DAY 1	Lotty	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?

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1. Publishing in Open Access Journals

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2. Sharing your data with your publication

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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)

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- 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?

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 accesse to your study in order to use it in my literature review. Thank you in anticipation of a favourable response.***

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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 AllORE, 2 weeks ago

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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.

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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.

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- 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

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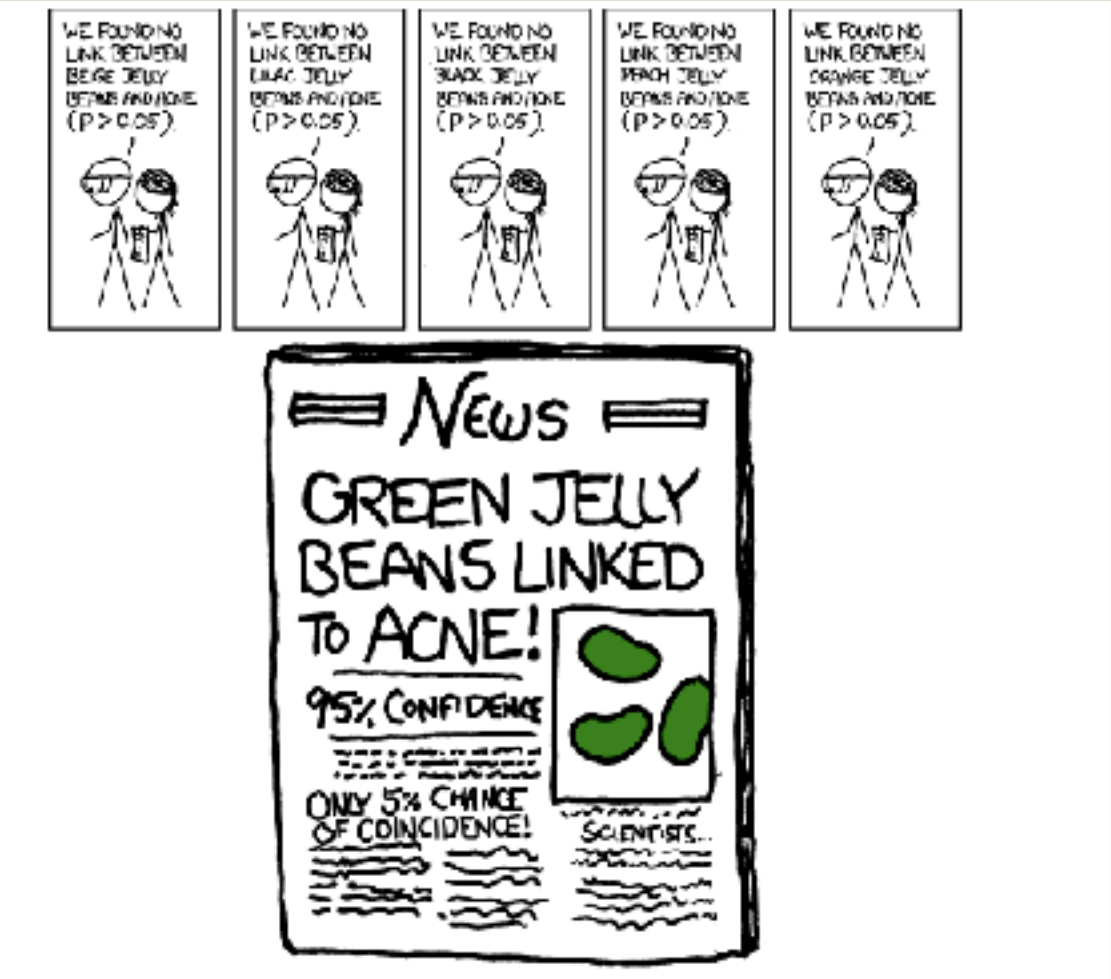
“potentially undermines the whole research publishing system” – *Springer Nature*

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



Share your analysis script

P-hacking

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Replication crisis

RESEARCH

RESEARCH ARTICLE

PSYCHOLOGY

Estimating the reproducibility of psychological science

Open Science Collaboration*†

Reproducibility is a defining feature of science, but the extent to which it characterizes current research is unknown. We conducted replications of 100 experimental and correlational

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.

Meta-science

ROYAL SOCIETY OPEN SCIENCE

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

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, 0000-0002-7733-5620; RME, 0000-0002-1887-5377

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

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

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

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

Reproducibility

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Now they can (and will)!

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PREREGISTRATION – Discuss

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

Preregistration

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

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

Preregistration vs Registered Reports

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- Peer-review is conducted on your intro, methods and analysis, *before you collect the data*

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- 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

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- Freedom from too many degrees of freedom (and anxiety)

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- Gain reviewers' trust
- Be scoop-proof!
- Improve the validity of science ..*forever*….

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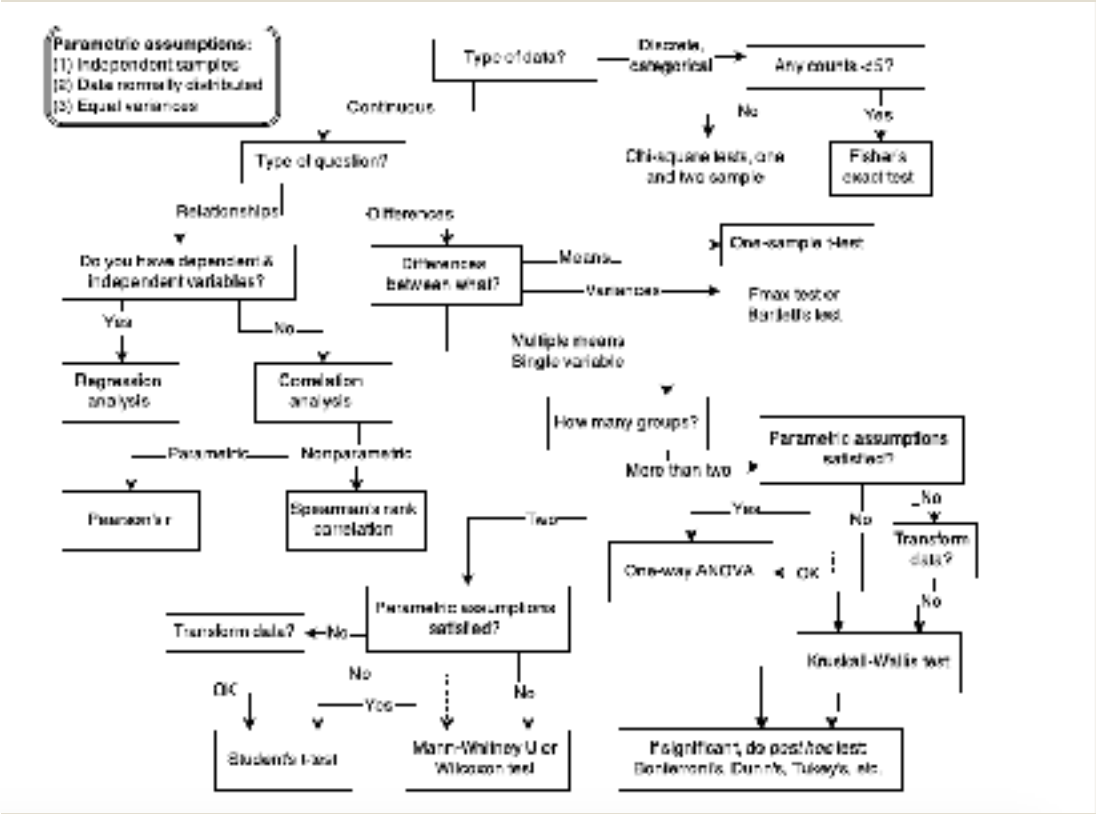

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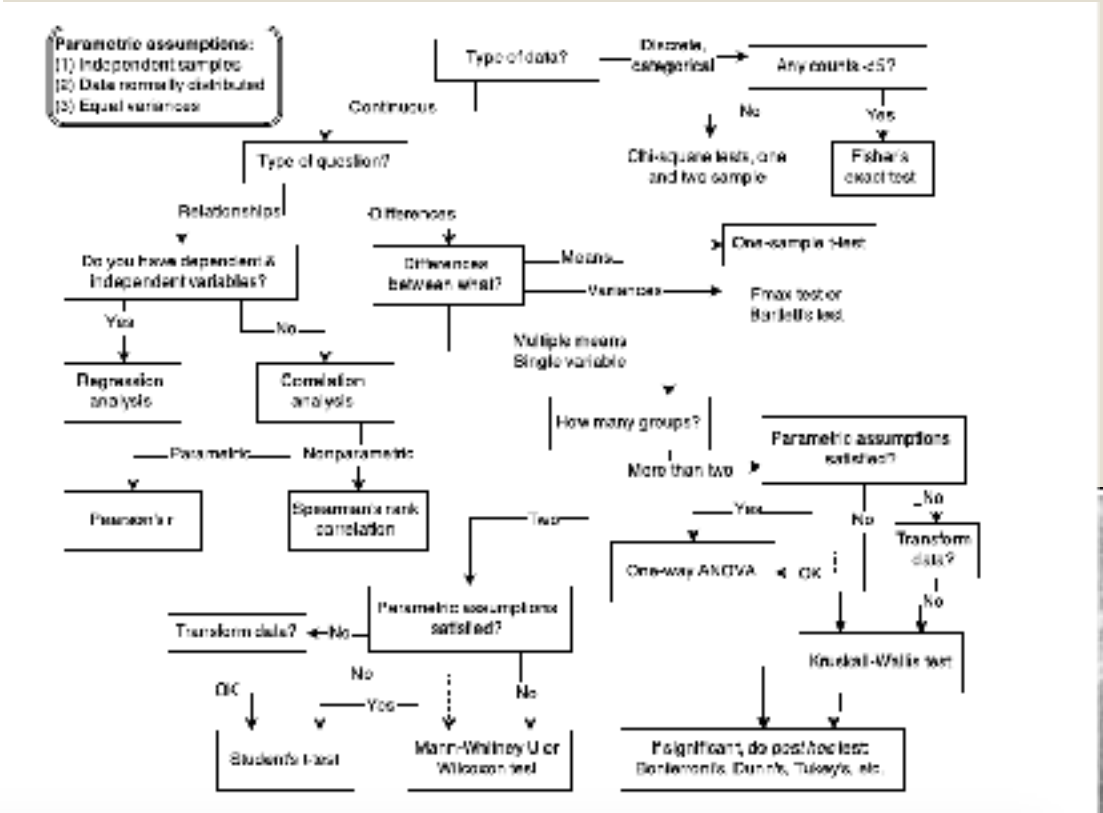

To consult the statistician after an experiment is finished is often merely to ask him to conduct a post mortem examination. He can perhaps say what the experiment died of.

Ronald Fisher

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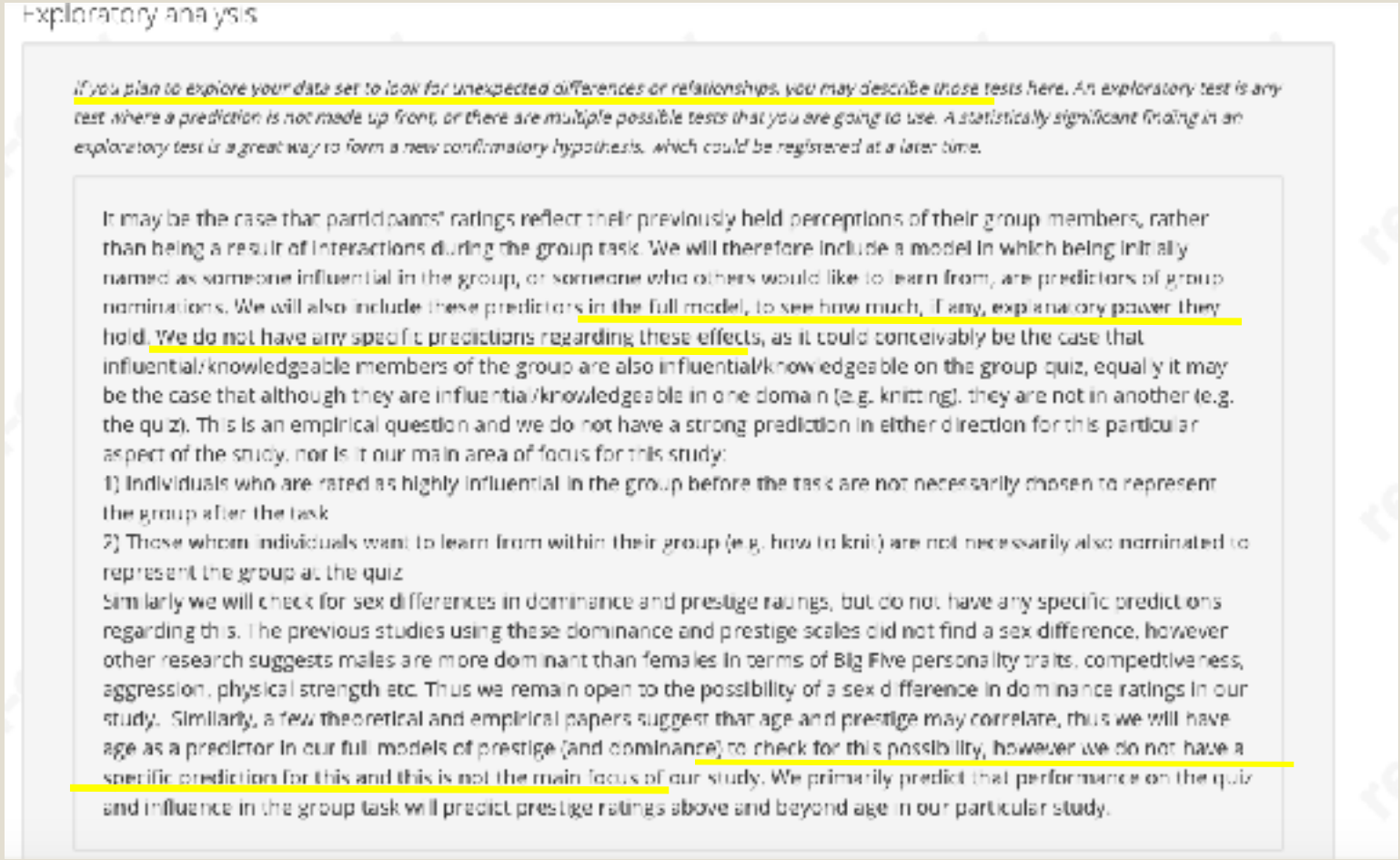
Confidence to Explore!



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!

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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!

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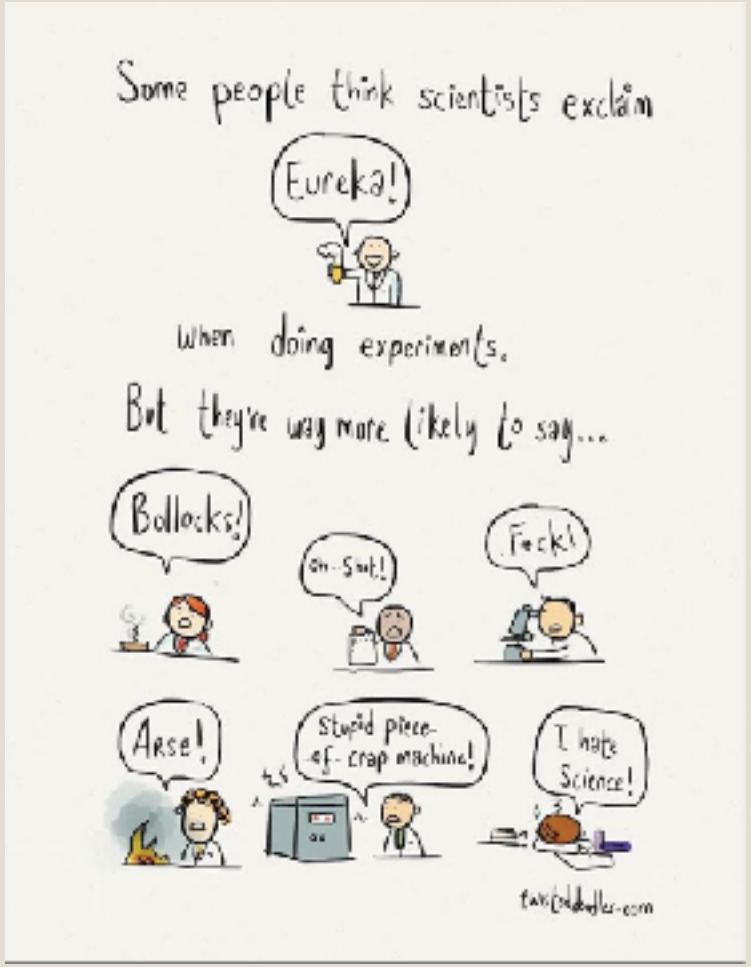

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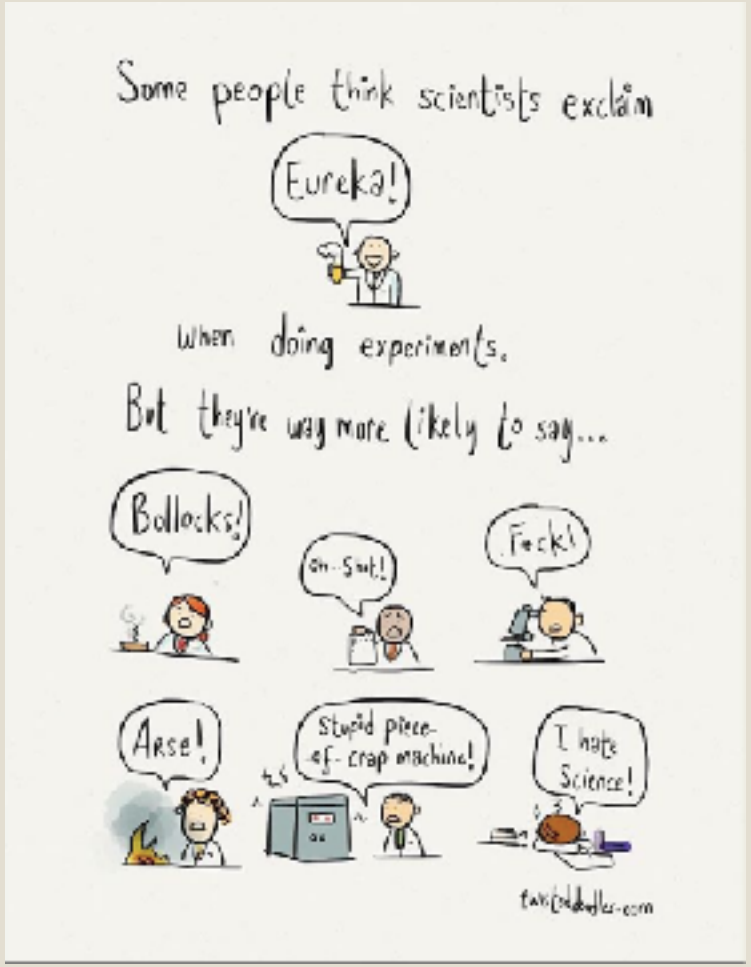

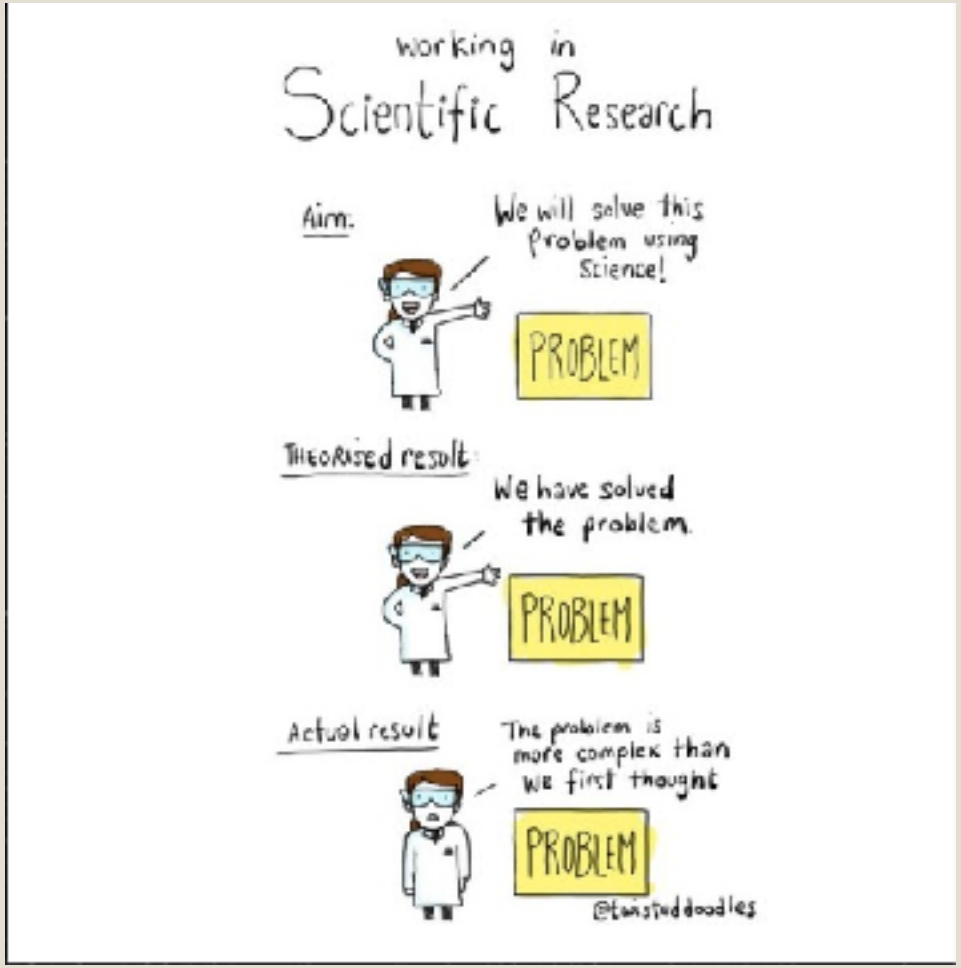

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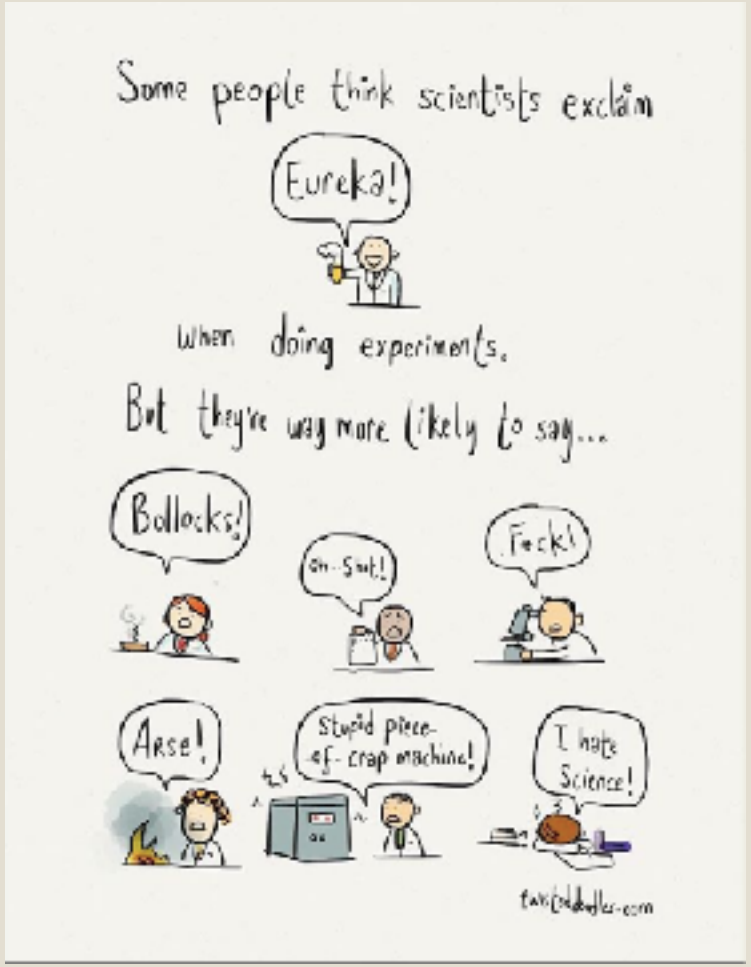
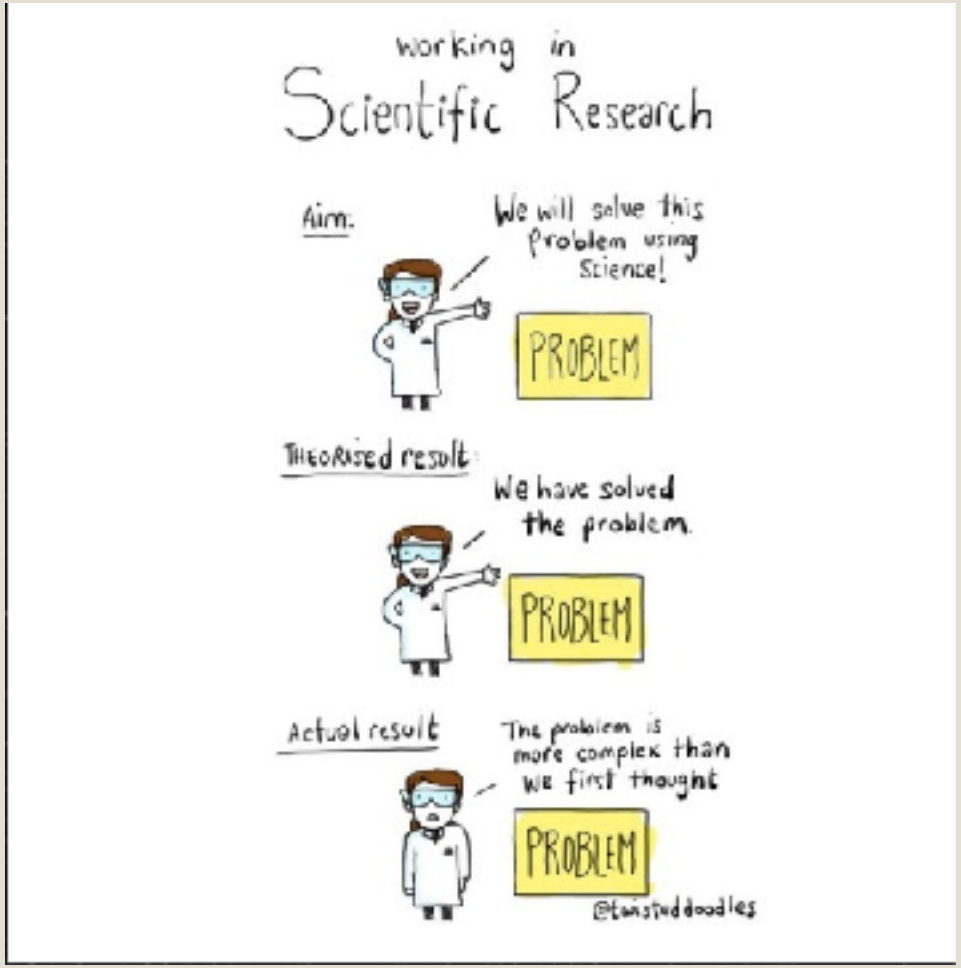




Let's talk about impact…

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.

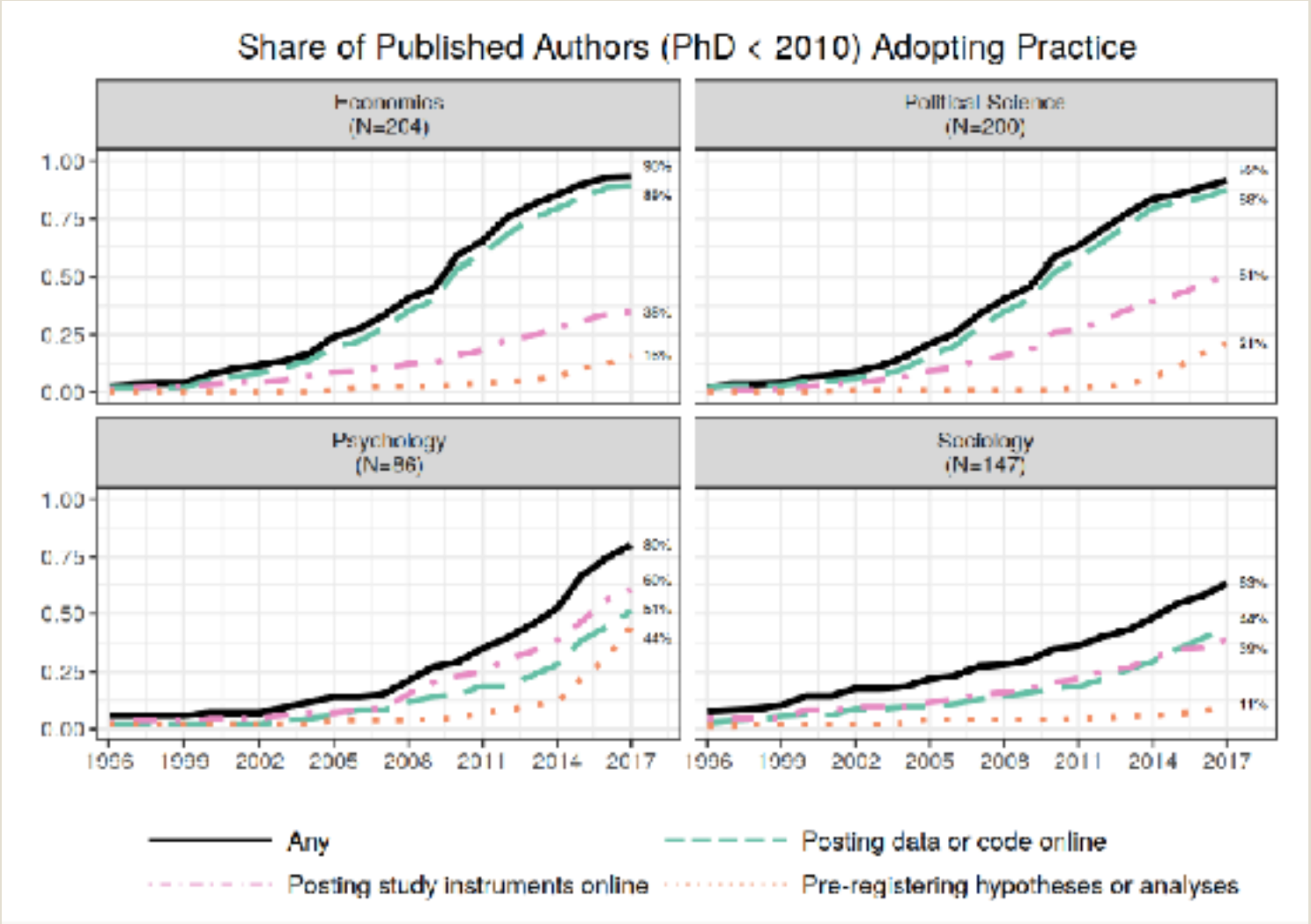
Wisdom, not impact

"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?

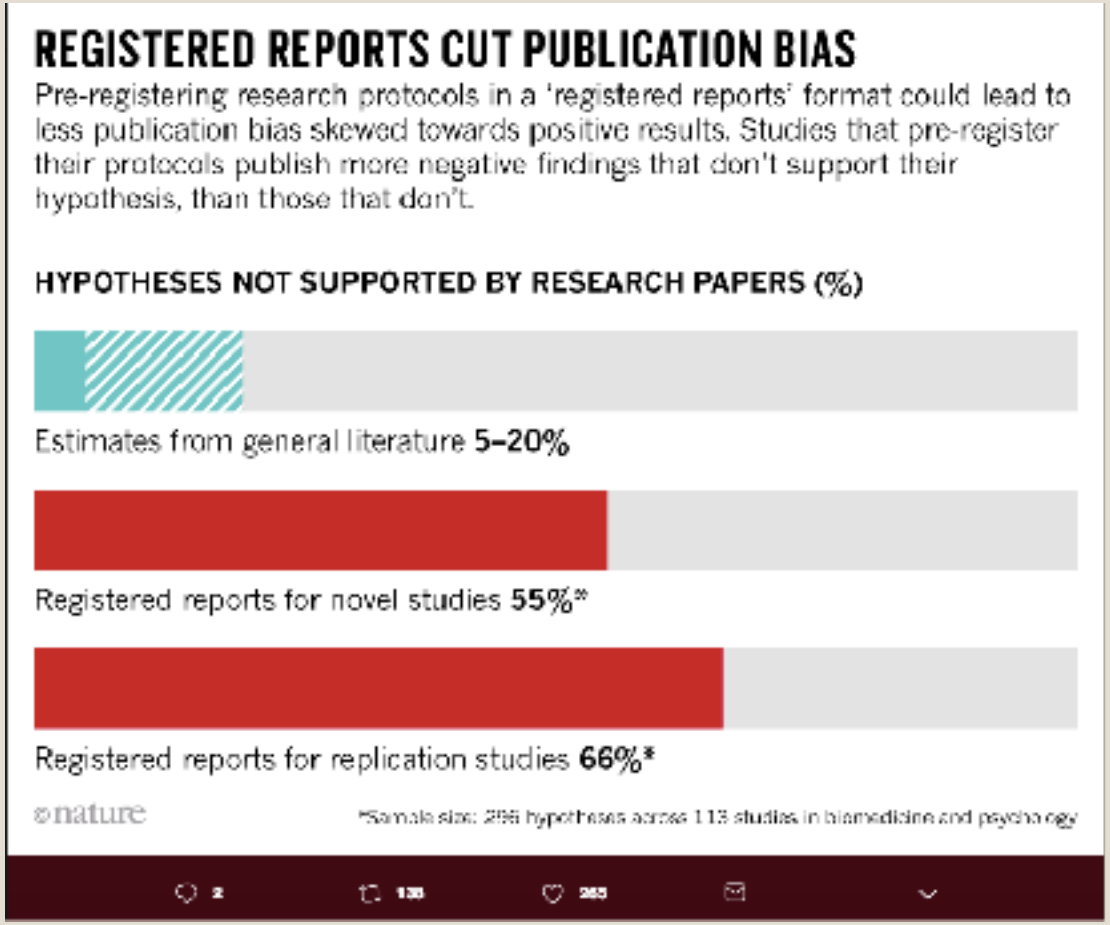


Pre-registered…
obviously!

- **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?



https://www.nature.com/articles/d41586-018-07118-1

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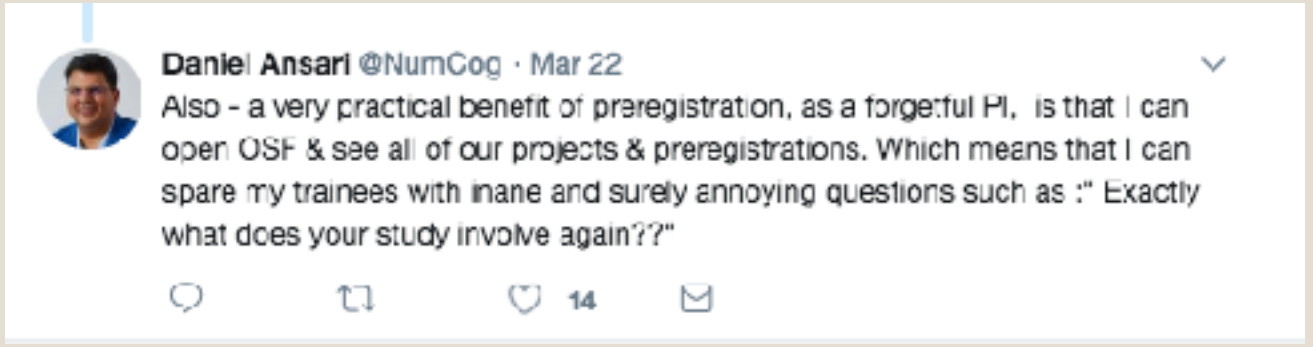
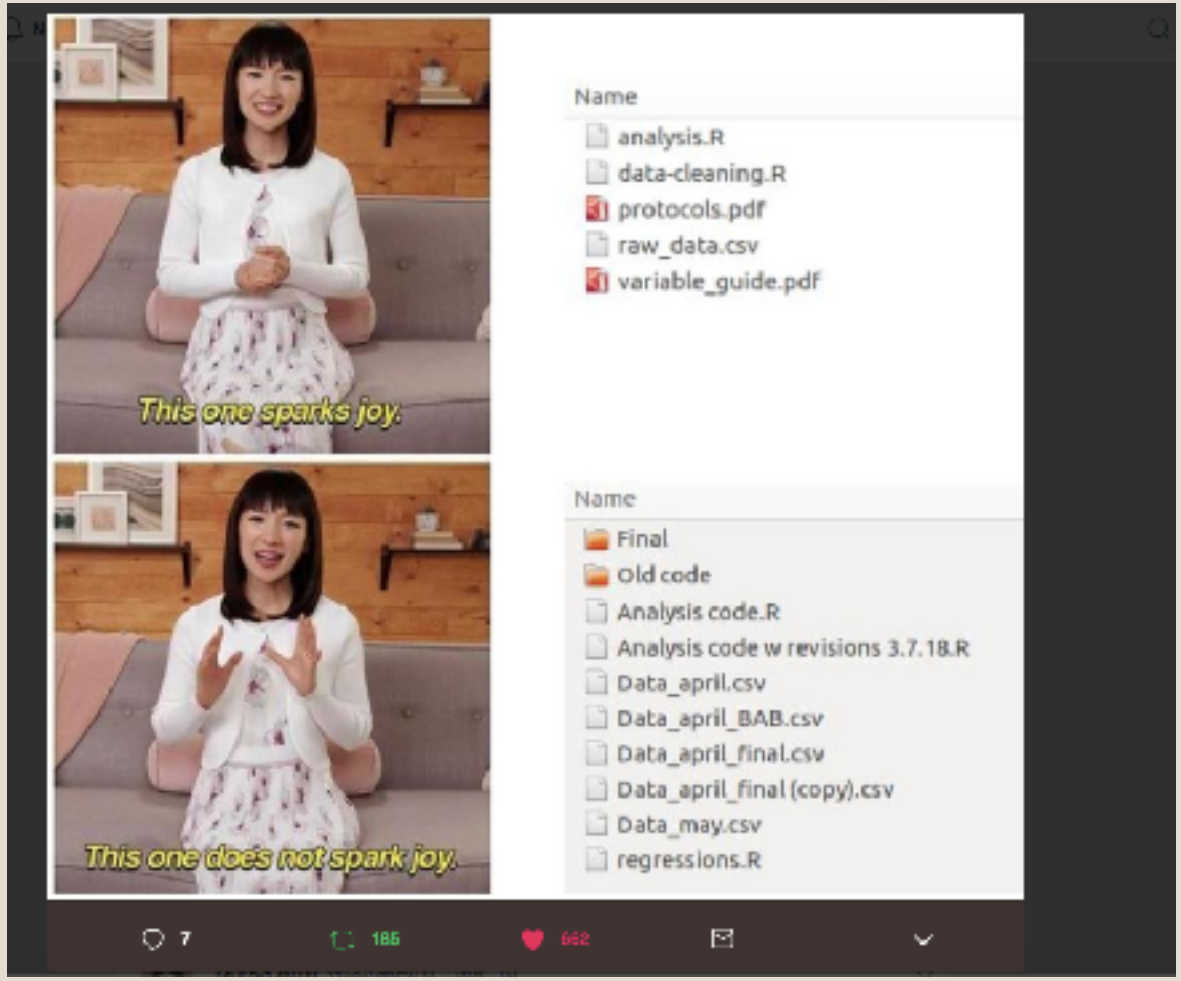


How do I do it?

- 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

Version Control



Benefits your collaborators

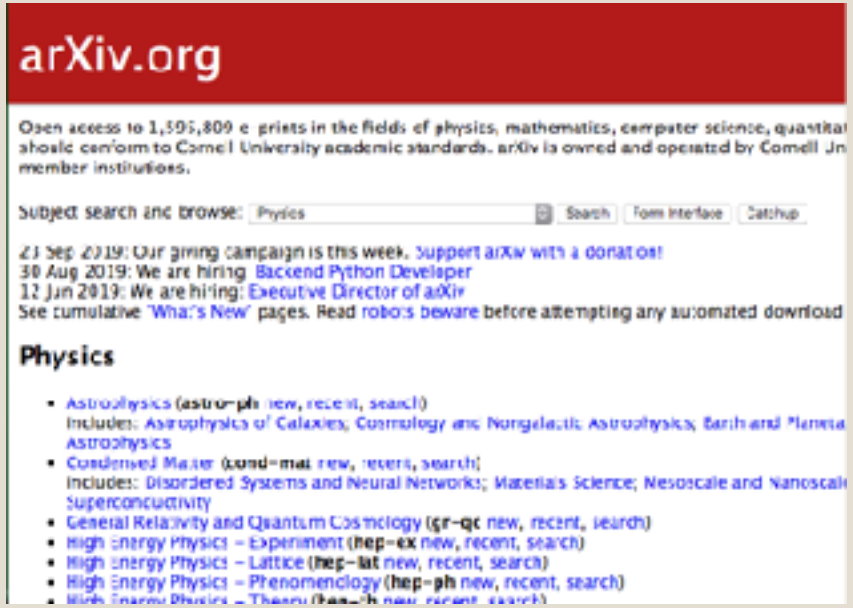
Benefits other researchers doing similar work

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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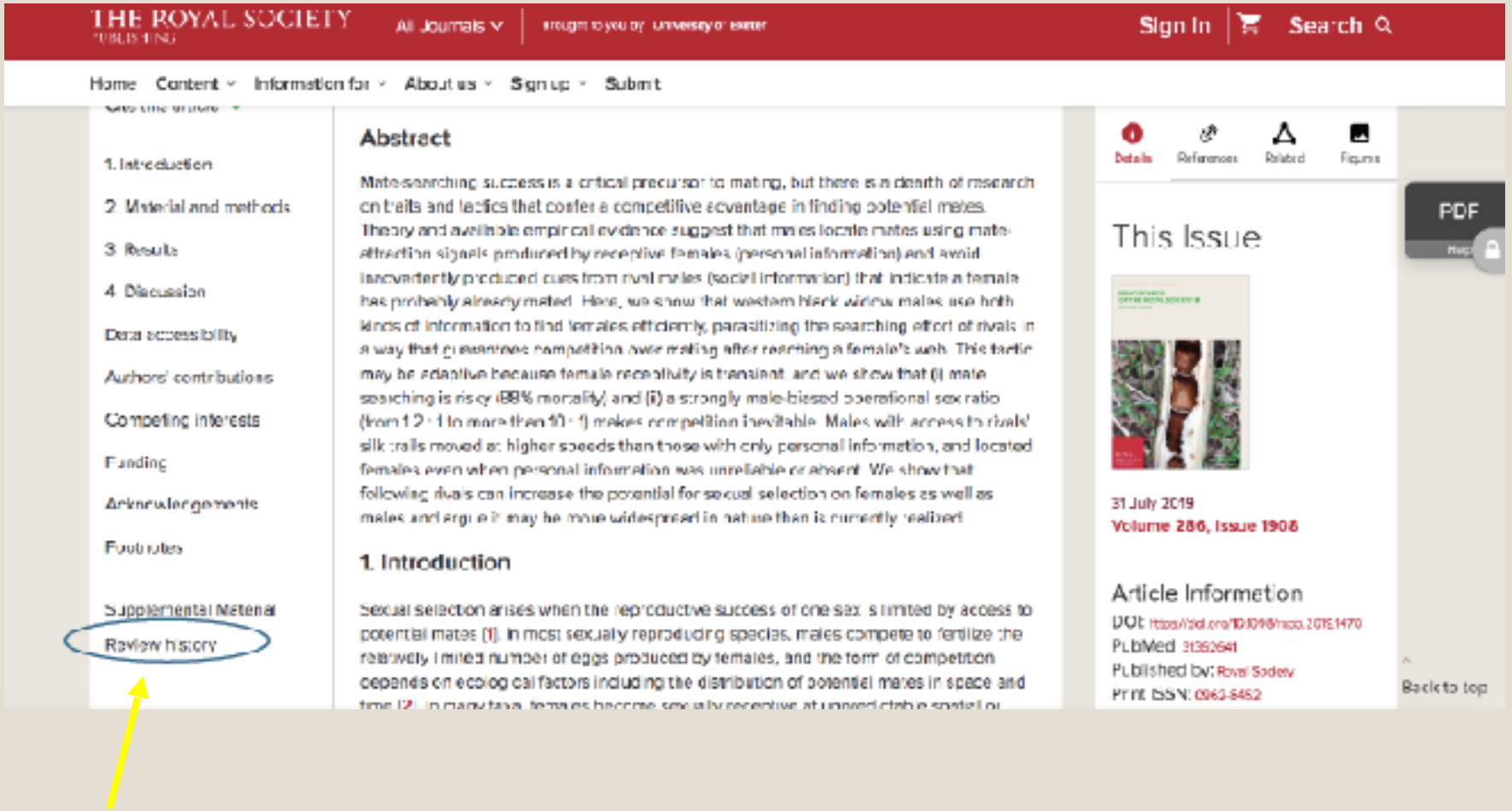
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31 July 2019
Volume 286, Issue 1908
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PDF
Back to top

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!

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

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- 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/
- 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…

- 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

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WHAT ARE THE INDICATORS OF A CREDIBLE RESEARCH CULTURE?

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

- 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 18 OF 47

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