DAY 1	Lotty (@lottybrand) 🐦	Diego
1.00pm	Introduce Open Science part 1	
1.30pm	Q&A / Discussion - Plan S	Q&A / Discussion – Plan S
1.45pm	Introduce Open Science part 2	
2.15pm	Q&A / Discussion – Preregistration **TEA & COFFEE**	Q&A / Discussion – Preregistration **TEA & COFFEE**
2.30pm	Further points on preregistration	
3.00pm		Introduce the dataset and the question for Day 2
3.15pm	Go over preregistration template	
3.15pm – 4.00pm	Preregistration exercise	Preregistration exercise
4.00pm	Q&A about preregistration, discuss any difficulties	Q&A about preregistration, discuss any difficulties
4.15pm	Introduce Github/ Version control	Introduce Github/ Version control
4.30pm	Download Git on machines	Download Git on machines

DAY 2	Lotty	Diego
1.00pm		Project structure, version control p. I
2.00pm	Q&A / Discussion	Q&A / Discussion
2.15pm		Version control p. II, GitHub
3.15pm	Q&A / Discussion	Q&A / Discussion
3.30pm		Using remake
4.00pm		Writing a reproducible report
4.30pm	Q&A / Discussion	Q&A / Discussion
4.45pm	Wrap-up	Wrap-up

What is Open Science?

1. Publishing in Open Access Journals

2. Sharing your data with your publication

3. Sharing your analysis script and your data with your publication

4. Practicing **transparent and reproducible** research from the **beginning** of the research project **to the end** (preregistration, version control, well documented data collection procedures, data processing and analysis scripts, preprints, open peer-review, and making all of this openly available alongside your manuscript and data)

Scientific Publishing

◦ Most of us can only access journal articles through your university subscription

◦ Ethical arguments against this: tax payers pay for research, but can't access the research themselves

◦ Also: researchers outside of wealthy academic institutions can't afford subscriptions, and other professionals need the info (e.g. doctors!)

◦ Academic publishers are hugely profiteering, wider profit margins than Google and Shell

Tax-funded academics do the research, write the papers, make the figures, do the editing roles, do the peer review – all for free, sign over the copyright to publishers who then sell it back to them, typeset.

Huh?

How we got here

In last 25 years, there's been a growing divergence between the roles of academic publishing:

- Disseminating validated knowledge.
- Symbolic capital for academic career progression.
- Profitable business enterprise – 35-40% profits.

Left ventricular non-compaction cardiomyopathy

Information needed - can you help?

I am a patient recently diagnosed with LVNC. I am looking for all papers related to my condition.

Requested by an anonymous user on 12/07/2018

Knowledge, attitude, and practices related to hepatitis B virus infection among Nigerian obstetricians and midwives

Information needed - can you help?

Greetings, I am a medical student in Lagos, Nigeria carrying out a study on Knowledge, attitude and risk factors of hepatitis B among waste scavengers in Lagos State. I would appreciate accese to your study in order to use it in my literature review. Thank you in anticipation of a favourable response.

Requested by an anonymous user on 15/07/2018

Cannabinoids and bone regeneration

In progress - join and share the request

I will use this information to support my patients with bone pain and bone loss

Requested by Nalini, a health professional at AIIORE, 2 weeks ago

Aaron Swartz was bankrupted by legal fees, faced $1 million in fines and 35 years in prison, for downloading academic journals.

1986-2013.

Alexandra Elbakyan is in hiding due to the risk of extradition.

Elsevier was granted a $15 million injunction against her.

~600,000 papers downloaded/day.

SCI-HUB

...to remove all barriers in the way of science

enter URL, PMID / DOI or search string

Open Access Journals

◦ Some subset of regular journals, RSOS, Nature Communications, etc – charge **APC**s

◦ Some are 'free'- Ecology & Evolution, PeerJ, PLOS Biology – see https://en.m.Wikipedia.org/wiki/List_of_open-access_journals

◦ Some are entirely free, online only, voluntarily run – see Meta-Psychology Journal (OJS)

Plan S- discuss
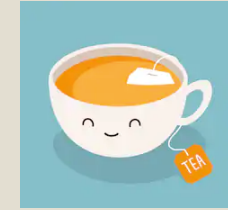
PLAN S

Requires researchers who benefit from state-funded research organisations to publish their work open access by 2020.

12 Countries: Austria, Finland, France, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Slovenia, Sweden, UK.

Plan S - discuss
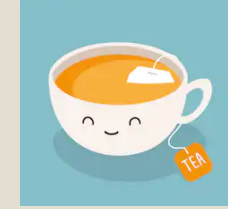
The AAAS, publisher of the journal *Science*, argued that Plan S "will not support high-quality peer-review, research publication and dissemination…

…would disrupt scholarly communications, be a disservice to researchers, and impinge academic freedom"

'If you think that information should be free of charge, go to Wikipedia' – Spokesperson for *Elsevier* (Tom Reller)

"potentially undermines the whole research publishing system" – *Springer Nature*

head of the Scientific Information Provision at the Max Planck Digital Library, told *The Scientist* that "This will put increased pressure on publishers and on the consciousness of individual researchers that **an ecosystem change is possible ..**"

Share your analysis script
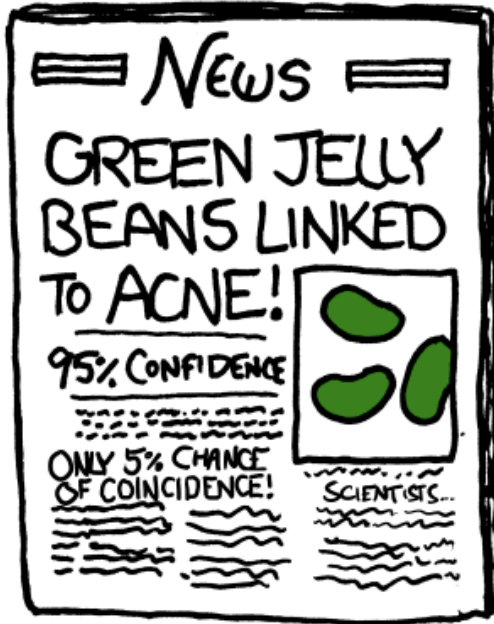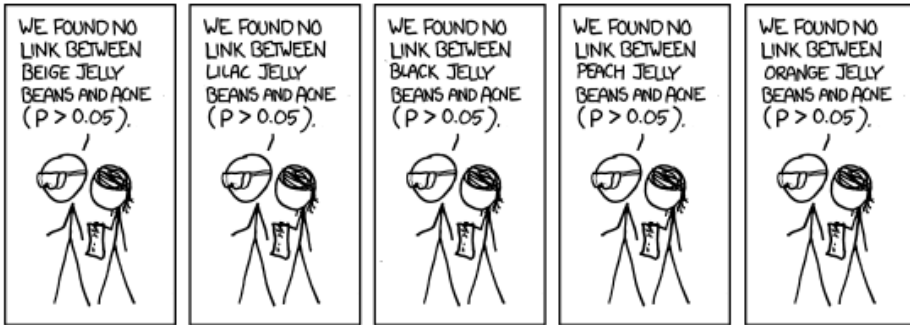
P-hacking
HARKing
Publication bias
→ distorted literature
→ Wasted research time & money
→ Replication crisis

Replication crisis

It 'began' in Psychology but the problems are science-wide…

Science Isn't Broken

It's just a hell of a lot harder than we give it credit for.

By Christie Aschwanden
Graphics by Ritchie King
Filed under Scientific Method
Published Aug. 19, 2015
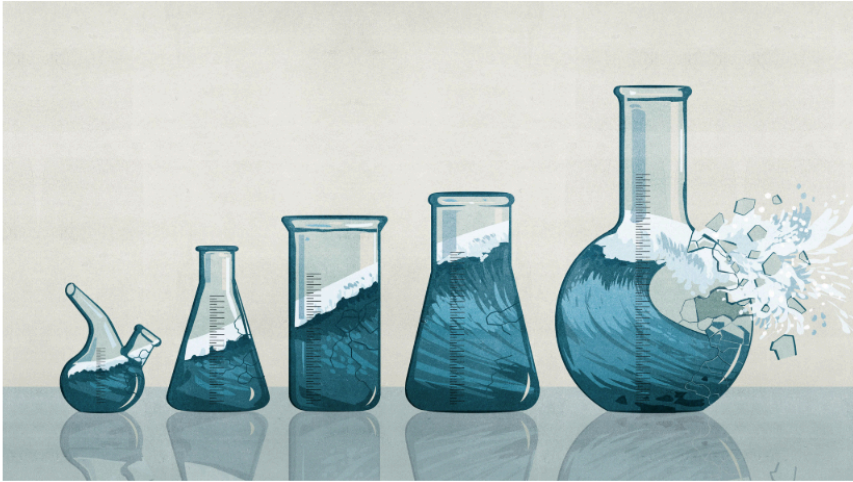
ILLUSTRATION BY SHOUT

Meta-science

The natural selection of bad science

Paul E. Smaldino[1] and Richard McElreath[2]

[1]Cognitive and Information Sciences, University of California, Merced, CA 95343, USA
[2]Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

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

Main message: *NOT* about *bad scientists*, but bad *incentives* and a flawed system

Through the variation, selection, and reproduction of scientific practices…

A lot of bad practice is maintained by accident, unconsciously following norms…

Reproducibility

- Is my supervisor checking this?
- Is the rest of the field checking this?

Now they can (and will)!

- Preregistration and/or Registered Reports
- Using R over SPSS/other point-click software
- Version control and repositories
- Pre-print archives
- Open journals/data/scripts
- (also, Twitter)

PREREGISTRATION – Discuss

Time-stamped, open record of your predictions, hypotheses and analysis plan

Preregistration

- Stating predictions before data collection (we do this anyway, right?!)

- Designed to prevents HARKing, p-hacking, other *unconscious* QRPs

Preregistration vs **Registered Reports**

- Time-stamped, open record of your predictions, hypotheses and analysis plan
- Usually (but not exclusively) before you collect your data
- Is not linked to any particular journal

- Peer-review is conducted on your intro, methods and analysis, *before you collect the data*
- This is done with a specific journal who promises to publish your work as long as you follow that peer-reviewed plan

Why bother?

- It speeds up your research
- Freedom from too many degrees of freedom (and anxiety)
- Confidence to explore
- Gain reviewers' trust
- Be scoop-proof!
- Improve the validity of science *..forever….*

Speeds up your research!
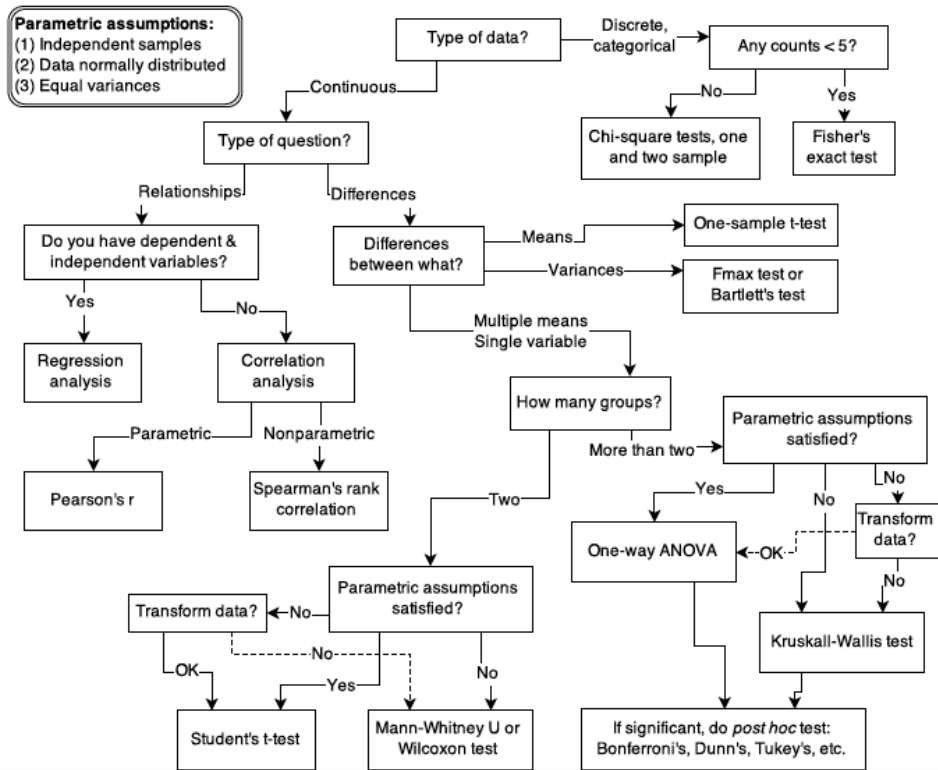
> To consult the statistician after an experiment is finished is often merely to ask him to conduct a post mortem examination. He can perhaps say what the experiment died of.
>
> — Ronald Fisher —

Freedom from degrees of freedom (and anxiety!)

Confidence to Explore!

Exploratory analysis

If you plan to explore your data set to look for unexpected differences or relationships, you may describe those tests here. An exploratory test is any test where a prediction is not made up front, or there are multiple possible tests that you are going to use. A statistically significant finding in an exploratory test is a great way to form a new confirmatory hypothesis, which could be registered at a later time.

It may be the case that participants' ratings reflect their previously held perceptions of their group members, rather than being a result of interactions during the group task. We will therefore include a model in which being initially named as someone influential in the group, or someone who others would like to learn from, are predictors of group nominations. We will also include these predictors in the full model, to see how much, if any, explanatory power they hold. We do not have any specific predictions regarding these effects, as it could conceivably be the case that influential/knowledgeable members of the group are also influential/knowledgeable on the group quiz, equally it may be the case that although they are influential/knowledgeable in one domain (e.g. knitting), they are not in another (e.g. the quiz). This is an empirical question and we do not have a strong prediction in either direction for this particular aspect of the study, nor is it our main area of focus for this study:
1) Individuals who are rated as highly influential in the group before the task are not necessarily chosen to represent the group after the task
2) Those whom individuals want to learn from within their group (e.g. how to knit) are not necessarily also nominated to represent the group at the quiz
Similarly we will check for sex differences in dominance and prestige ratings, but do not have any specific predictions regarding this. The previous studies using these dominance and prestige scales did not find a sex difference, however other research suggests males are more dominant than females in terms of Big Five personality traits, competitiveness, aggression, physical strength etc. Thus we remain open to the possibility of a sex difference in dominance ratings in our study. Similarly, a few theoretical and empirical papers suggest that age and prestige may correlate, thus we will have age as a predictor in our full models of prestige (and dominance) to check for this possibility, however we do not have a specific prediction for this and this is not the main focus of our study. We primarily predict that performance on the quiz and influence in the group task will predict prestige ratings above and beyond age in our particular study.

Gain reviewers' trust!

I read this manuscript with interest, and I appreciated the efforts taken to obtain a diverse community sample of groups with varying sets of interests. I also appreciated how the authors reported both supported and unsupported hypotheses in an unbiased way. I had some questions and comments that I think would help to clarify some aspects of the paper.

Improve validity and trust in science... forever!
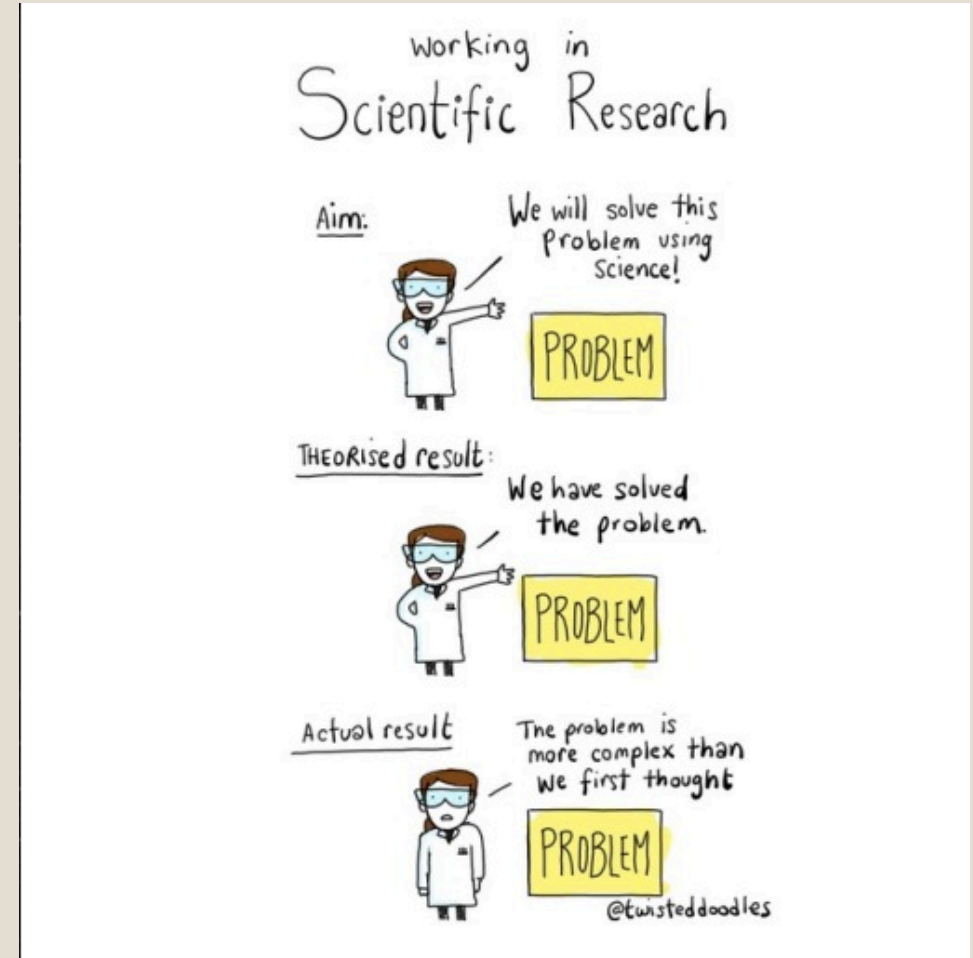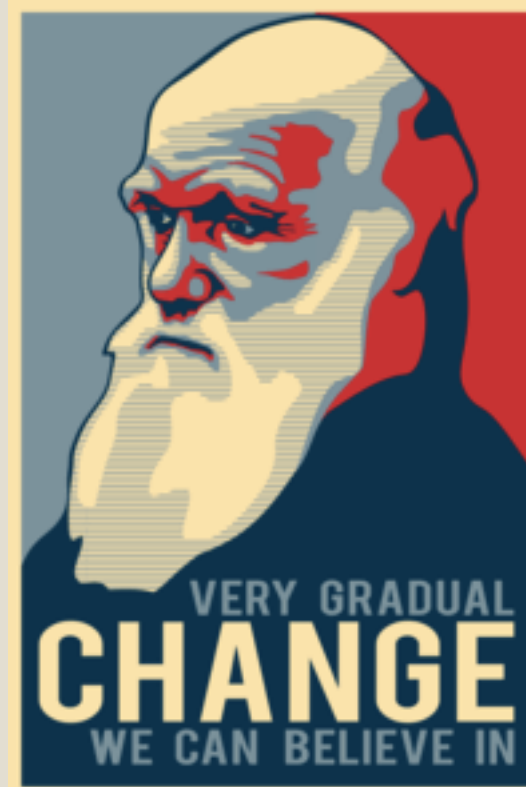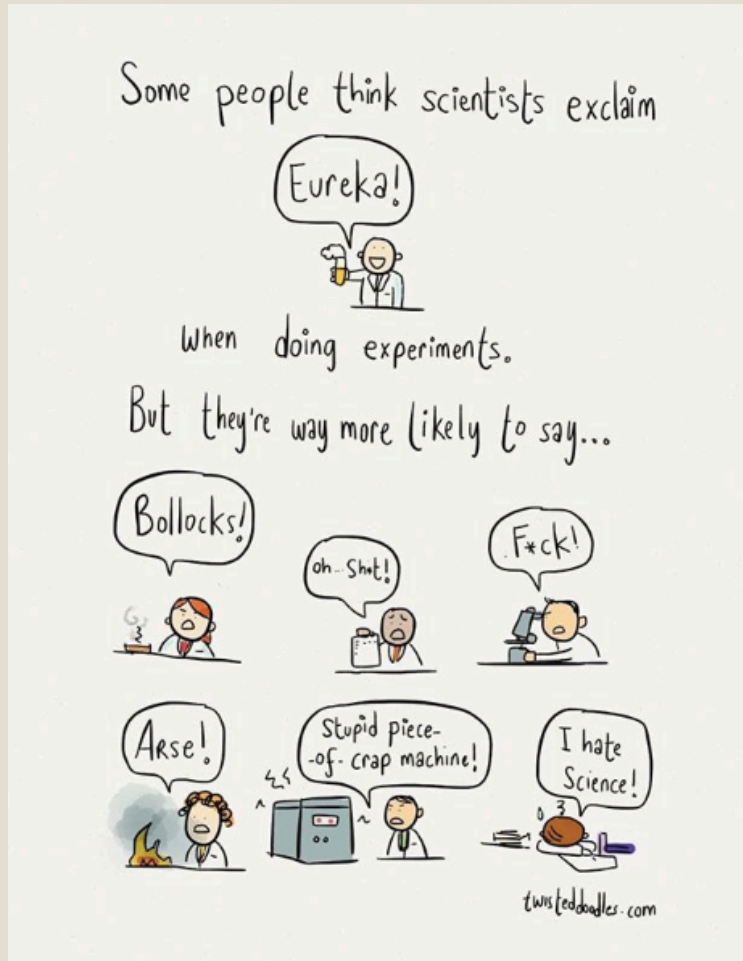
Let's talk about impact...

UK Research Councils Sign Declaration Against The Use of Journal Impact Factors in Evaluating Research Excellence

All seven UK Research Councils have joined others from across the globe signing the San Francisco Declaration on Research Assessment (DORA), to protest against the use of Journal Impact Factors in assessing research quality, Times Higher Education reported on 7 February 2018. This is significant for the UK research funding allocation as a new category of "impact" had been added from 2014 onwards

The Declaration protests against the use of Journal Impact Factors in research assessment, hiring and grant applications. DORA signatories argue that Journal Impact Factors were not designed to measure research quality, but rather as a tool to assist librarians in deciding which journals to purchase. They are based on how frequently the journal is cited across a period of two years, a practice which DORA signatories argue has very little to do with research quality, and does not reflect differences across disciplines, nor differences in the quality of papers within the same publication. It has become common practice, however, for individual and institutional quality to be evaluated according to the number of publications in high impact journals.
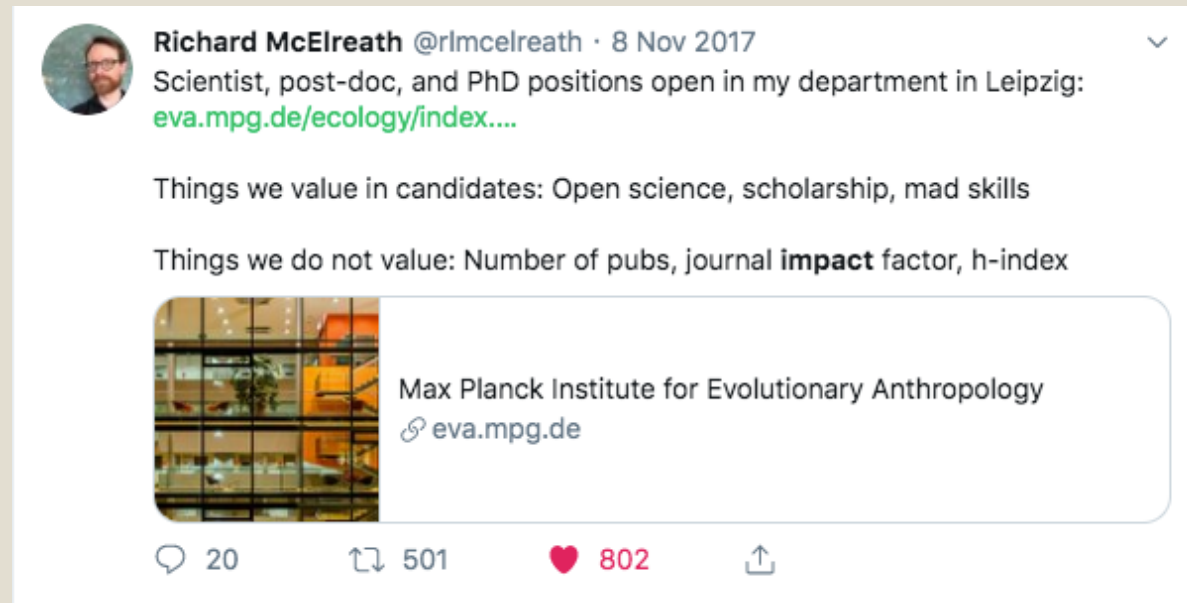
Wisdom, not impact

"Some people think that what I should be doing is
producing *Nature* and *Science* papers. More than one colleague has specifically asked
me which "*Science/Nature* projects" I have planned. That is not what Max Planck
Departments are for. High-profile publications may arise, but they should be side effects.
We demand wisdom, not professional impact."

Richard McElreath, a director of the Max Planck Institute for Evolutionary Anthropology
http://elevanth.org/blog/2018/09/02/golden_eggs/

Hiring decisions:

Is anyone actually doing it?

Share of Published Authors (PhD < 2010) Adopting Practice
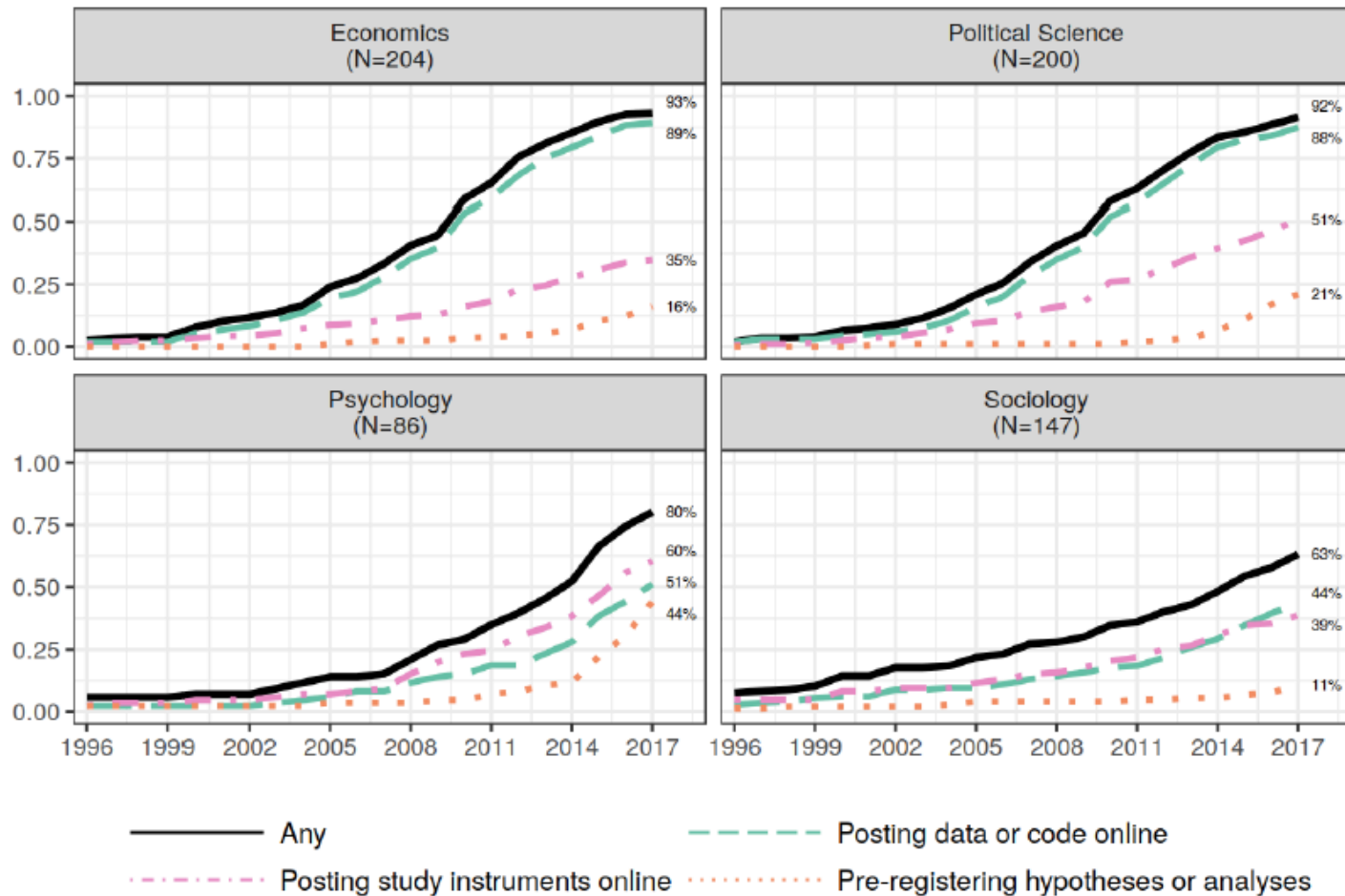
Pre-registered...
obviously!

▸ **Published Authors**: Scraped journal websites for all individuals with at least one publication between 2014-2016 in top 10 journals from each discipline

▸ **PhD Students**: Scraped top-20 North American doctoral program websites for PhD students in Fall 2017

https://www.bitss.org/events/2018am/

Is anyone actually doing it?

REGISTERED REPORTS CUT PUBLICATION BIAS

Pre-registering research protocols in a 'registered reports' format could lead to less publication bias skewed towards positive results. Studies that pre-register their protocols publish more negative findings that don't support their hypothesis, than those that don't.

HYPOTHESES NOT SUPPORTED BY RESEARCH PAPERS (%)

Estimates from general literature **5–20%**

Registered reports for novel studies **55%***

Registered reports for replication studies **66%***

©nature   *Sample size: 296 hypotheses across 113 studies in biomedicine and psychology

💬 2   🔁 138   ♡ 265   ✉   ⌄

Is anyone doing it?

Daniel Ansari @NumCog

Follow

I now get more enjoyment & excitement out of writing preregistrations than manuscripts, since the latter depends on the former and the former lays the recipe for the latter (with the exception of non-registered exploratory analyses).

12:37 am - 22 Mar 2019

2 Retweets 43 Likes

💬 2   🔁 2   ♡ 43   ✉

Tweet your reply

Daniel Ansari @NumCog · Mar 22
I am also enjoying how the @NumCogLab 's preregistrations have evolved. We are learning from our early mistakes, becoming more detailed. I am sure this will evolve further as we gain more experience with this process.

💬 1   🔁 1   ♡ 9   ✉

Daniel Ansari @NumCog · Mar 22
It's the process of making predictions precise, thinking of (hopefully) most of the details ahead of time that is so satisfying, with the added benefits of error control etc.

💬 1   🔁   ♡ 12   ✉

Daniel Ansari @NumCog · Mar 22
Also - a very practical benefit of preregistration, as a forgetful PI, is that I can open OSF & see all of our projects & preregistrations. Which means that I can spare my trainees with inane and surely annoying questions such as :" Exactly what does your study involve again??"

💬   🔁   ♡ 14   ✉

How do I do it?

- https://psyarxiv.com/wte5z/ <- step by step slideshow

- https://osf.io/prereg/

- www.aspredicted.org

- https://docs.google.com/document/d/1w_3DPN6c-evOfgHBfeVgN-huBwMRe3EJCzGFG9Tzs54/edit?usp=sharing <- full template

OSF **PREREGISTRATION**

Improve your research with preregistration. By writing out specific details such as data collection methods, analysis plans, and rules for data exclusion, you can make important decisions early on and have a clear record of these choices. This can help reduce biases that occur once the data are in front of you.

Use OSF Registries to discover previously registered work.

Start a new preregistration   Preregister a project you already have on OSF

Version Control
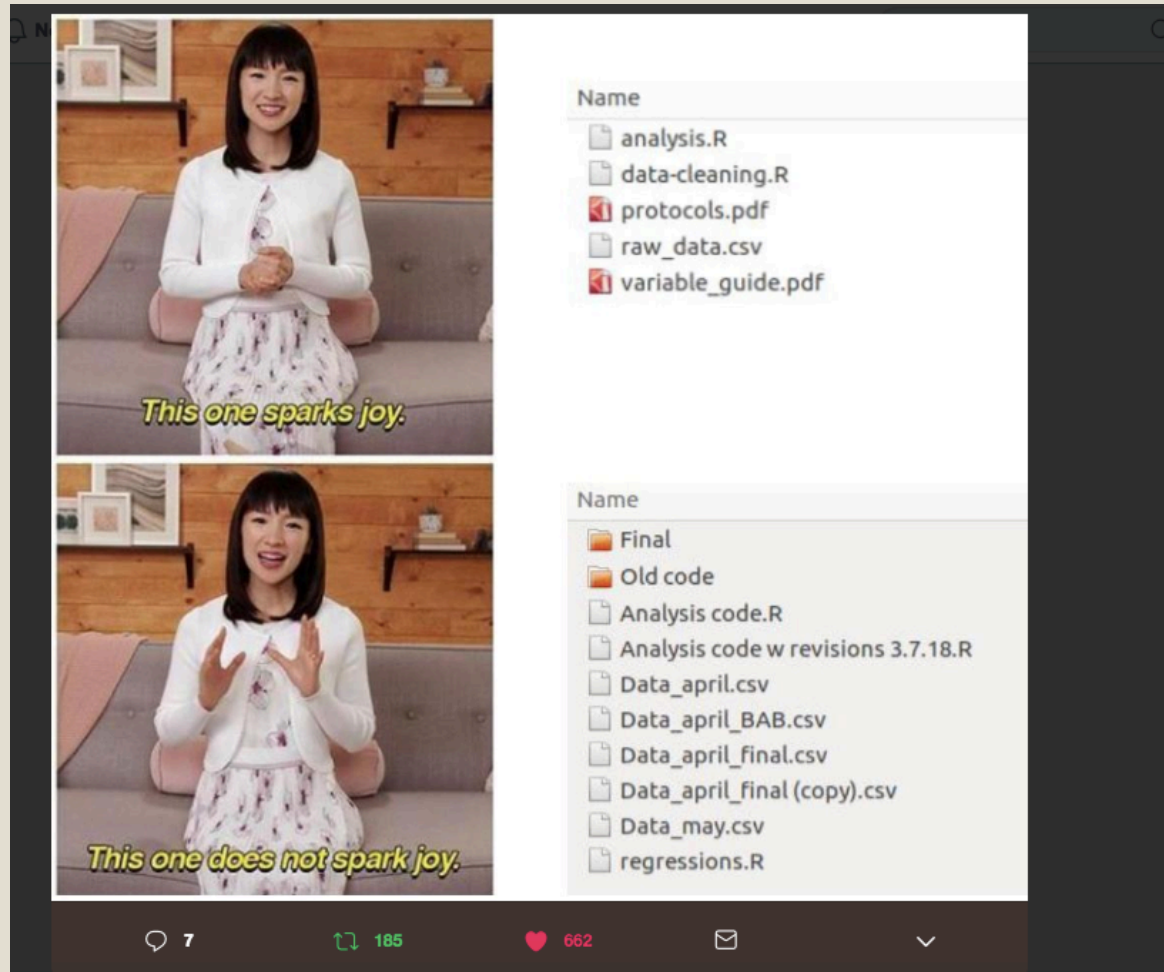
Benefits your collaborators

Benefits other researchers doing similar work

Benefits FUTURE YOU

How do I do it?

- GitHub
- Can use desktop / Rstudio if command-line too confusing…
- http://swcarpentry.github.io/git-novice/01-basics/index.html
- http://swcarpentry.github.io/git-novice/guide/
- http://nicercode.github.io/2014-02-13-UNSW/lessons/70-version-control/why.html

Preprints

Open Review

Sharing your data?

Should data be owned, bought, sold? Some argue no, as long as the data complies with ethics, is anonymized, was consented, should be open to all.

From a scientific perspective- sharing your data allows others to verify your conclusions, make use of it themselves, not have to repeat collect the same data – collaborate!

Scoop Proof!

◦ You have a jaw-dropping unique idea- Preregister it!

◦ Someone claims the same idea - point them to your time-stamped preregistration! If they claim they had the idea first, too bad, they should've preregistered it (or, you should've!)

◦ If they preregistered at exactly the same time too, bond over this coincidence and turn the competition into collaboration

◦ If they claim they genuinely didn't see your preregistration (or you genuinely didn't see theirs) this is just bad luck and cannot be avoided just like the real life world of people having simultaneous research ideas…. Preregistration doesn't make this any more likely

Other resources:

- Transparency in Ecology and Evolution community: http://www.ecoevotransparency.org/

- List of journals accepting Registered Reports: https://cos.io/rr/

- Metascience conference: https://www.metascience2019.org/program/

- Open Sci Conf: https://www.aimos2019conference.com/program

- Open Science Workshop: https://psyarxiv.com/wte5z/

- https://doi.org/10.1098/rsos.160384 The Natural Selection of Bad Science (Smaldino & McElreath 2016)

- https://journals.sagepub.com/doi/full/10.1177/1745691618767878 – Open Science is Liberating and can foster Creativity (Frankenhuis & Nettle 2018)

- https://www.pnas.org/content/115/11/2600 The Preregistration Revolution (Nosek et al 2018)

- OSF https://osf.io/

- Preprints https://www.biorxiv.org/

- Publons https://publons.com/researcher/1248054/charlotte-brand/

- Access Lab: https://fo.am/activities/accesslab/

- Julia Rohrer's open science slides https://osf.io/e4fja

- Open science course course https://osf.io/87arq/

- Munafo manifesto https://www.nature.com/articles/s41562-016-0021

- Dance of the p values https://www.youtube.com/watch?v=5OL1RqHrZQ8

- APC's http://thetaper.library.virginia.edu/big%20deal/apcs/serials%20crisis/2019/10/07/weekly-big-deal-longread-article-processing-charge-hyperinflation-and-price-insensitivity-an-open-access-sequel-to-the-serials-crisis.html

Other resources… contact me for more! @lottybrand

- https://force2019.sched.com/2019-10-16/overview Force2019

- https://twitter.com/curatescience/status/1183454160068530180 Curate Science

- https://www.norrag.org/democratising-knowledge-a-report-on-the-scholarly-publisher-elsevier-by-dr-jonathan-tennant/ A report on Elsevier

- https://peerj.com/preprints/27638.pdf research into use of impact factors

- https://osf.io/854zr/ Positive results rate in psychology: registered reports compared to conventional literature (Schijen, Scheel & Lakens 2019)

- http://www.talyarkoni.org/blog/2018/10/02/no-its-not-the-incentives-its-you/ It's Not the Incentives, it's You

- Plea for positivity and preregistration https://lottybrand.wordpress.com/2018/10/05/a-postdocs-plea-for-positivity-preregistration/

- refuse Elsevier: https://www.talyarkoni.org/blog/2016/12/12/why-i-still-wont-review-for-or-publish-with-elsevier-and-think-you-shouldnt-either/

- Universities ditch Elsevier: https://www.editage.com/insights/norway-joins-the-ranks-of-germany-and-sweden-cancels-subscription-with-elsevier, 2) https://scholarlykitchen.sspnet.org/2019/05/06/the-university-of-california-and-elsevier-an-interview-with-jeff-mackie-mason/

- Profiteering publishers: https://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science

https://www.theguardian.com/commentisfree/2019/mar/04/the-guardian-view-on-academic-publishing-disastrous-capitalism

- Aaron Swartz https://en.wikipedia.org/wiki/Aaron_Swartz

WHAT ARE THE INDICATORS OF A CREDIBLE RESEARCH CULTURE?

Credibility
- Transparent methods
- Pre-registration
- Declaration of COIs
- Contributions are credited
- Direct replications/audits
- Null findings reported
- Few unforced errors
- Open review

INCREDIBLE
- Papers as advertisements
- "Take my word" culture
- Appeals to authority/flair
- Few people get all the glory
- All novelty all the time
- Everything is significant
- Many unforced errors
- Blind faith in peer review

SLIDE 19 OF 47

Download Presentation

Fetzer Franklin Fund — Exploring Frontiers. Breakthroughs. Science.

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Berkeley — UNIVERSITY OF CALIFORNIA

PHENOSCIENCE LABORATORIES

METASCIENCE 2019 SYMPOSIUM

Download Poster (2.8 MB)