

Science is broken

Openness can help fix it

Jessica Butler

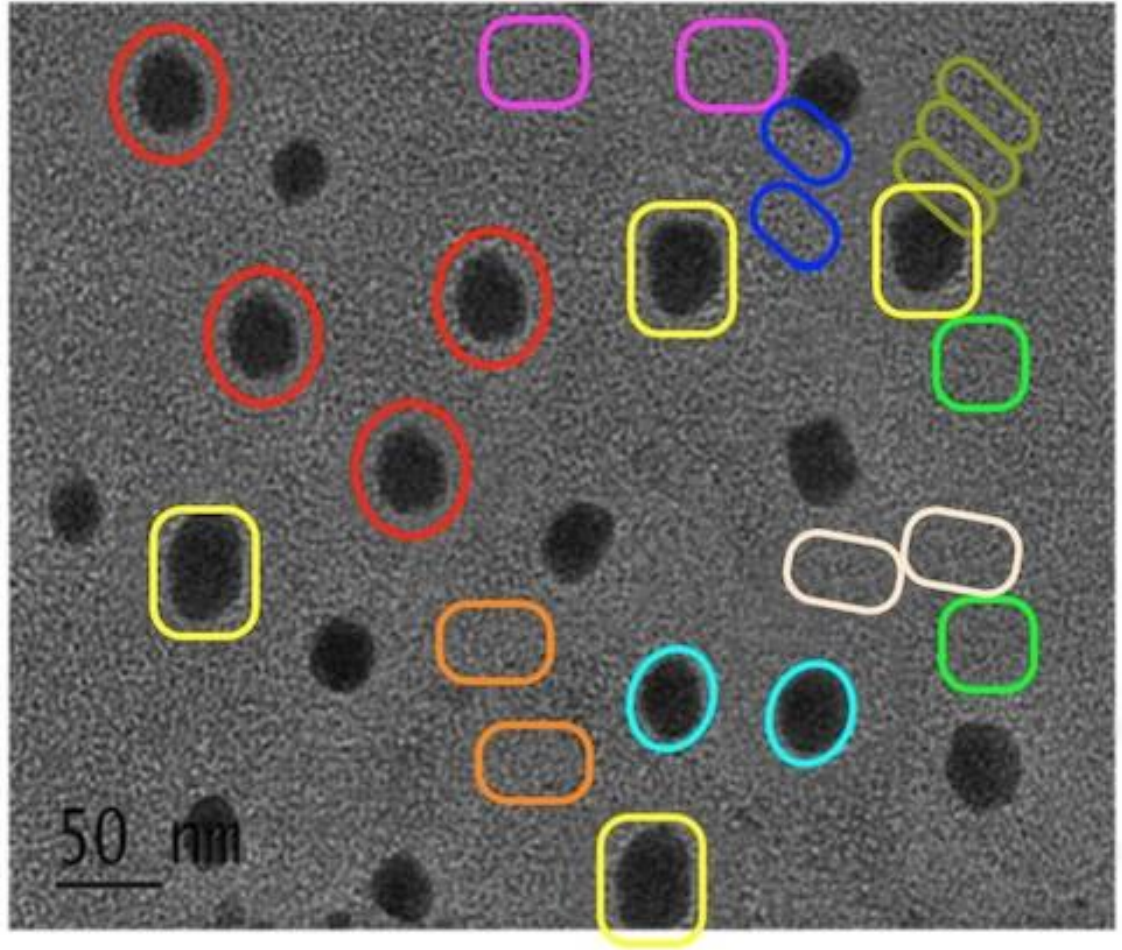
Centre for Health Data Science

University of Aberdeen + NHS Grampian

Is there *really* a problem
with research quality?



Elisabeth Bik
@MicrobiomDigest



Retraction
Watch
@RetractionWatch

Researcher charged with abusing his wife has third paper retracted

Safdar et al. *Skeletal Muscle* (2021) 11:8
<https://doi.org/10.1186/s13395-021-00264-7>

Skeletal Muscle

RETRACTION NOTE

Open Access

Retraction Note to: Exercise-induced mitochondrial p53 repairs mtDNA mutations in mutator mice



Adeel Safdar^{1,2,3}, Konstantin Khrapko⁴, James M. Flynn⁵, Ayesha Saleem², Michael De Lisio¹, Adam P. W. Johnston¹, Yevgenya Kratysberg⁴, Imtiaz A. Samjoo⁶, Yu Kitaoka², Daniel I. Ogborn⁶, Jonathan P. Little⁷, Sandeep Raha², Gianni Parise^{1,8}, Mahmood Akhtar³, Bart P. Hettinga², Glenn C. Rowe⁹, Zoltan Arany¹⁰, Tomas A. Prolla^{11,12} and Mark A. Tarnopolsky^{2,3*}

The problem is bigger
than a few
bad apples



Believe it or not: how much can we rely on published data on potential drug targets?

Florian Prinz, Thomas Schlange & Khusru Asadullah 

BMJ

BMJ 2014;348:g3725 doi: 10.1136/bmj.g3725 (Published 13 June 2014)

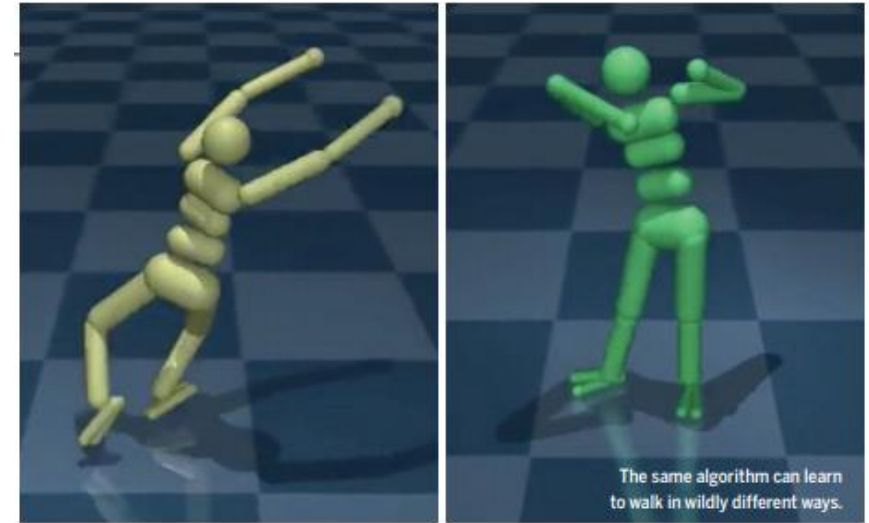
Evidence based medicine: a movement in crisis?

Trisha Greenhalgh and colleagues argue that, although evidence based medicine has had many benefits, it has also had some negative unintended consequences. They offer a preliminary agenda for the movement's renaissance, refocusing on providing useable evidence that can be combined with context and professional expertise so that individual patients get optimal treatment

Deming, data and observational studies

A process out of control and needing fixing

"Any claim coming from an observational study is most likely to be wrong."



COMPUTER SCIENCE

Artificial intelligence faces reproducibility crisis

Unpublished code and sensitivity to training conditions make many claims hard to verify

Power failure: why small sample size undermines the reliability of neuroscience

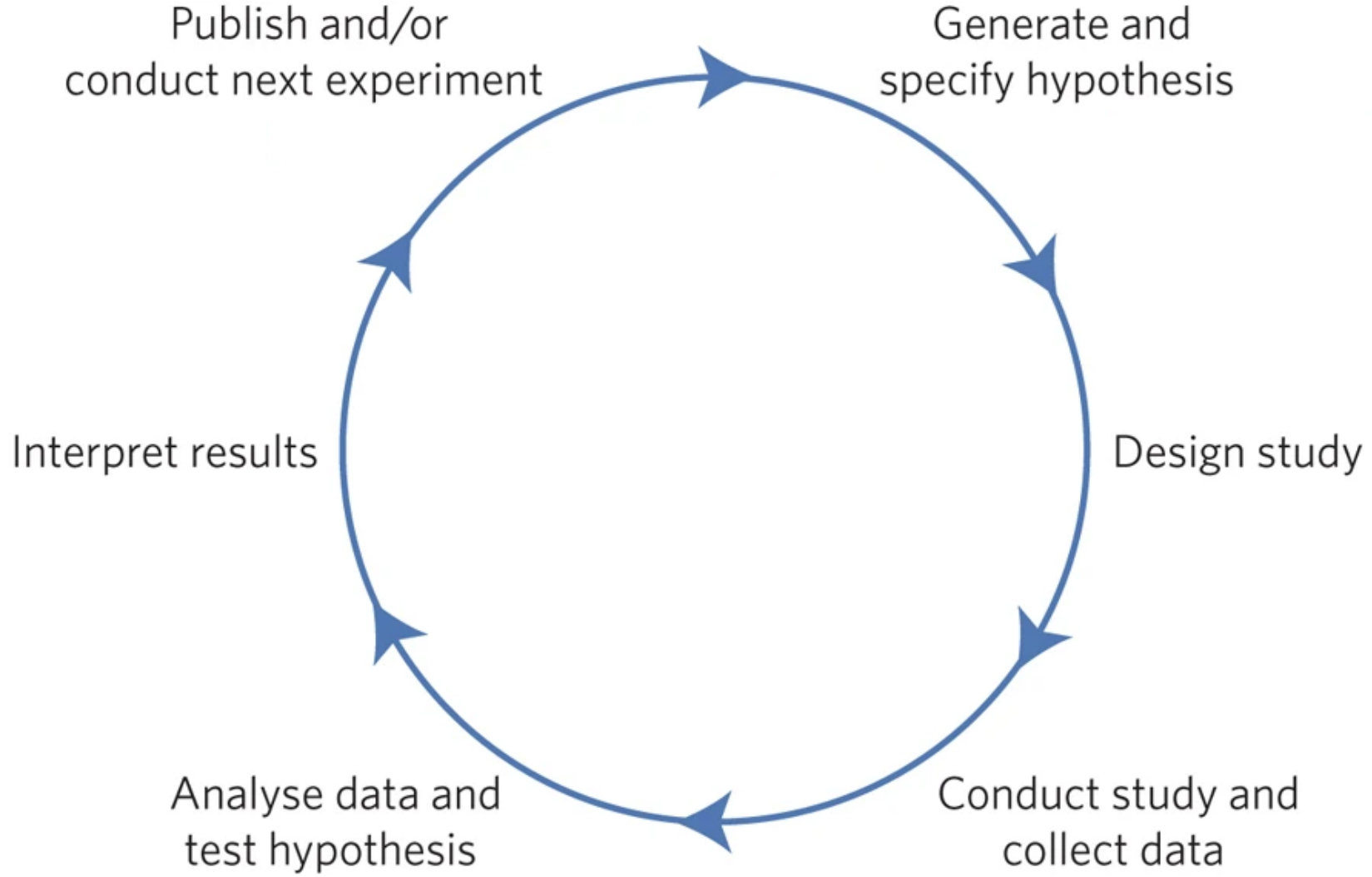
Katherine S. Button^{1,2}, John P. A. Ioannidis³, Claire Mokrysz¹, Brian A. Nosek⁴, Jonathan Flint⁵, Emma S. J. Robinson⁶ and Marcus R. Munafò¹

Committees

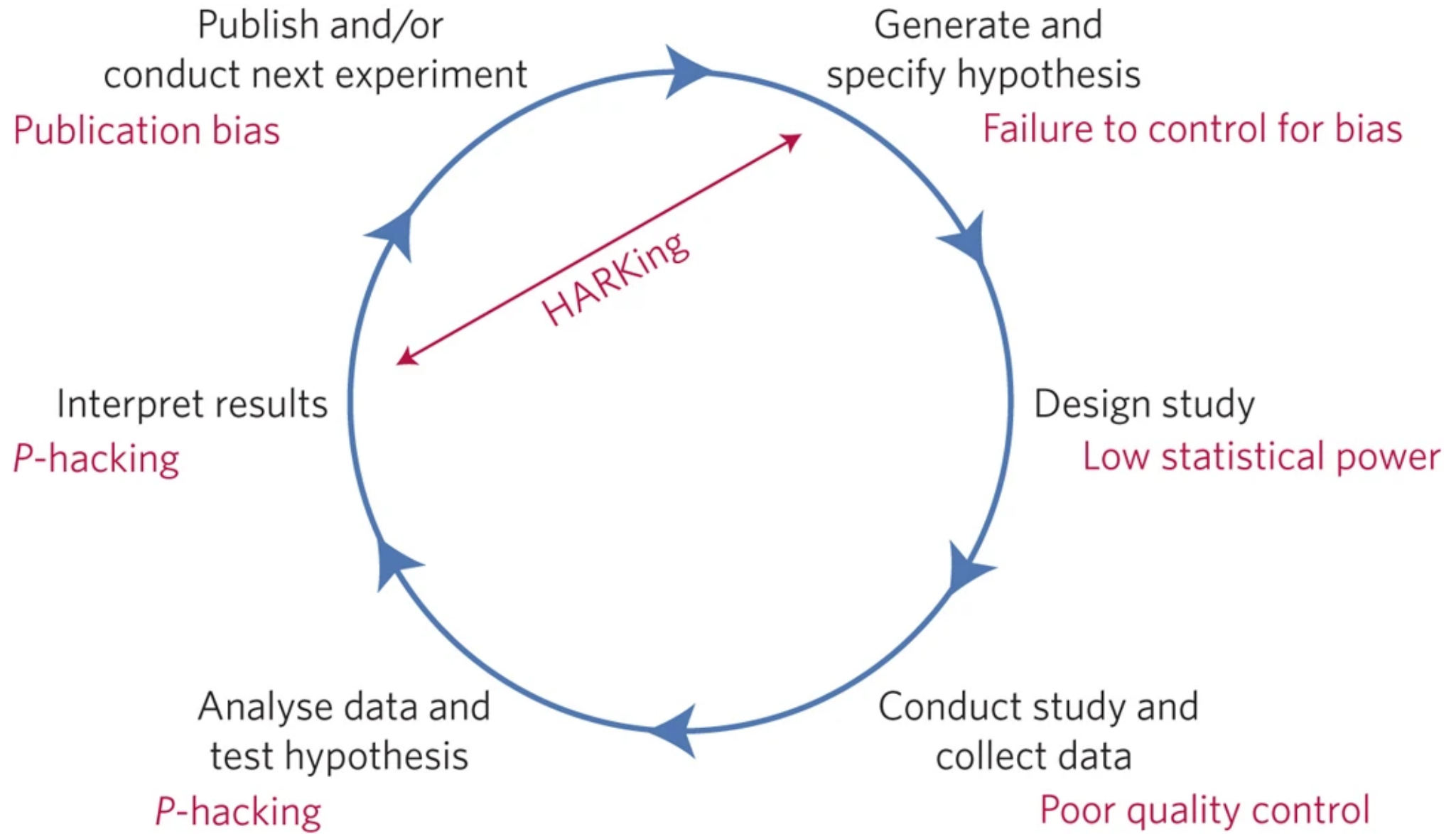
Reproducibility and research integrity

Inquiry

Why is our research
such poor quality?



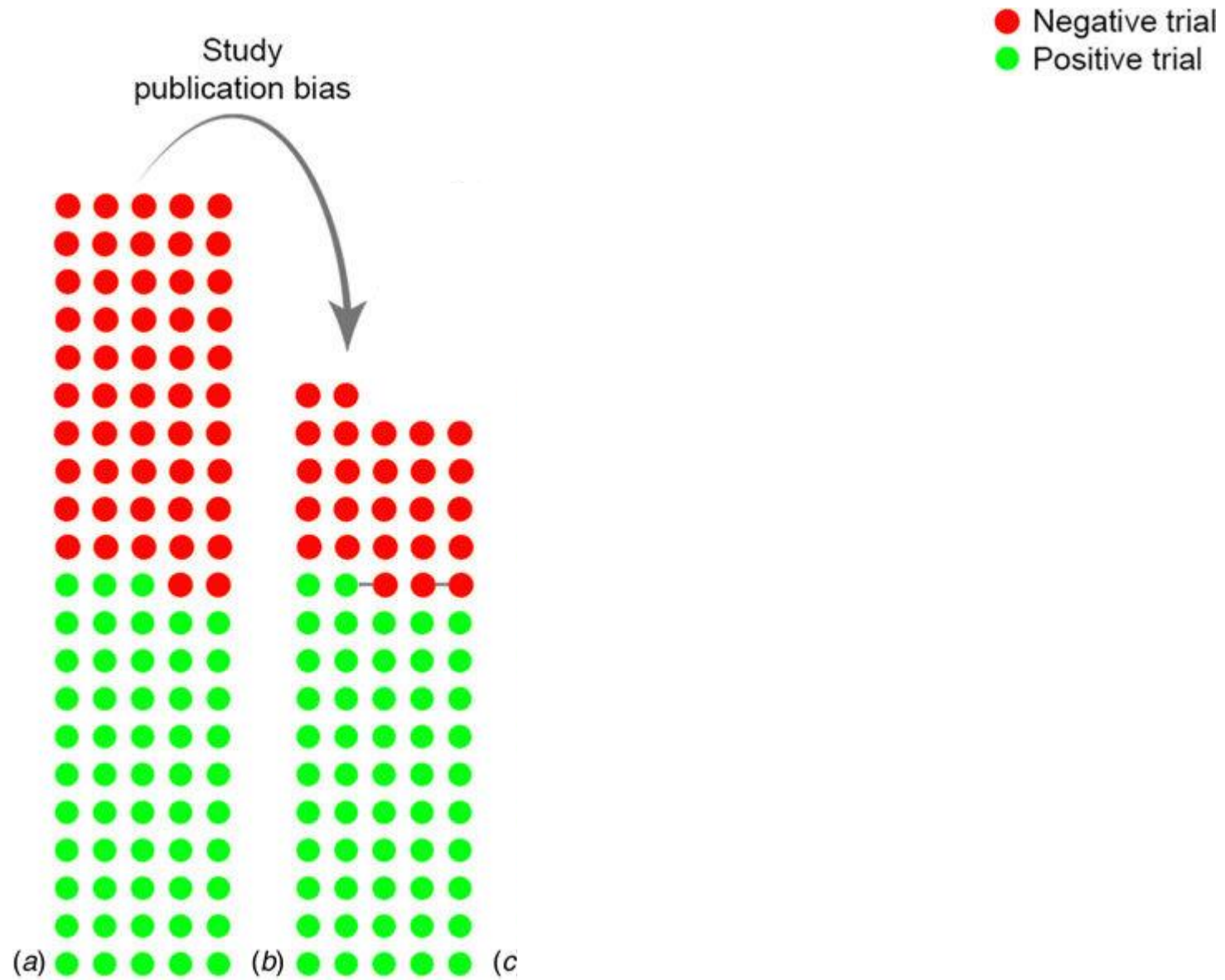
Quality control failure
at every point
in the research cycle

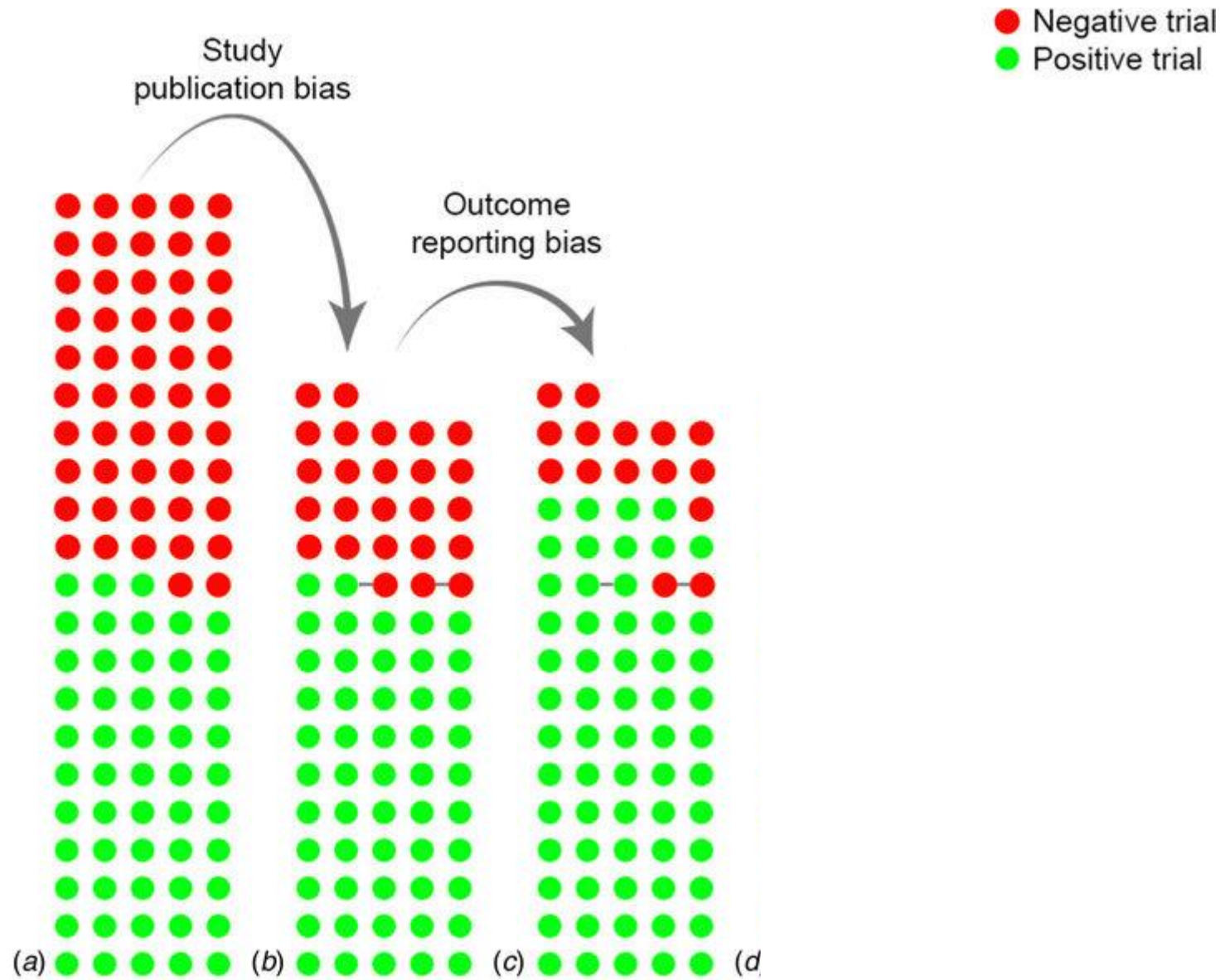


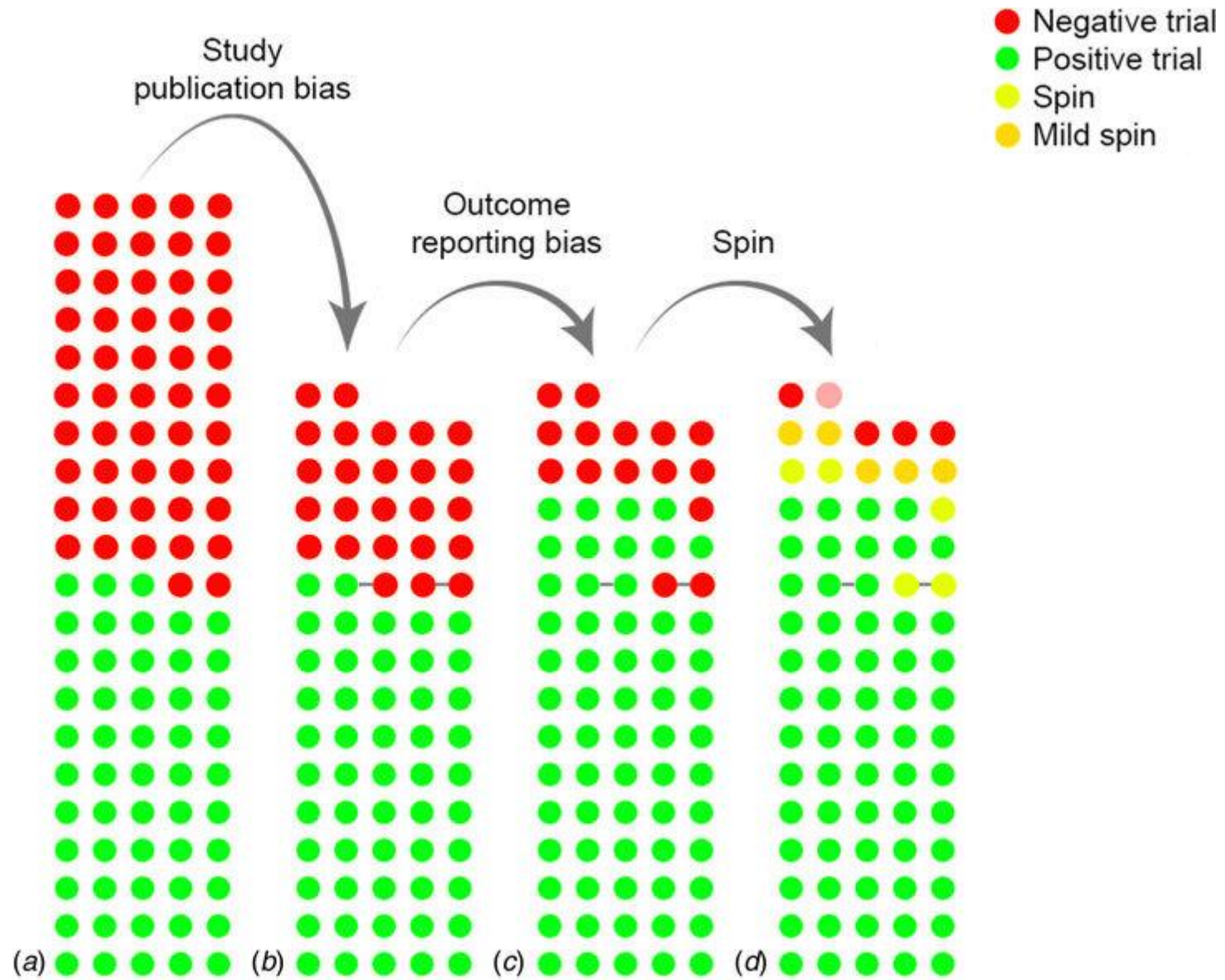
105 clinical trials of anti-depressants

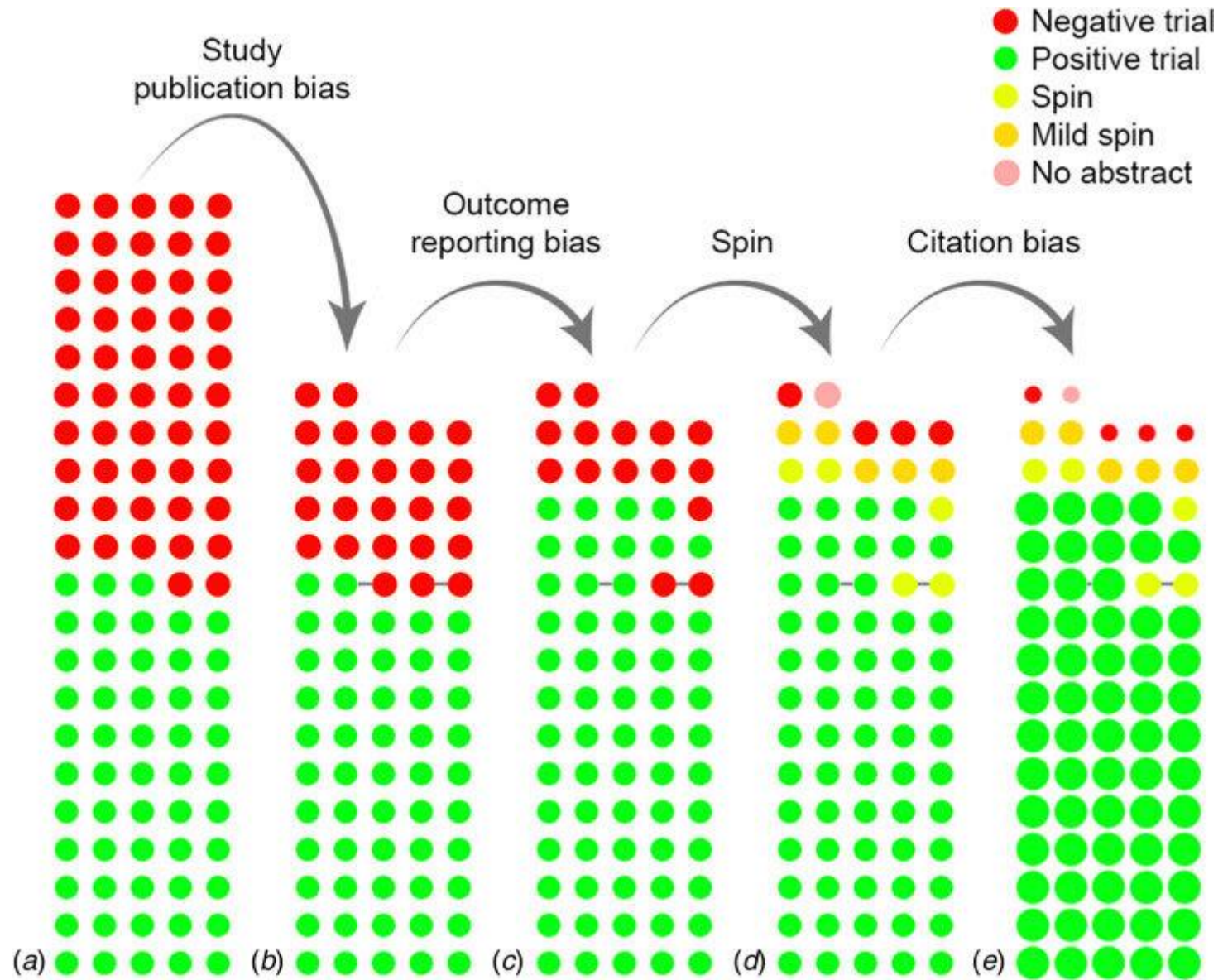
● Negative trial
● Positive trial











The cumulative effect of reporting and citation biases on the apparent efficacy of treatments, de Vries et al, 2018

RIGOR MORTIS

HOW SLOPPY SCIENCE
CREATES WORTHLESS
CURES, CRUSHES HOPE,
AND WASTES BILLIONS

RICHARD HARRIS



Science Fictions

Stuart
Ritchie



Exposing Fraud,
Bias, Negligence
and Hype in Science

We know how
to improve
research quality



Register study plans



OSF REGISTRIES ▾

Add New Registration

Which type of registration would you like to create? *

OSF Preregistration ▾

Share code & data



zenodo

Publish regardless of results

Preprint
Journal of Trial & Error
Registered Reports

The logo for arXiv.org, consisting of the text "arXiv.org" in white, centered within a solid red rectangular background.

arXiv.org

Replicate studies

Investigating the replicability of preclinical cancer biology

**Timothy M Errington^{1*}, Maya Mathur², Courtney K Soderberg¹,
Alexandria Denis^{1†}, Nicole Perfito^{1‡}, Elizabeth Iorns³, Brian A Nosek^{1,4}**

Reward error detection



We provide trustworthy evaluations of scientific research by connecting people with **Red Team critics**: skilled, independent experts who rigorously scrutinize scientific research.

Imagine if we
were promoted
for doing research
this way!

How do you get
an academic job?



How do you get
promoted?

Grade	Teaching ¹ / administration ² 20%	Research 80%		
		REF 3* papers published	Grants awarded (total co-applicant share)	PGRs ³
Grade 6	320 hours	3	60K	1.0
Grade 7	320 hours	4	125K	2.0
Grade 8	320 hours	4	250K	3.0
Grade 9	320 hours	4	600K	3.0



teamwork

studies reviewed

methods improved

errors detected

studies replicated

data shared

Research integrity: a landscape study

June 2020



Top 5 reasons for bad research

Workloads

Promotion criteria

Use of metrics (Impact Factor)

League tables

Bullying & harassment

We don't need
research integrity
police



Change
the entire
research culture?

Really?



WORLD VIEW · 10 DECEMBER 2019

Raising research quality will require collective action



Institutions must act together to reform research culture, says Marcus Munafò.

Make yourself visible

Find the good people

Educate your leaders

Has your uni signed DORA?

What are local promotion criteria?

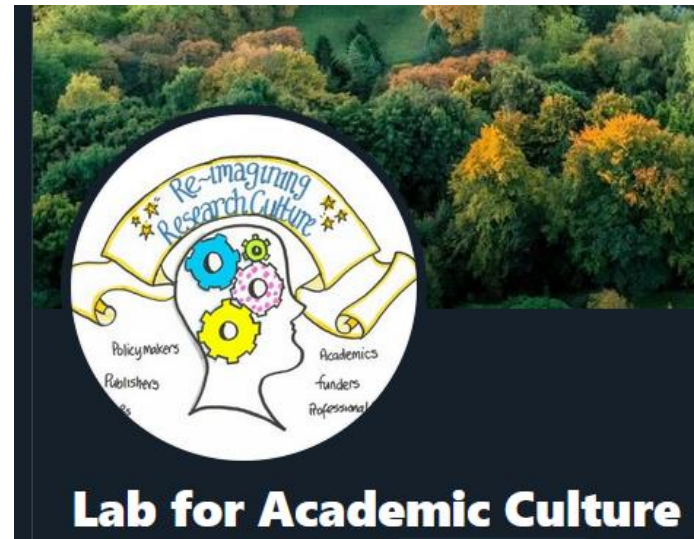
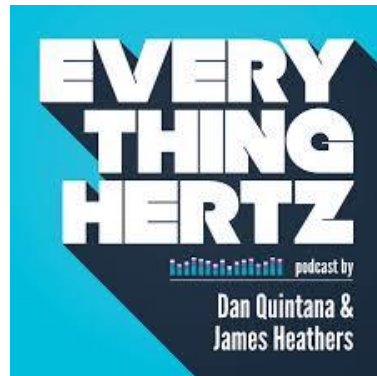
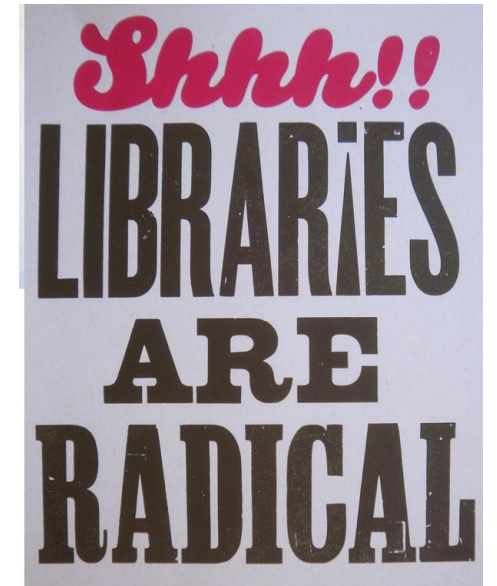
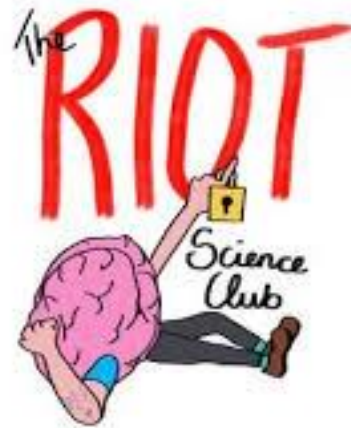
How does your uni assess rigour for REF?

Is there training for writing the new UKRI CV?

Which committees are making decisions?



#ResearchCulture
#ReimagineResearch





@JessButler@mastodon.social

Slides: osf.io/t327u