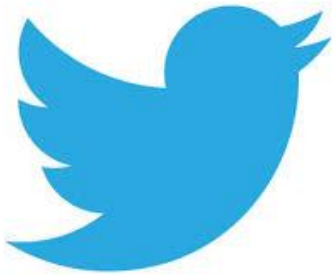
Jessica Butler

Analytics Lead
Centre for Health Data Science
University of Aberdeen

Analyst, NHS Grampian
Aberdeen Lead, UK Reproducibility Network



@JessButler284

These slides

osf.io/e2r59

How can we make more research true?

Is there really a problem with research quality?

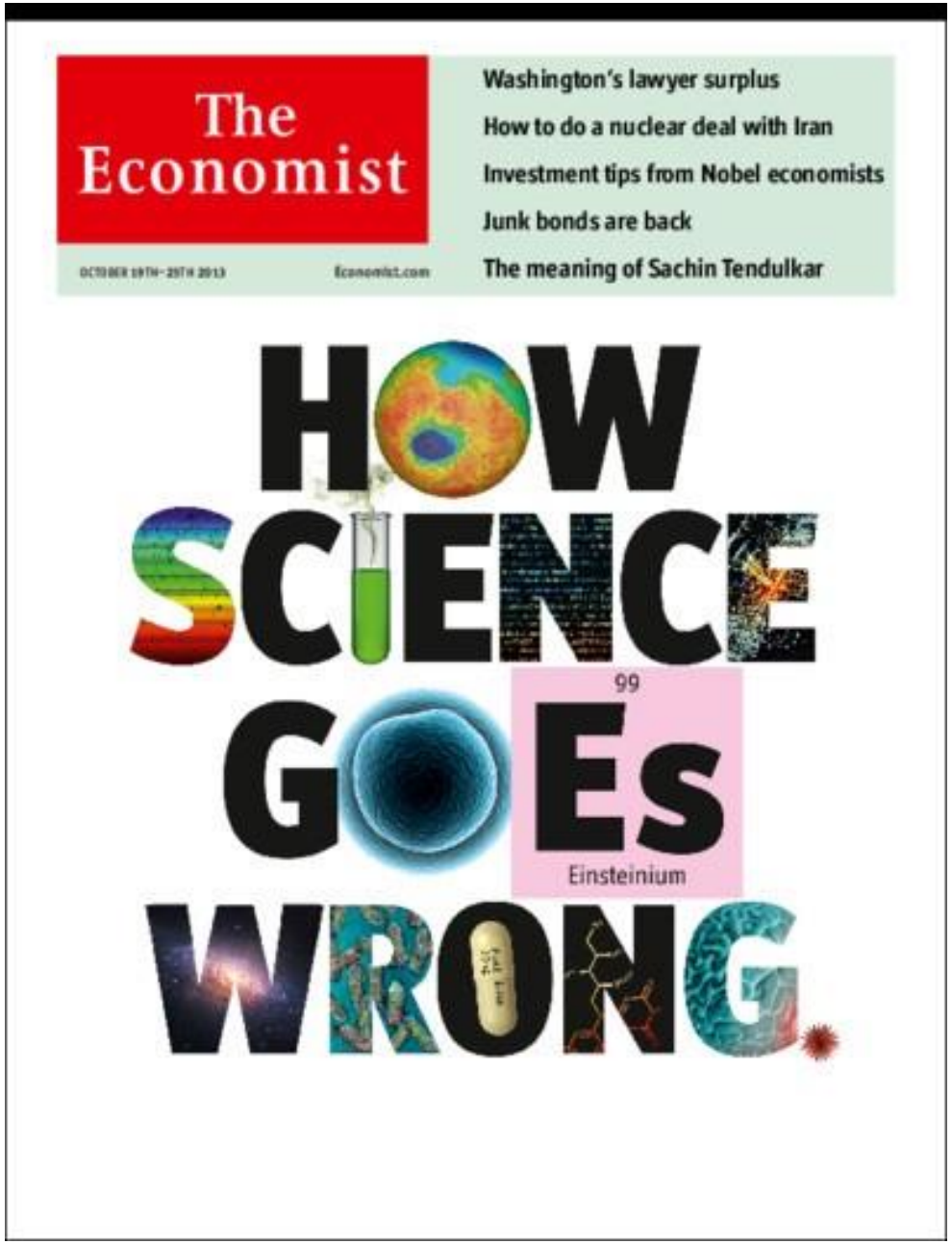
PLOS MEDICINE

Why Most Published Research Findings Are False

John P. A. Ioannidis

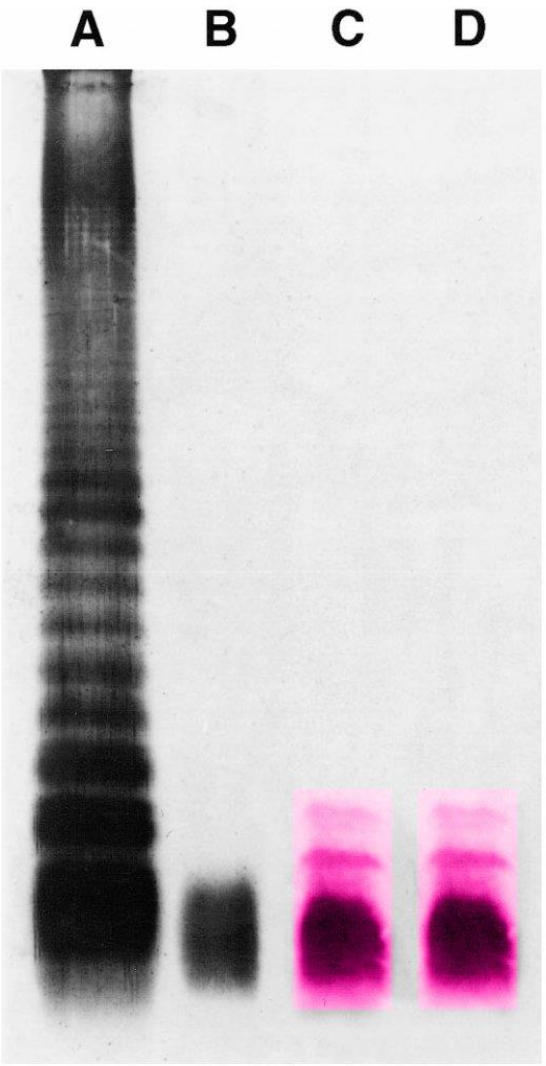
Published: August 30, 2005 • https://doi.org/10.1371/journal.pmed.0020124

75,435 Save	5,655 Citation
2,658,202 View	7,052 Share


The Economist
Washington's lawyer surplus
How to do a nuclear deal with Iran
Investment tips from Nobel economists
Junk bonds are back
The meaning of Sachin Tendulkar
OCTOBER 19TH–25TH 2013
Economist.com
HOW
SCIENCE
99
GOES
Einsteinium
WRONG.

Elisabeth Bik

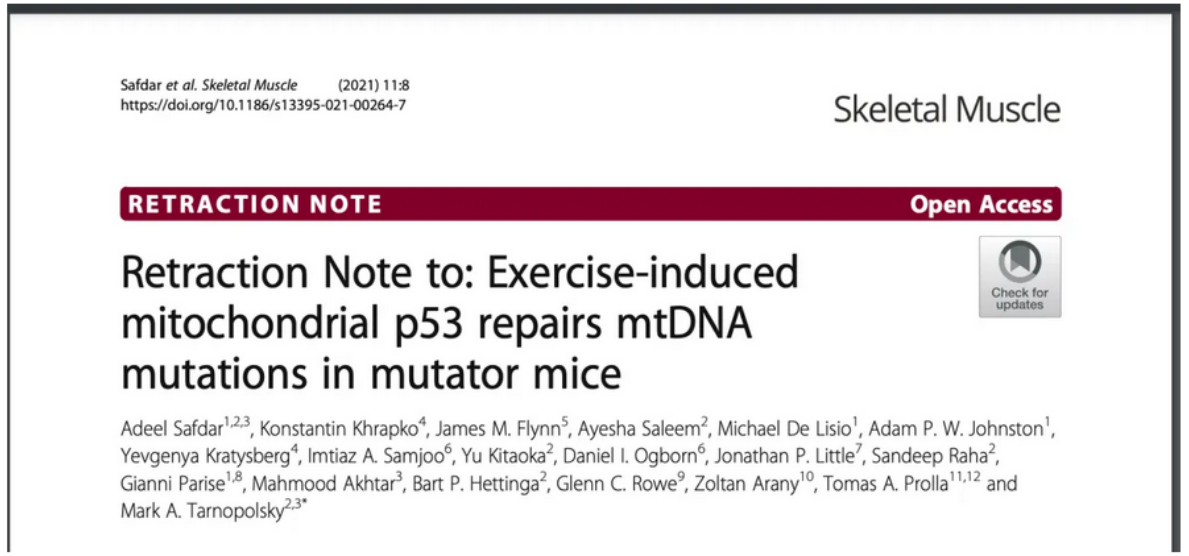
@MicrobiomDigest



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

Check for updates

Adeel Safdar[1,2,3], Konstantin Khrapko[4], James M. Flynn[5], Ayesha Saleem[2], Michael De Lisio[1], Adam P. W. Johnston[1], Yevgenya Kratysberg[4], Imtiaz A. Samjoo[6], Yu Kitaoka[2], Daniel I. Ogborn[6], Jonathan P. Little[7], Sandeep Raha[2], Gianni Parise[1,8], Mahmood Akhtar[3], Bart P. Hettinga[2], Glenn C. Rowe[9], Zoltan Arany[10], Tomas A. Prolla[11,12] and Mark A. Tarnopolsky[2,3*]

nature REVIEWS DRUG DISCOVERY

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

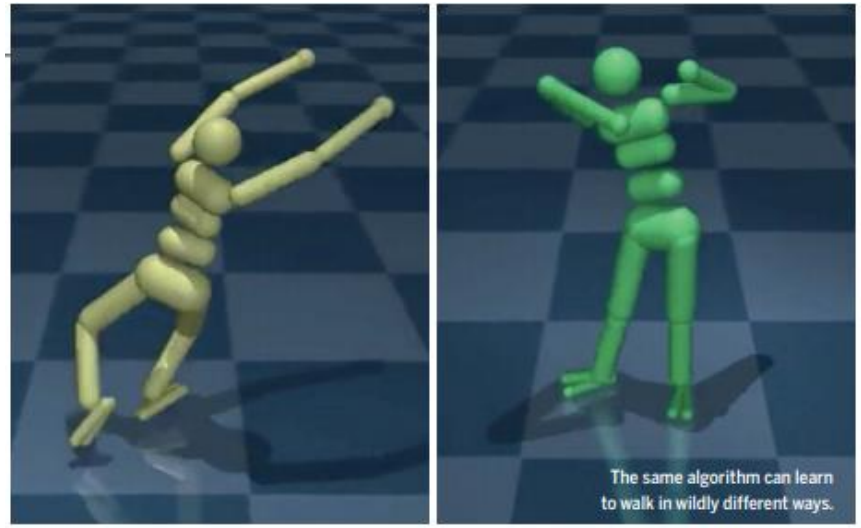
Florian Prinz, Thomas Schlange & Khusru Asadullah

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



COMPUTER SCIENCE

Artificial intelligence faces reproducibility crisis

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

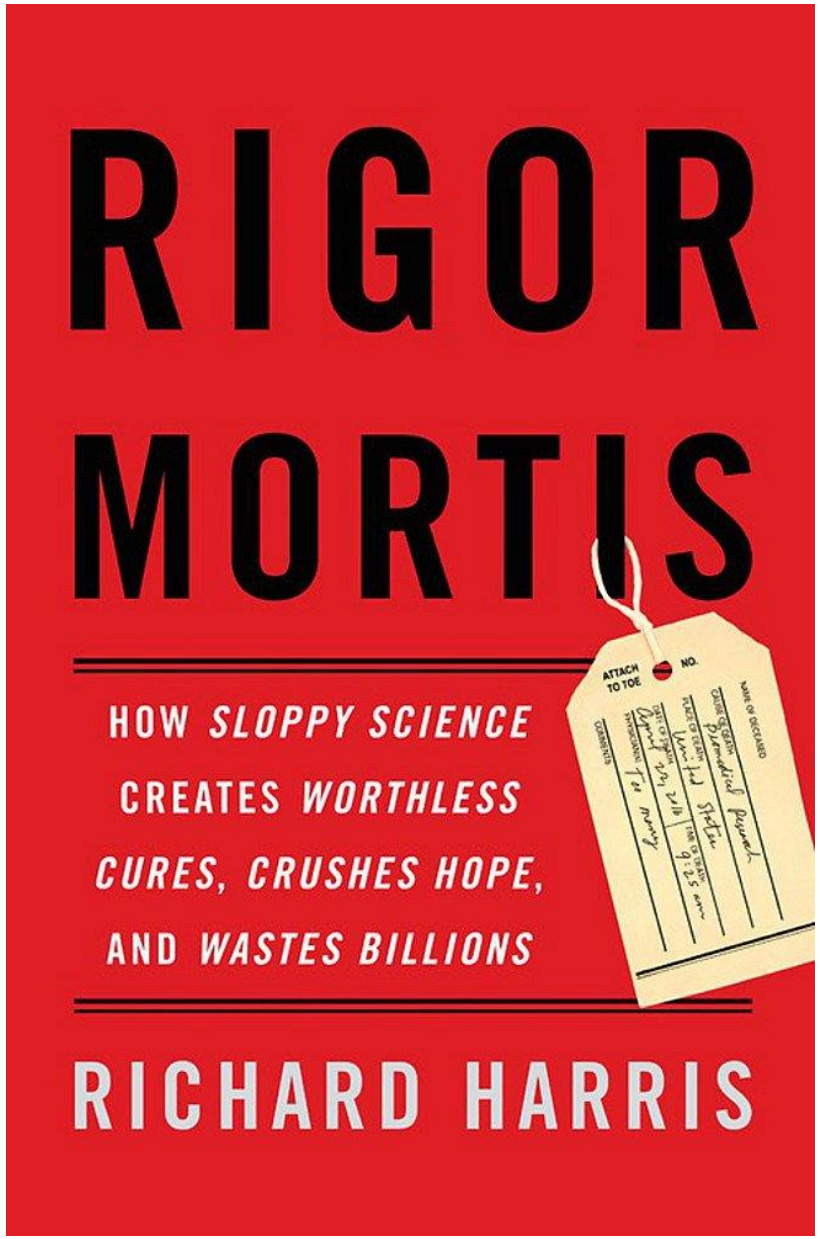
Deming, data and observational studies

A process out of control and needing fixing

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

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

Katherine S. Button[1,2], John P. A. Ioannidis[3], Claire Mokrysz[1], Brian A. Nosek[4], Jonathan Flint[5], Emma S. J. Robinson[6] and Marcus R. Munafò[1]



Science Fictions

Stuart Ritchie

Exposing Fraud, Bias, Negligence and Hype in Science

Scientific research has a problem

Why is our research such poor quality?

Research integrity:

a landscape study

June 2020

Top 5 reasons for bad research

UKRI Research Integrity Landscape Study, 2020

Top 5 reasons for bad research

Workloads
Promotion criteria
Use of metrics (Impact Factor)
League tables
Bullying & harassment

UKRI Research Integrity Landscape Study, 2020

Top 5 reasons for bad research

Workloads

Promotion criteria

Use of metrics (Impact Factor)

League tables

Bullying & harassment

UKRI Research Integrity Landscape Study, 2020

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

The Postdoc, Engine of Research

Requires PhD

1 or 2 year post, then made redundant

Paid £2,000 per month

1 day per week teaching & admin

4 days per week research

Must design and supervise research for two PhDs

Must publish at least 4 papers that are ‘world-leading’ or ‘internationally excellent’ in originality, significance and rigour

(Can’t share paper credit with uni coauthors!)

Win at least £125,000 in grants

(Only credited for your portion!
Divide £ by total co-applicants)

Median UKRI award = £380,000

6 co-applicants

So, you must win at least 2 grants

Success rate = 25%

So, plan to apply for 8 grants

(N.B. can't apply to many funders – they require applicants to have a permanent post)

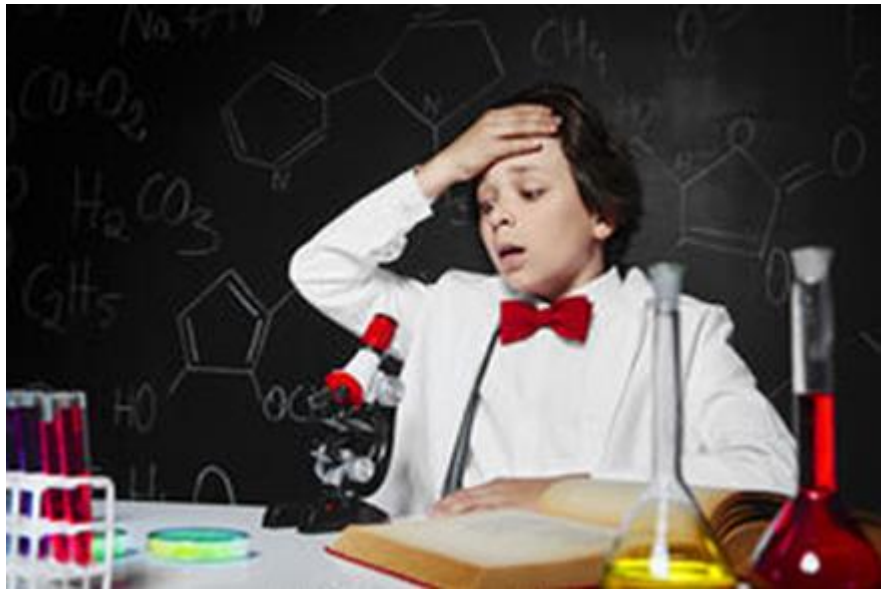
https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-DiversityResultsForUKRIFundingData2014-19.pdf

And senior academics must win
5 times more grant money than this.

So plan to apply to 40 grants.

https://www.ukri.org/wp-content/uploads/2020/10/UKRI-020920-DiversityResultsForUKRIFundingData2014-19.pdf

No wonder we have problems



We can fix this!

We know how to improve research quality

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)

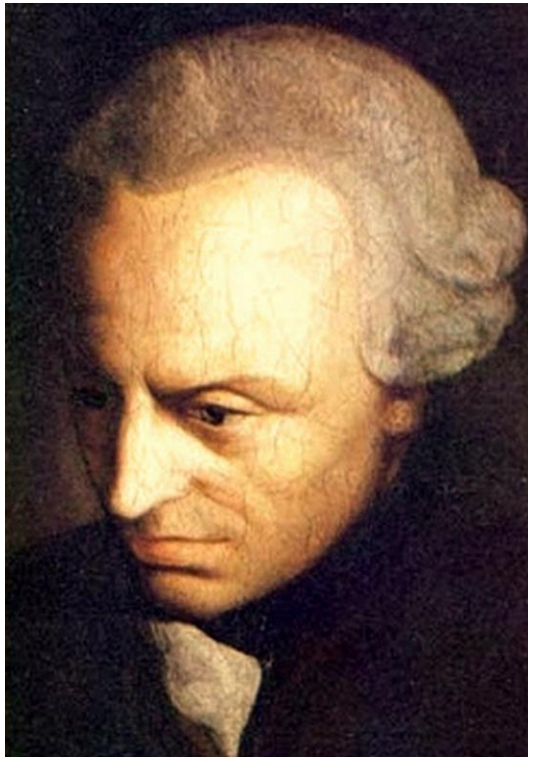
67k Accesses | **913** Citations

Register study plans
Use blinding
Publish regardless of results
Share code & data
Replicate studies
Normalise retraction
Reward teamwork

Imagine if we
were rewarded
for doing research
this way

teamwork
papers reviewed
methods improved
errors detected
studies replicated
data shared

Ought implies can



We can't do better science
if doing better science is dangerous to our careers

Change
the entire
research culture?

Really?

Junior people can lead

People in power are sympathetic but overwhelmed

Where to start?

Get informed
Find the good people
Pass solutions upwards

How are the powerful changing research culture?

https://wellcome.org/reports/what-researchers-think-about-research-culture

Universities must

Evaluate research content NOT journal metrics

Value ALL research outputs (not only publications)

DORA

Universities must

Report on research culture

Improve job security

Recognise all researchers' contributions

All UKRI applicants must submit a narrative (not metric) CV

Résumé for Researchers

How have you contributed to the generation of knowledge?
How have you contributed to the development of individuals?
How have you contributed to the wider research community?
How have you contributed to broader society?

How does this work locally?

Is there training for writing a UKRI CV?
Has your uni signed DORA? Concordat?
What are local promotion criteria?
How does your uni assess rigour for REF?
Who decides these things?

Find the good people

Polish your uni website
Join #ResearchCulture Twitter
Join UKRN, ReproducibiliTea, RIOT Science

Pass solutions upwards

Retweet
Send emails
Have coffees
Start a ReproducibiliTea or RIOT Club
Give talks
Ask to join committees

We don’t need research integrity police

WORLD VIEW · 10 DECEMBER 2019

Raising research quality will require collective action

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

https://www.nature.com/articles/d41586-019-03750-7

UKRI Chief Exec and UK Science Minister on research culture
https://www.youtube.com/watch?v=yPgh2l2O6gw
https://www.youtube.com/watch?v=nfS8OuemgGc

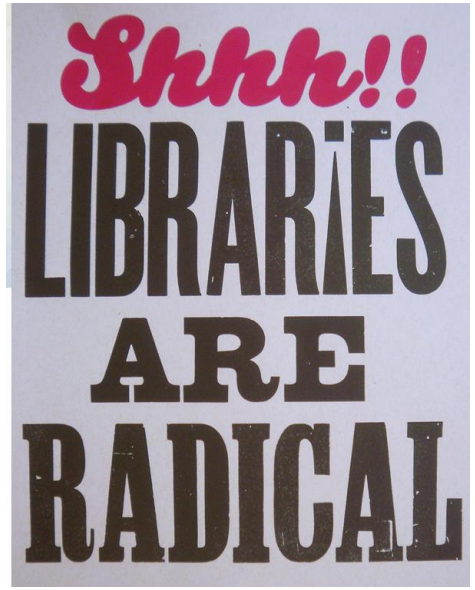
Wellcome's Research Culture change resources
https://wellcome.org/what-we-do/our-work/research-culture

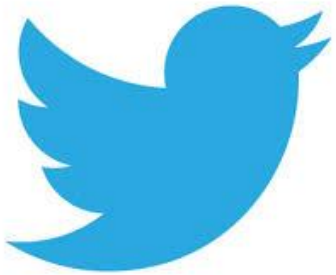
University of Glasgow's research culture change movement
https://www.gla.ac.uk/myglasgow/ris/researchculture/

Hong Kong Principles of Research Assessment
https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3000737

UK Reproducibility Network Open-License Statements for Universities
https://www.ukrn.org/common-statements/

#ResearchCulture
#ReimagineResearch





@JessButler284

These slides

osf.io/e2r59