

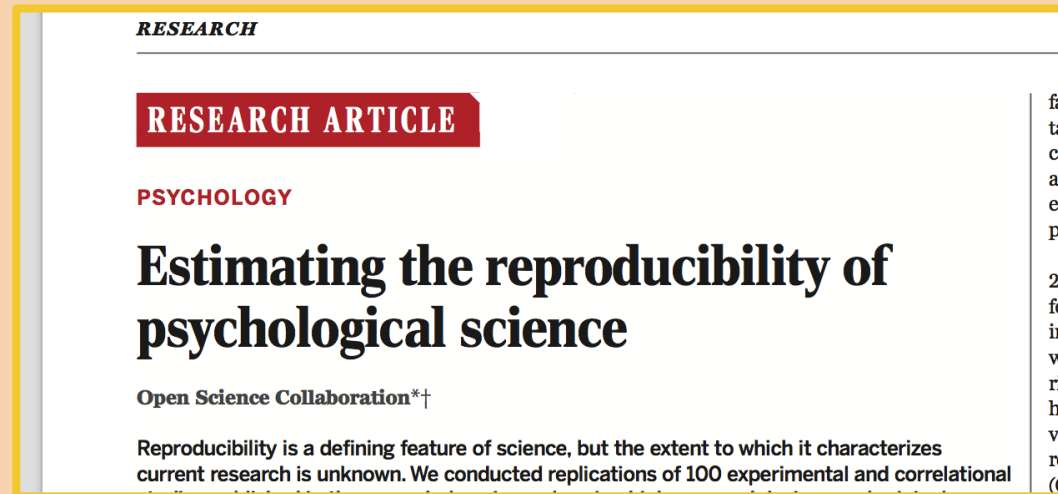
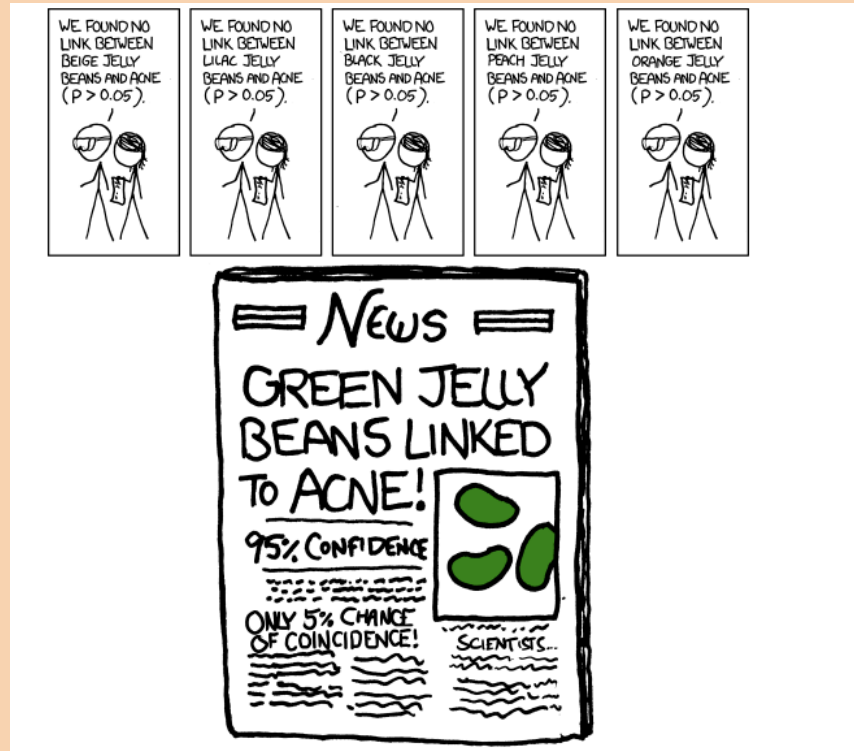
Preregistration & Open Science Practices

- What is it and where has it come from?
- Why bother, what can I gain?
- Is anyone else actually doing it?
- Q & A
- How do I do it? Work through an example
- Other Open Science tips & tricks (e.g. Github?)
- More resources

What is preregistration?

- The replication crisis ‘began’ in Psychology... but the problems are science-wide
- ‘The natural selection of bad science’ is NOT about *bad* scientists but an outdated system with outdated incentives
- Feelings that every PhD student (and scientists) can relate to....

What is preregistration?



ROYAL SOCIETY
OPEN SCIENCE

rsos.royalsocietypublishing.org

The natural selection of bad science

Paul E. Smaldino¹ and Richard McElreath²

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²Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Abstract: Smaldino PE, McElreath R. The natural selection of bad science. *Sci. Adv.* 3: 160384. doi.org/10.1098/rsos.160384

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

Statistical Modeling, Causal Inference, and Social Science

« "Methodological terrorism"
"Crimes Against Data": My talk at Ohio State University this Thurs; "Solving Statistics Problems Using Stan": My talk at the University of Michigan this Fri »

What has happened down here is the winds have changed

Posted by [Andrew](#) on 21 September 2016, 9:03 am

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

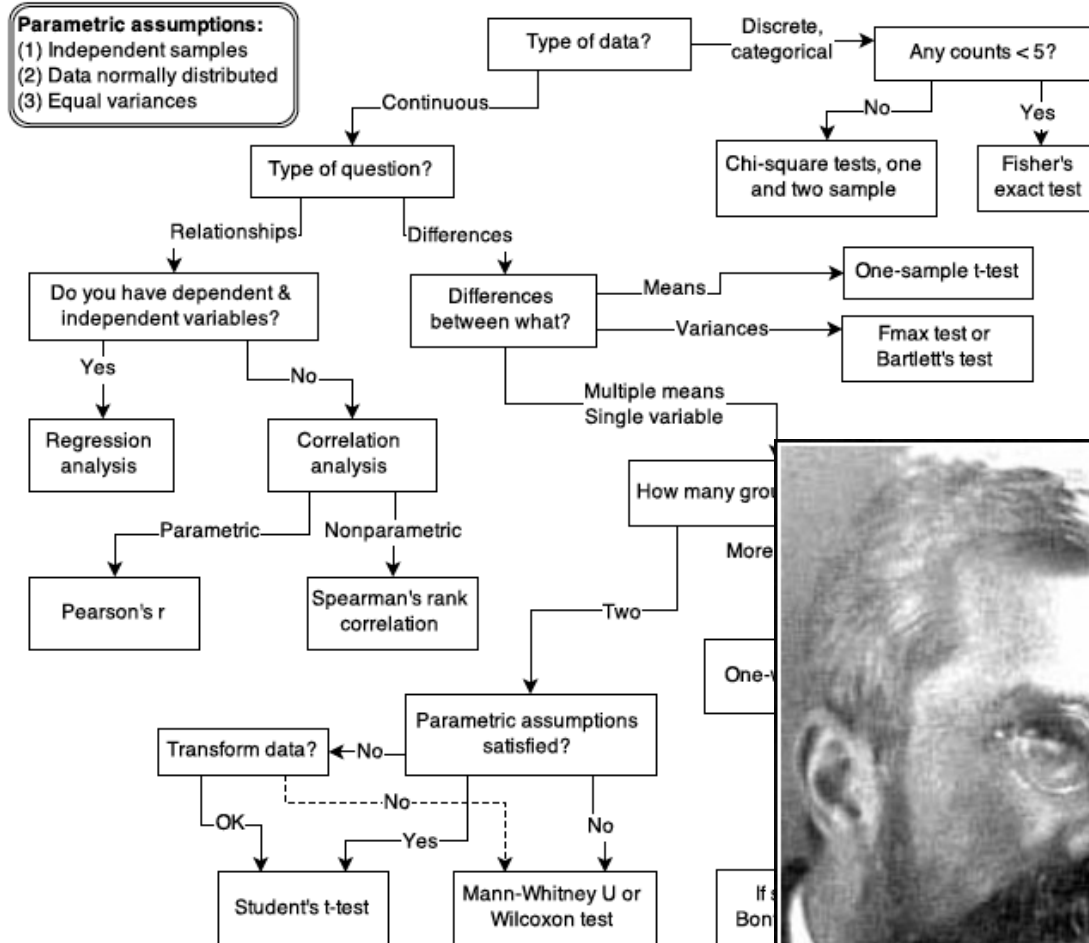
- Peer-review is conducted on your intro, methods and analysis, *before you collect the data*
- This is done with a specific journal who promises to publish your work as long as you follow that peer-reviewed plan

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!)

Khandis Blake, Ph.D @KhandisBlake · Mar 29
Academic tweeps - what are your thoughts on calling a study "pre-registered", when the hypotheses were pre-registered, but the analyses deviated from the pre-registration in order to test them? Would you still call this "pre-registered"?

11 3 20

Danielle Navarro @djnav
I think so. Departing from (documented), even if you data violate assumptions calculated p-values (or B

1 1

Gjalt-Jorn Peters @matth
I agree. It's about maximizing rigidity. After

1 1

Danielle Navarro @djnav
Yes. Personally I think the because several distinct t situations I think it's impo involved

OSF Prereg @OSFPrereg
Preregister your research on @OSFramework. Need help with OSF? Check out @OSFSupport!

Charlottesville, VA
cos.io/prereg/
Joined January 2018

Roger Giner-Sorolla @RogertheGS
Follow

Replying to @gemma_learmonth @Ben_C_J and 3 others

You can cite back EVERY article written about pre-registration by its advocates

PREREGISTRATION: A PLAN, NOT A PRISON

OSF Prereg @OSFPrereg · 1 May 2018
"The Preregistration Revolution" now available in PNAS:

The preregistration revolution
Progress in science relies in part on generating hypotheses with existing observations and testing hypotheses with new observations. This distinction b...
pnas.org

Who to follow · Refresh · View all

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- Katie Corker** @katiecorker Follow
- SIPS** @improvingpsych Follow

2 8

come across someone
m the planned analyses,
arently labelled and

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!



November 2015, Volume 44, [Issue 8](#), pp 2227–2235 | [Cite as](#)

High Heels Increase Women's Attractiveness

Authors

[Authors and affiliations](#)

Nicolas Guéguen

Original Paper

First Online: 19 November 2014

198

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Citations

Abstract

Research has found that the appearance of women's apparel helps increase their attractiveness as rated by men and that men care more about physical features in potential opposite-sex mates. However, the effect of sartorial appearance has received little interest from scientists. In a series of studies, the length of women's shoe heels was examined. A woman confederate wearing black shoes with 0, 5, or 9 cm heels asked men for help in various circumstances. In Study 1, she asked men to respond to a short survey on gender equality. In Study 2, the confederate asked men and women for help. In Study 3, men and women in the confederate who dropped a glove asked for help. Helping behavior increased as soon as women wore high heels. The effect was more pronounced on women's helping behavior. It was more quickly when they wore high heels. The results suggest that the misattribution of sexiness and

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.

Scoop Proof!

- You have a jaw-droppingly 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 in the real life world of people having simultaneous research ideas.... Preregistration doesn't make this any more likely



Improve validity and trust in science... forever!

Some people think scientists exclaim

Eureka!

When doing experiments.

But they're way more likely to say...

Bollocks!



oh-shit!



F*ck!



Arse!



Stupid piece-of-crap machine!



I hate Science!



twisteddoodles.com

Working in
Scientific Research

Aim:

We will solve this
Problem using
Science!



PROBLEM

THEORISED result:

We have solved
the problem.



PROBLEM

Actual result

The problem is
more complex than
we first thought



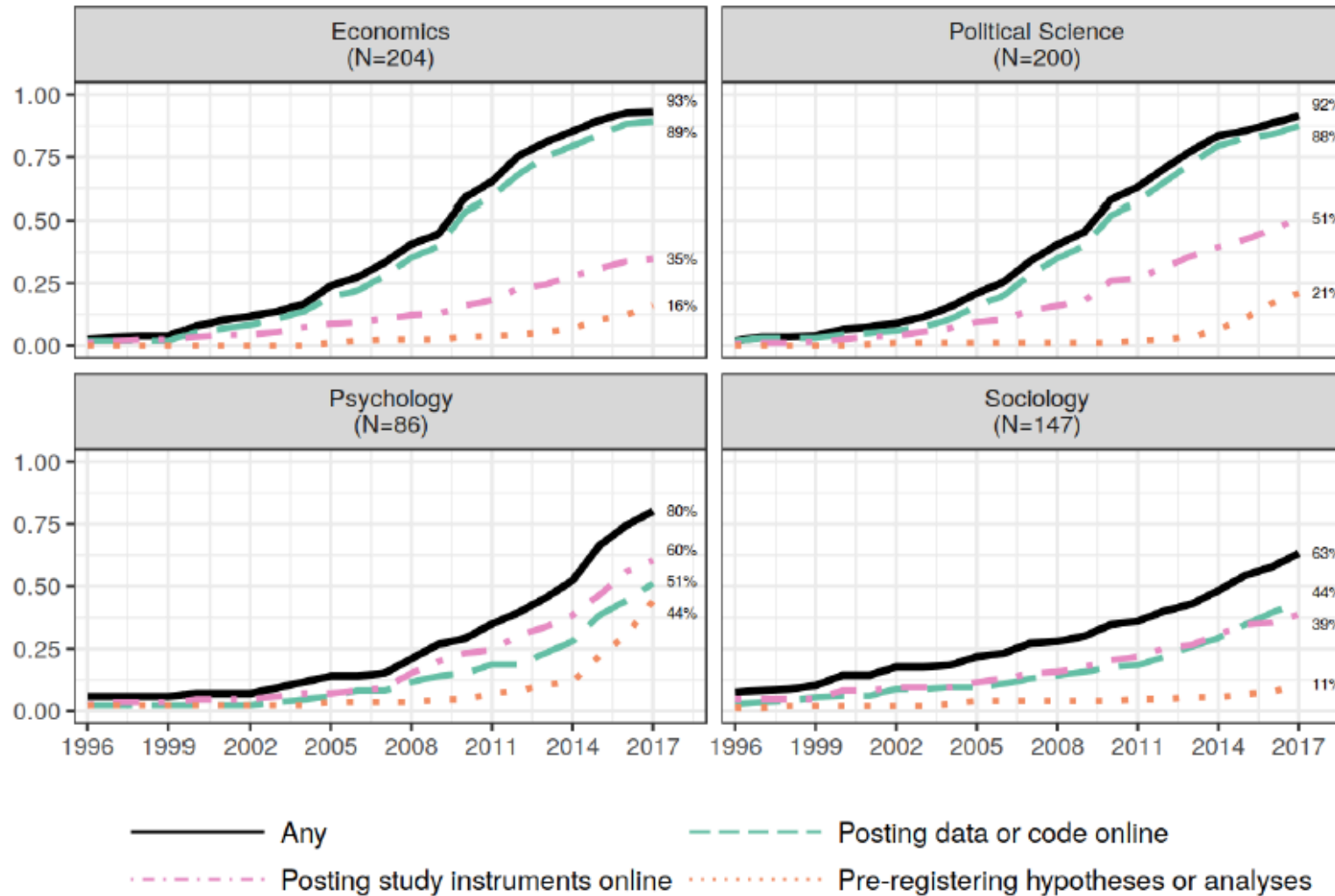
PROBLEM

@twisteddoodles



Is anyone actually doing it?

Share of Published Authors (PhD < 2010) Adopting Practice



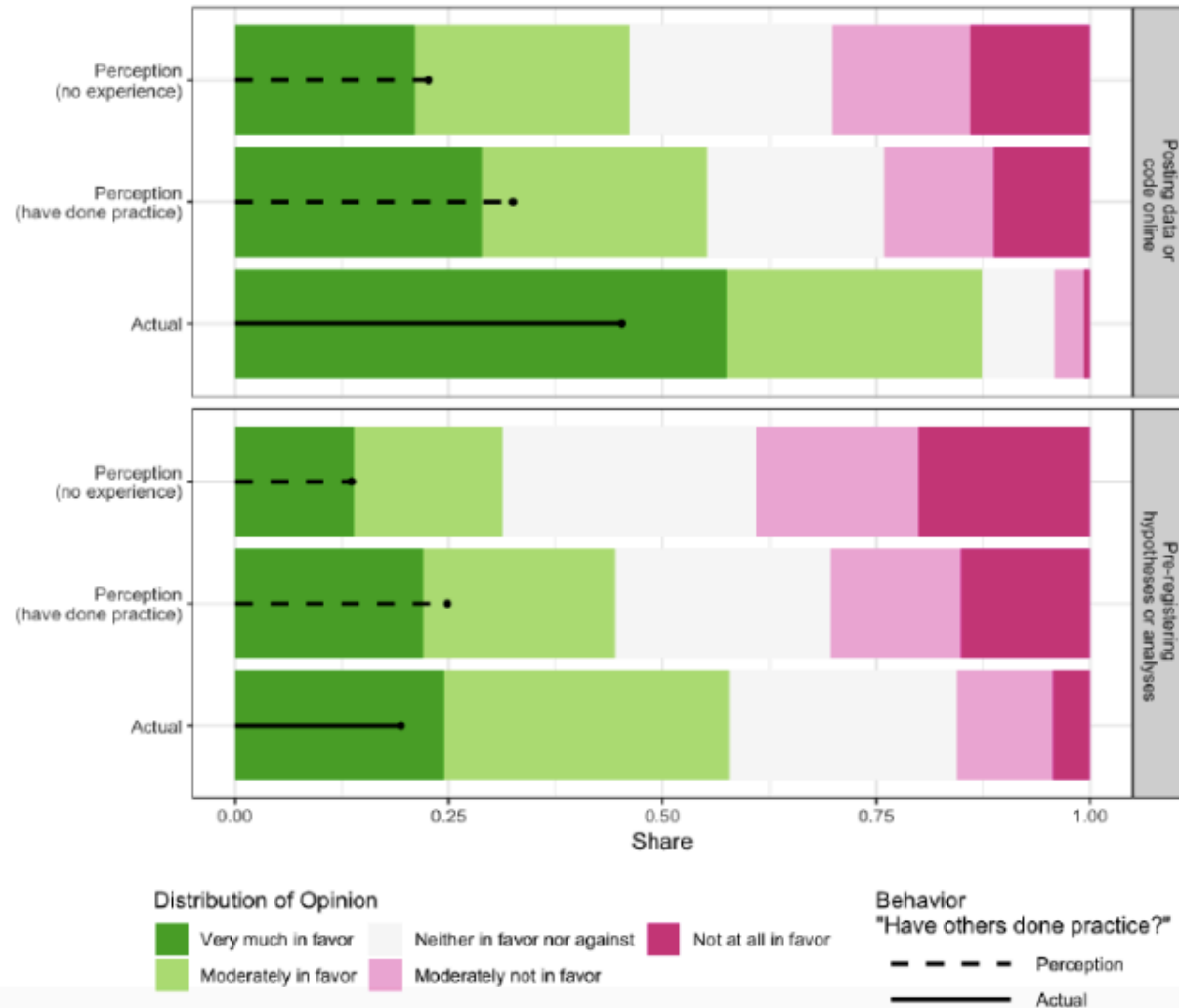
Pre-registered... obviously!

- **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?

Perceived norms vs. actual opinions and behavior



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



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

Is anyone doing it?



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??"



14



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



43



your reply

umCog · Mar 22

how the @NumCogLab 's preregistrations have evolved. We our early mistakes, becoming more detailed. I am sure this will re 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

1

12



Any questions....?



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/1DaNmJEtBy04bq1I5OxS4JAscdZEKUGATURWwnBKLYxk/edit?pli=1> <- 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

Other Open Science tips & tricks:

- OSF <https://osf.io/>
- Preprints <https://www.biorxiv.org/>
- Publons <https://publons.com/researcher/1248054/charlotte-brand/>
- GitHub https://github.com/lottybrand22/Preregistration_workshop/
- Access Lab: <https://fo.am/activities/accesslab/>
- Open reviews (RSOS tab):
- Ditch Elsevier:
- Twitter....!!!! @OSFprereg <https://twitter.com/OSFPrereg>

GitHub



Name

- analysis.R
- data-cleaning.R
- protocols.pdf
- raw_data.csv
- variable_guide.pdf

Name

- Final
- Old code
- Analysis code.R
- Analysis code w revisions 3.7.18.R
- Data_april.csv
- Data_april_BAB.csv
- Data_april_final.csv
- Data_april_final (copy).csv
- Data_may.csv
- regressions.R



7



185



662



Other resources

- <https://doi.org/10.1098/rsos.160384> The Natural Selection of Bad Science (Smaldino & McElreath 2016)
- What's happened down here is the winds have changed. Gelman 2016
<https://statmodeling.stat.columbia.edu/2016/09/21/what-has-happened-down-here-is-the-winds-have-changed/>
- <https://journals.sagepub.com/doi/full/10.1177/1745691618767878> – Open Science is Liberating and can foster Creativity (Frankenhuis & Nettle 2018)
- <https://osf.io/854zr/> Positive results rate in psychology: registered reports compared to conventional literature (Schijen, Scheel & Lakens 2019)
- <https://www.pnas.org/content/115/11/2600> The Preregistration Revolution (Nosek et al 2018)
- <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/>

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, director of the Department of Human Behavior, Ecology, and Culture at the Max Planck Institute for Evolutionary Anthropology

http://elevanth.org/blog/2018/09/02/golden_eggs/