26.

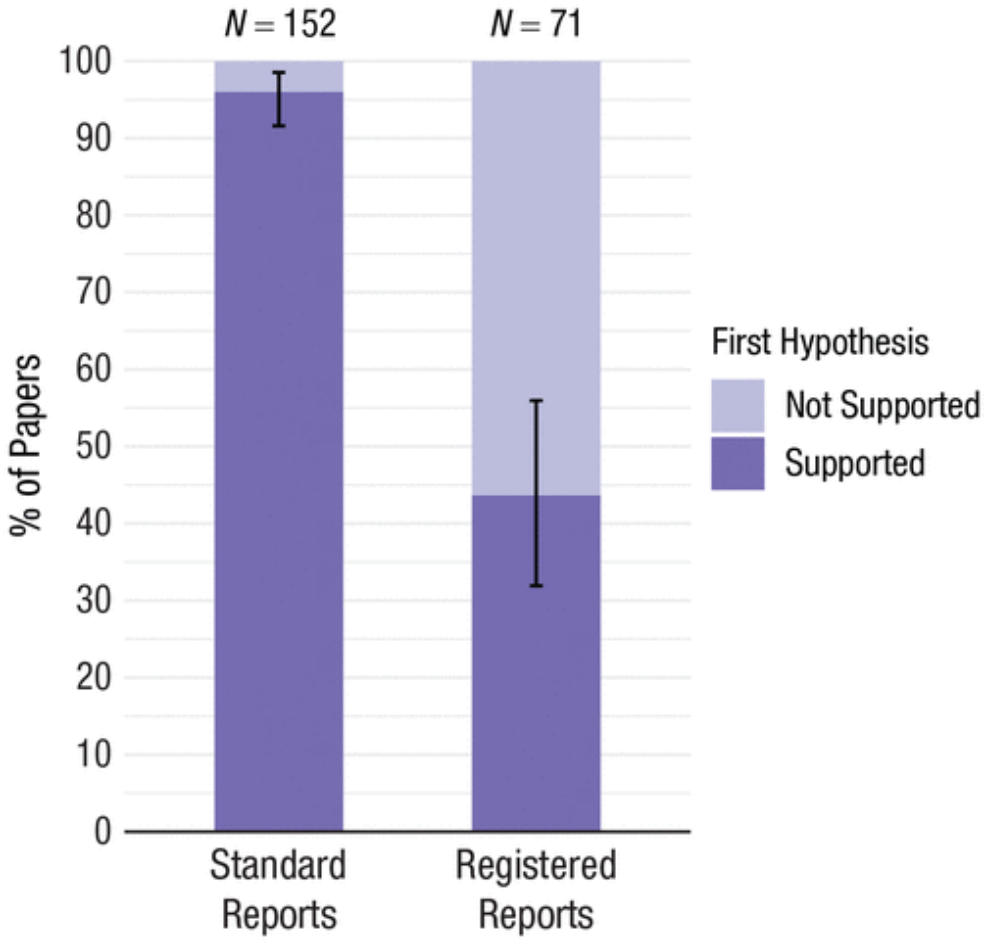
Registered Reports

- Registered Reports are a new publishing format where the study design is peer-reviewed and accepted in-principle (Chambers et al., 2015)
- This combats publication bias – the notion that positive results are most worth publishing – and shifts focus to rigor and methodology away from the findings

Chambers, C. D., Dienes, Z., McIntosh, R. D., Rotshtein, P., & Willmes, K. (2015). Registered reports: realigning incentives in scientific publishing. *Cortex*, *66*, A1-A2.

It is working!

- Registered Reports have substantially fewer positive results than the standard literature (Scheel, Schijen and Lakens, 2021)
  - Likely due to a reduction in publication bias and error inflation!

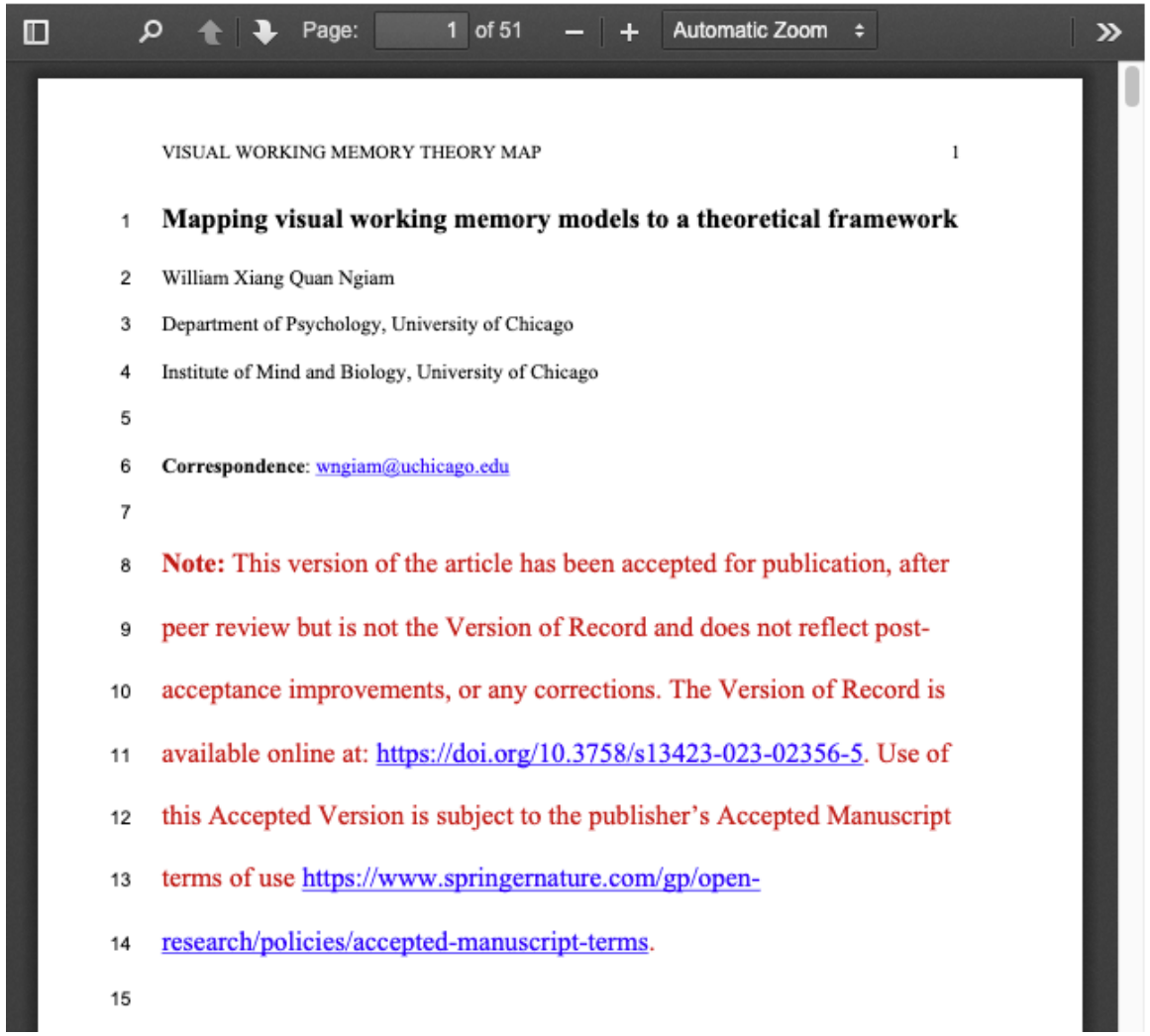


Scheel, A. M., Schijen, M. R., & Lakens, D. (2021). An excess of positive results: Comparing the standard Psychology literature with Registered Reports. *Advances in Methods and Practices in Psychological Science*, *4*(2), 251524592110074*67*.

Open access publishing

- Making scientific publicly accessible via preprints (*PsyArXiv* or *bioRxiv*) or publishing in (diamond) open access journals
  - Journals have article processing charges (APC) (charging the scientist!) to publish the paper for open access
    - USD$3710 for *Cognitive Psychology*, USD$3450 for *NeuroImage*
  - Receives more citations and coverage than non-OA research, likely due to increased ease of access and visibility (McKiernan et al., 2016)
- Consider other content formats for sharing research that are likely more effective science communication!
  - Open access shifts power away from publishers
  - Creating open educational resources (e.g. how-to or explainer videos)
  - Writing informal blogposts

McKiernan, E. C., Bourne, P. E., Brown, C. T., Buck, S., Kenall, A., Lin, J., ... & Yarkoni, T. (2016). Point of view: How open science helps researchers succeed. elife, 5, e16800.



Page: 1 of 51 Automatic Zoom

Mapping visual working memory models to a theoretical framework

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Note: This version of the article has been accepted for publication, after peer review but is not the Version of Record and does not reflect post-acceptance improvements, or any corrections. The Version of Record is available online at: https://doi.org/10.3758/s13423-023-02356-5. Use of this Accepted Version is subject to the publisher's Accepted Manuscript terms of use https://www.springernature.com/gp/open-research/policies/accepted-manuscript-terms.

Abstract

The body of research on visual working memory (VWM) – the system often described as a limited memory store of visual information in service of ongoing tasks – is growing rapidly. The discovery

preprint DOI

https://doi.org/10.31234/osf.io/g8erx

License

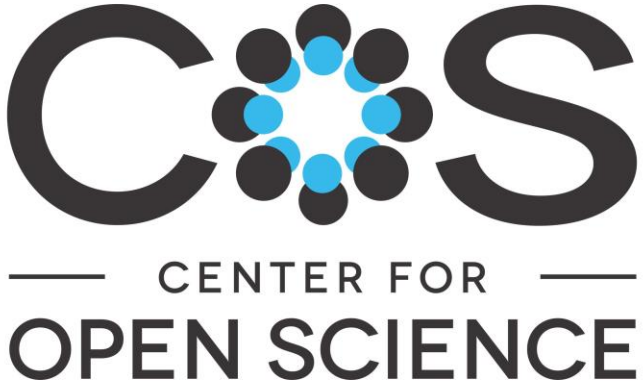
Disciplines

Memory Cognitive Psychology Social and Behavioral Sciences

Open access to research materials

- Sharing experimental code/data/stimuli for open access
  - Making a public repository of all research materials on the Open Science Framework (run by the Center for Open Science)
  - Uploading code and packages to GitHub and making it publicly available

- Allows for in-depth scrutiny and evaluation
  - And allows for re-analysis of the data for other purposes!
  - Promotes equity as it can reduce barriers for other researchers!



Abstract

Brady, Konkle and Alvarez (2009) argued that statistical learning boosts the number of colors that can be held online in visual working memory (WM). They showed that when specific colo...

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Open Data for "Memory compression" effects in visual working mem...	
− OSF Storage (United States)	
− Experiment 1 Data	
− OSF Storage (United States)	
+ Analysis Code	
+ Data	
+ UserData	
− Experiment 2 Data	
− OSF Storage (United States)	
+ Analysis Code	
+ Data	
+ UserData	

Experiment 1 Data

Ngiam & Awh

The raw data files for Experiment 1 have been uploaded here. 7/1/19: De-identified data was re-uploaded (participant information removed from files).

Experiment 2 Data

Ngiam

The raw data files for Experiment 2 are uploaded here. 7/1/19: The de-identified data is uploaded (participant information was removed).

Tags

Add a tag to enhance discoverability

Recent Activity

William X. Q. Ngiam removed Chaoxiong Ye as contributor(s) from Open Data for "Memory compression" effects in visual working memory are contingent on explicit long-term memory
2019-06-20 03:56 PM

William X. Q. Ngiam added Chaoxiong Ye as contributor(s) to Open Data for "Memory compression" effects in visual working memory are contingent on explicit long-term memory
2019-06-20 03:56 PM

William X. Q. Ngiam made Open Data for "Memory compression" effects in visual working memory are contingent on explicit long-term memory public
2019-06-20 03:56 PM

William X. Q. Ngiam updated wiki page Home to version 3 of Open Data for "Memory compression" effects in visual working memory are contingent on explicit long-term memory
2019-06-12 10:50 AM

Personal benefits of Open Science

- Improve the quality and reliability of your scientific research
  - For example, preregistrations prompt theory development, justifications of sample sizes and analyses, and statistical power considerations to protect against researcher bias
  - Being slow, thinking through research decisions, and being careful probably leads to better designed studies and more trustworthy results!
- Increases the impact of your scientific research
  - Increase reviewers' quality of feedback if they reproduce your results and analyses
  - Increase citations from re-analysis and re-use of open datasets
- Can become part of your academic brand
  - Increasingly considered in grants and job applications

Markowetz, F. (2015). Five selfish reasons to work reproducibly. Genome biology, 16(1), 1-4.
Piwowar, H. A., & Vision, T. J. (2013). Data reuse and the open data citation advantage. *PeerJ*, *1*, e175.

Personal benefits of Open Science

- You and/or others can conduct secondary analyses with the available data
  - May be used to answer research questions that were not the original aim
  - May inform future research (i.e. data-driven power analysis)
  - May be included in meta-analyses for better synthesis

- To improve your organization and storage (and peace of mind)
  - Moving data between institutions or sharing with colleagues
  - Remembering where research materials are when coming back to a project after a long time
  - Being able to pick up where you left off
    - Remembering what you actually did in the study and how you analysed the data

Positive assessments from my DECRA

- “In addition, his contribution to open science is impressive”
- “In addition, Dr Ngiam has established a reputation for scientific integrity and is an active promoter of open and transparent science.”
- “He also has substantial evidence of contributions to the field in terms of advocacy for open science, which are impressive for someone at such an early career stage.”
- “Ngiam’s collaborative relationships and commitment to open science further the potential for this project to contribute to Australia’s research reputation in this space.”

Some potential drawbacks

- You are committing to somewhat slower science (because good science takes time!)
  - My DECRA assessors were not impressed with my publication record
  - I suggested that prioritising rigour and transparency leads to greater impact (and publication in better journals)
- Other initiatives are often volunteer or in-your-own time, and do not always result in research outputs
  - Creating open-access software is not yet appreciated in the scientific community
  - Being a community-builder or creating other resources is not directly reflected in your publication numbers or citation counts

ORIGINAL ARTICLE

PSYCHOPHYSIOLOGY SPR WILEY

Estimating the statistical power to detect set-size effects in contralateral delay activity

William X. Q. Ngiam[1] | Kirsten C. S. Adam[2] | Colin Quirk[1] | Edward K. Vogel[1] | Edward Awh[1]

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Mapping visual working memory models to a theoretical framework

AUTHORS
William X. Q. Ngiam

It's not either/or – your goals can include improving science while conducting empirical research.

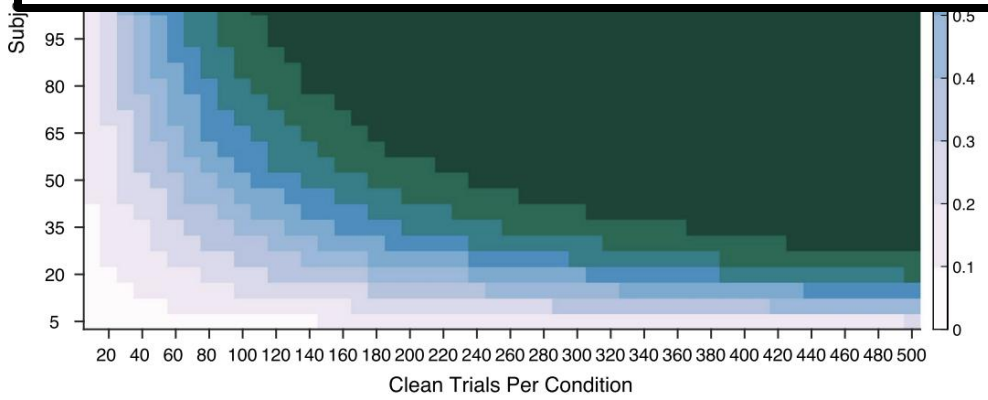


FIGURE 6 Simulated statistical power for observing a significant difference in CDA amplitude between set sizes 2 and 4 beyond the bounds of the Hakim et al. (2019) dataset

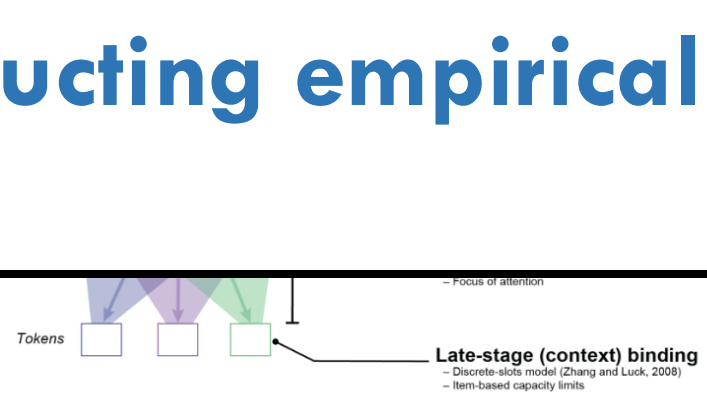


Figure 1. A simplified schematic of the Memory for Latent Representations (MLR) model architecture (Hedayati et al., 2022) with visual working memory phenomena and current models mapped on to its components: the variational autoencoder (VAE), the binding pool, and the tokens. This theory map aims to provide a coherent framework within which to organize visual working memory phenomena and discuss the relevant explanatory models. As such, the compatibility or inconsistencies between models can be better identified, and subsequently tested. For example, one could use a working definition for the noisy representation in VWM as the noise held in the pattern of neuron activity in the binding pool that follows a summation of information from various perceptual sources.

Early-career researchers leading the way with ReproducibiliTea

- An initiative founded by early-career researchers in 2018 that now spans 125 institutions across 31 countries
- Creating open scholarship communities at research institutions, especially empowering early-career researchers

Check out https://reproducibilitea.org/

- I started a ReproducibiliTea journal club chapter at the University of Chicago in my first year as a postdoc
- Became a steering committee member in the second year of my postdoc and served for three years
  - I'm still involved!
- Started a ReproducibiliTea journal club chapter University of Adelaide in my first year as a lecturer

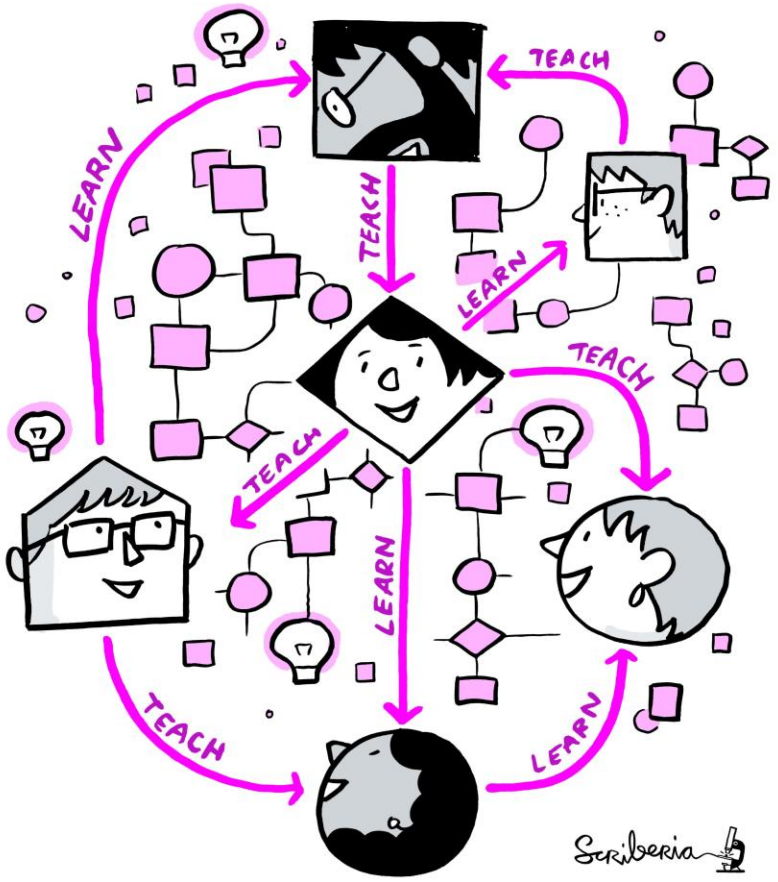


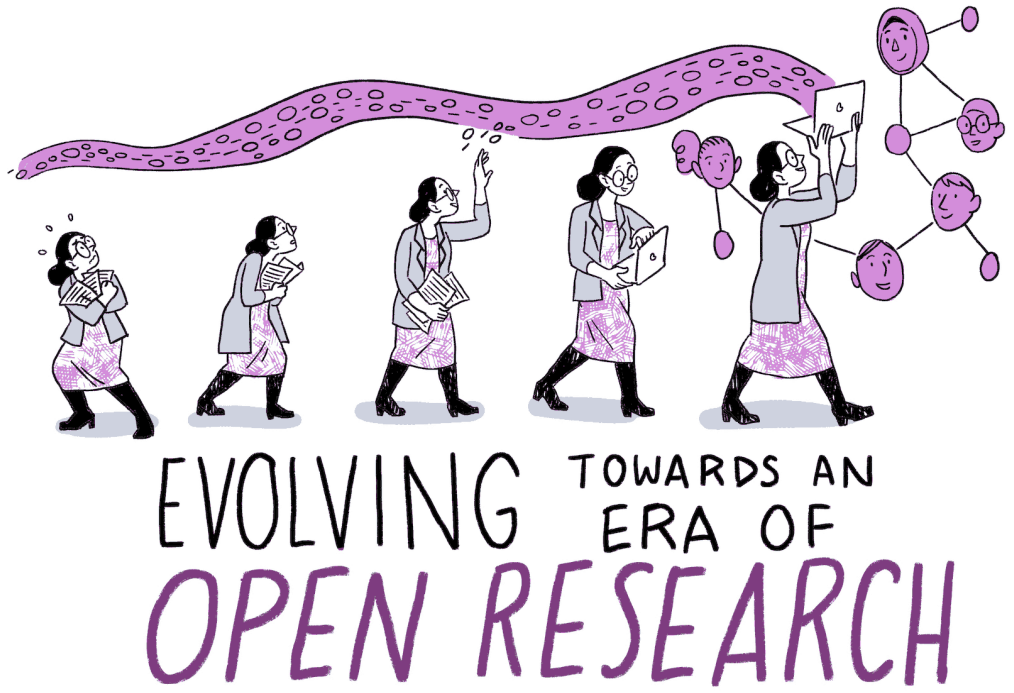
Fig. 1 Modes of change towards scientific credibility. This figure presents an overview of the three modes of change proposed in this article: structural change is often evoked at the institutional level and expressed by new norms and rules; procedural change refers to behaviours and sets of commonly used practices in the research process; community change encompasses how work and collaboration within the scientific community evolves.

Korbmacher, M., Azevedo, F., Pennington, C., Hartmann, H., Pownall, M., Schmidt, K., ... & Evans, T. (2023). The replication crisis has led to positive structural, procedural, and community changes. *Communications Psychology*.

Communication network for sharing, learning and teaching. *The Turing Way* project illustration by Scriberia. Used under a CC-BY 4.0 licence.
DOI: 10.5281/zenodo.3332807.

Research rigour needs to be a priority…

and that starts with you.



The Turing Way project illustration by Scriberia.
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DOI: 10.5281/zenodo.3332807.

The credibility revolution in science can only succeed if ***we take action together***.

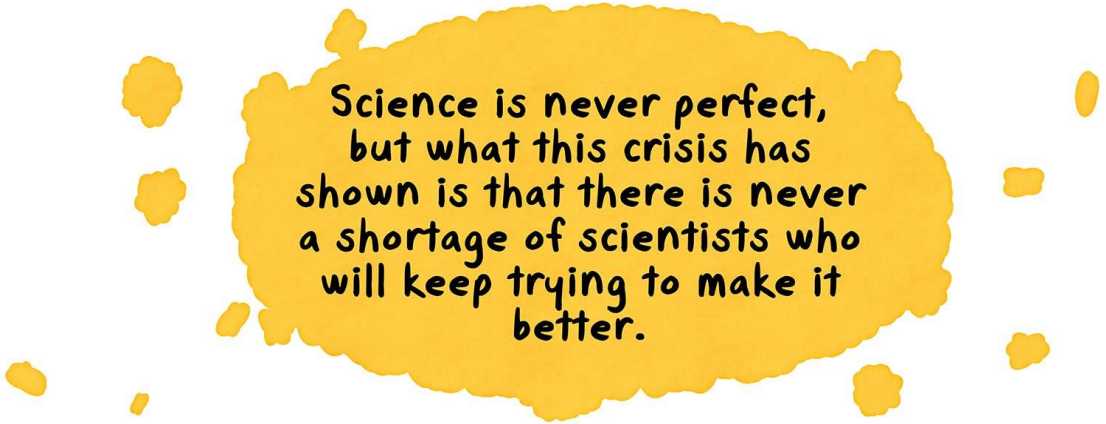
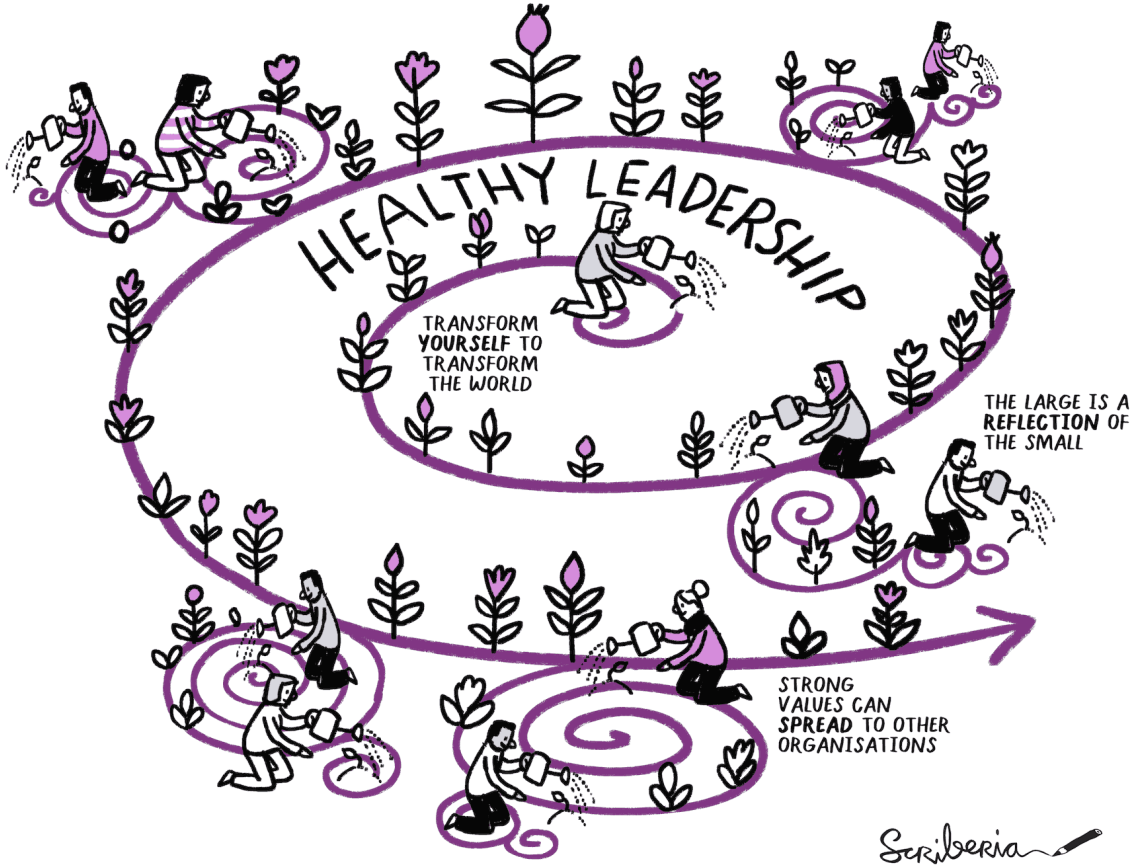


Illustration from Repeat After Me by Maki Naro
https://thenib.com/repeat-after-me/



Dr William Xiang Quan Ngiam *williamngiam.github.io* *william.ngiam@adelaide.edu.au*