CENTER FOR OPEN SCIENCE

Open science and Pre-registration

SIPPS 2022

Ana DiGiovanni

What is open science?

movement to make scientific research, data, and dissemination open to all levels of an inquiring society

Why did the open science movement start?

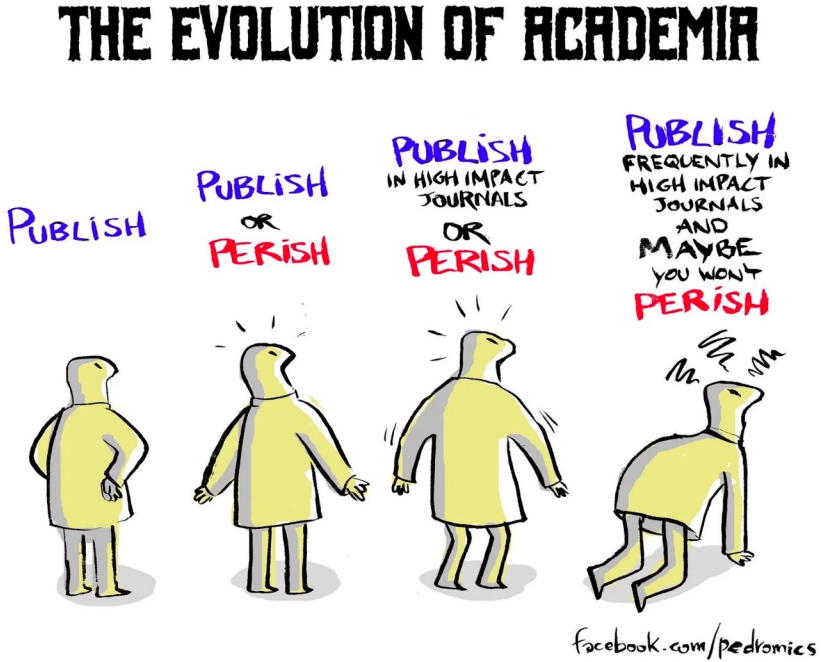
- Academic incentive structures to “publish or perish”
  - Plus tendency for journals to publish “positive” results

Academic incentive structures

- Published work is important for
  - Getting a job
  - Getting tenure
  - Being awarded grants
  - Being viewed favorably in the field

- “Rat race” culture develops
  - Trying to publish as much as you can

- Balancing desire to be truthful with to publish



… can result in researchers taking shortcuts or sometimes worse …

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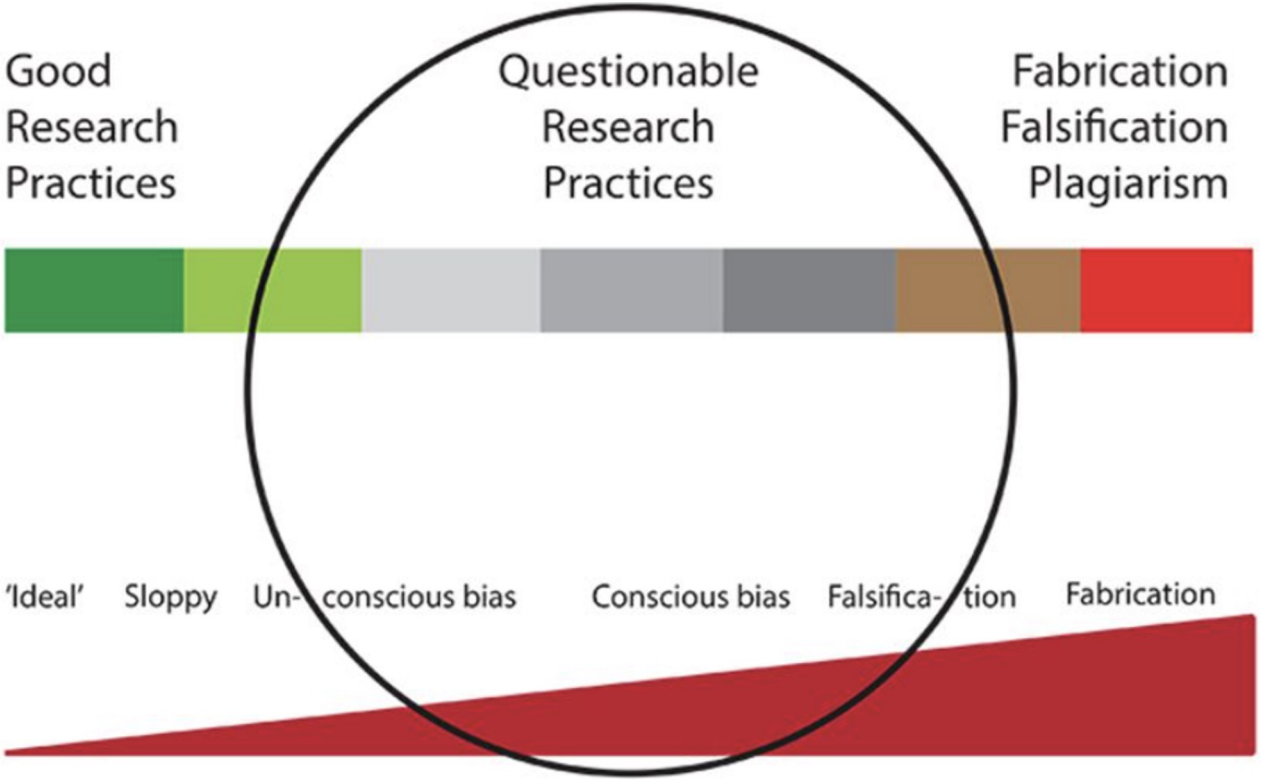
- Research misconduct

Scientific misdeeds (15%)

- Misappropriation of ideas
- Impropriety of authorship
- Improper or misleading reporting of results
- Not disclosing ties to commercial interests

Scientific fraud (1-2%)

- Fabrication
- Falsification
- Plagiarism


Good
Research
Practices
Questionable
Research
Practices
Fabrication
Falsification
Plagiarism
'Ideal'
Sloppy
Un-
conscious bias
Conscious bias
Falsifica-
tion
Fabrication

Different types of bad research practices

Peeking at the data as you're collecting it and stopping when the results are significant

Different types of bad research practices

Excluding participants for various reasons (i.e. performance) until an effect is significant

Different types of bad research practices

Hypothesizing after results are known (HARKing)

Different types of bad research practices

Garden of forking paths: Issues arise when you report the analysis that best fits the hypothesis as strong evidence

Research misconduct

Andrew Wakefield and the MMR vaccine

THE

The Lancet, Volume 35
doi:10.1016/S0140-

This article was re

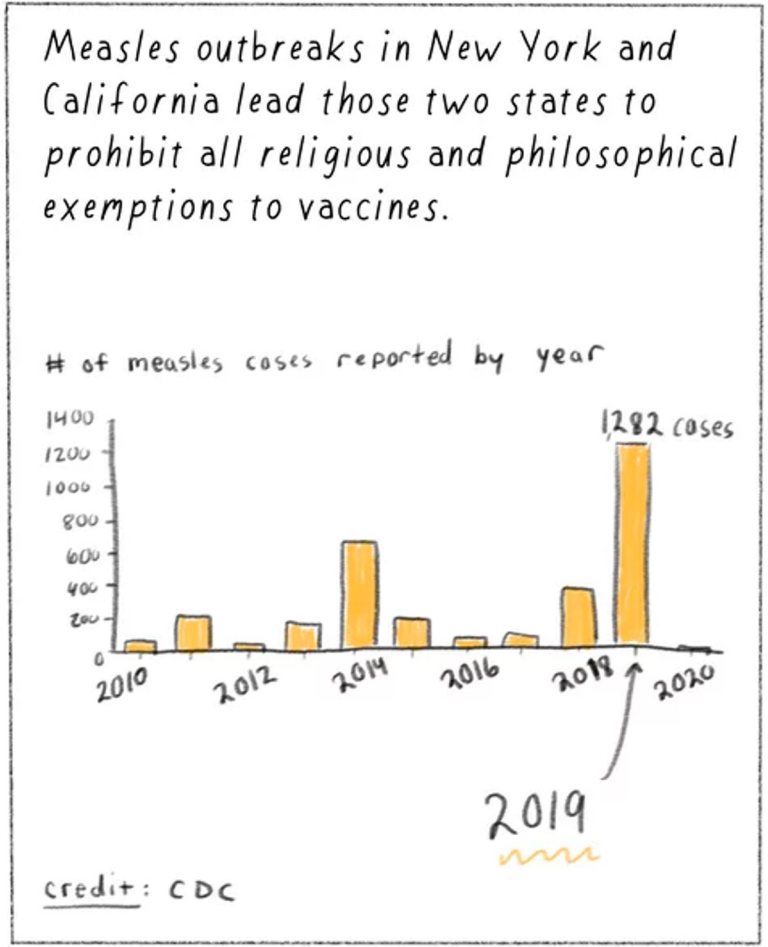
RETRACTE
pervasive

Dr AJ Wakefield FR
MRCPath a, MA Thor

Summary

Background
We investigated a c

Methods
12 children (mean a
followed by loss of a
neurological, and de
(MRI), electroencep
Biochemical, haema



s, and

FRCPsych c, AP Dhillon

mal development
nterological,
ic-resonance imaging
done where possible.

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- Lack of replication in results

Lack of replication

HALF OF CANCER STUDIES FAIL HIGH-PROFILE REPLICATION TEST

Barriers to reproducing preclinical results included unhelpful author communication.

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

Florian Prinz, Thomas Schlange and Khusru Asadullah

Article | Published: 20 May 2020

Variability in the analysis of a single neuroimaging dataset by many teams

Rotem Botvinik-Nezer, Felix Holzmeister, ... Tom Schonberg + Show authors

Nature **582**, 84–88 (2020) | Cite this article

Replication, falsification, and the crisis of confidence in social psychology

Brian D. Earp [1,2*] ***and David Trafimow*** [3]

Is there really a replication “crisis”?

- Unknown differences between studies
  - Sample or design specific reasons for non-replication
  - Boundary effects
  - Quality differences
- Researchers cherry pick studies due to a personal / intellectual ax to grind
- Exploratory research is important for scientific discovery
- Scientific literature is not made up of one study, it is an overall body of work
- Science is naturally self-correcting

Open science as a proposed solution

- Pre-registration
- Share study materials
- Deposit data and analysis scripts

What is preregistration?

- Specify your research plan in advance of your study

- Submit plan to a registry

- Separates hypothesis-generating (exploratory) from hypothesis-testing (confirmatory) research
    - Both are important in science

Forms of preregistration

Open-Ended Registration: no requirements. You will be asked to write a summary description of the project.

OSF-Standard Pre-Data Collection Registration: Questions: 1. Data already collected? 2. have you already looked at data?

AsPredicted.org: Online input mask with 9 questions: hypothesis; dependent variables; conditions; Data analysis; outliers & exclusion criteria; sample size (power analysis); type of study

OSF Preregistration: 25 subject areas that need to be answered. Preregistration Prize ($1,000 prize, by December 31, 2018)

Registered Report: Preregistration is reviewed via a journal (peer-review process) and labelled with "IPA" (in-principle acceptance). If the study is carried out correctly, it is guaranteed that it will be published, regardless of the result. (see also https://cos.io/rr).
125 journals already participate: https://docs.google.com/spreadsheets/d/1D4_k-8C_UENTRtbPzXfhjEyu3BfLxdOsn9j-otrO870/edit#gid=0

Preregistration Templates: https://osf.io/zab38/wiki/home/

Pre-prints as a way to get science out faster

- Anyone can post a pre-print of work that is “finished” but not yet peer-reviewed
- Helps facilitate rapid dissemination of research

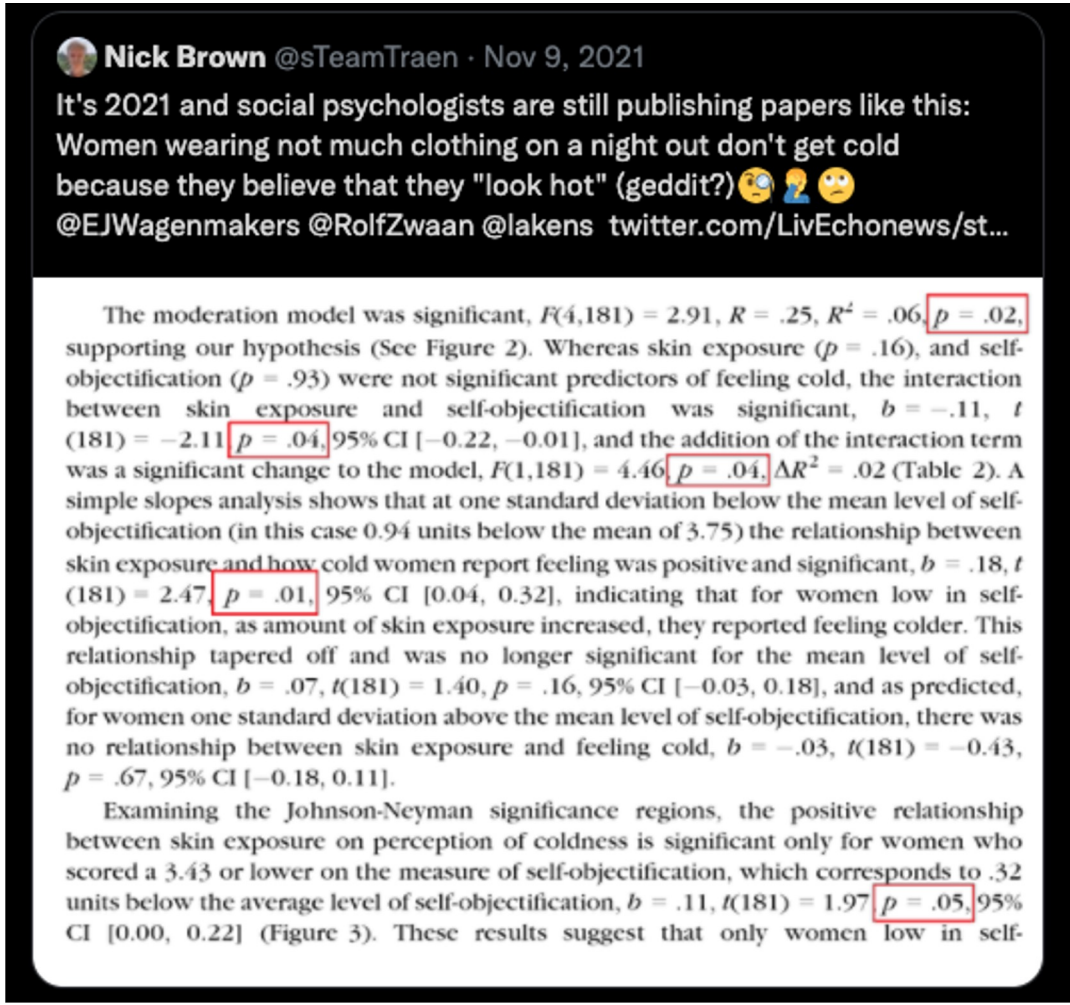
Open science or #bropen science?

Amy Cuddy’s work on the power pose

- Study limitations
  - Psychophysiology portions of study didn’t replicate
  - Possible p-hacking as shown by p-curves?
- Online vigilantes attacked career, income, ambition, characterize, and intelligence
- Gave up on getting tenure

Open science or #bropen science?

Roxanne Felig (PhD student) published a paper … and got attacked by mostly White men.



#Bropen science article

- Take 10 min to skim the following article and take a few notes that stand out the most to you: https://thepsychologist.bps.org.uk/volume-33/november-2020/bropenscience-broken-science
- Discuss as a group

#bropenscience is broken science

- Vigilantism
- Problematic
  - Condesce
  - Aggressiv
  - Lacking ki
- More likely t roups
  - Male, Whit al, English-speaking
- Targets ofte nen researchers

"PSYCHOLOGICAL SCIENCE, AS PRACTICED IN THE UNITED STATES, WAS BUILT BY, FOR, AND ABOUT WHITE, AFFLUENT, MALE PEOPLE AND THEIR PERSPECTIVES."

-

LEDGERWOOD ET AL., 2021

Is open science promoting diversity, equity, and inclusivity in science?

- Increased access to data and research tools
- Value in transparency, but comes at a cost
- Imposes impractical constraints
- Open science movement seems to work better for some than others
- Reflection of societal power structures and privileges
- Complications arise when working with sensitive populations
- Difficult to practice with qualitative data
- Online vigilantism often targeting people who have less power (women, POC)
- Open science badges ranking and monitoring researchers

Thank you!

- Thank you to Anna Vannucci and Hannah Tarder-Stoll for their contributions on these slides!