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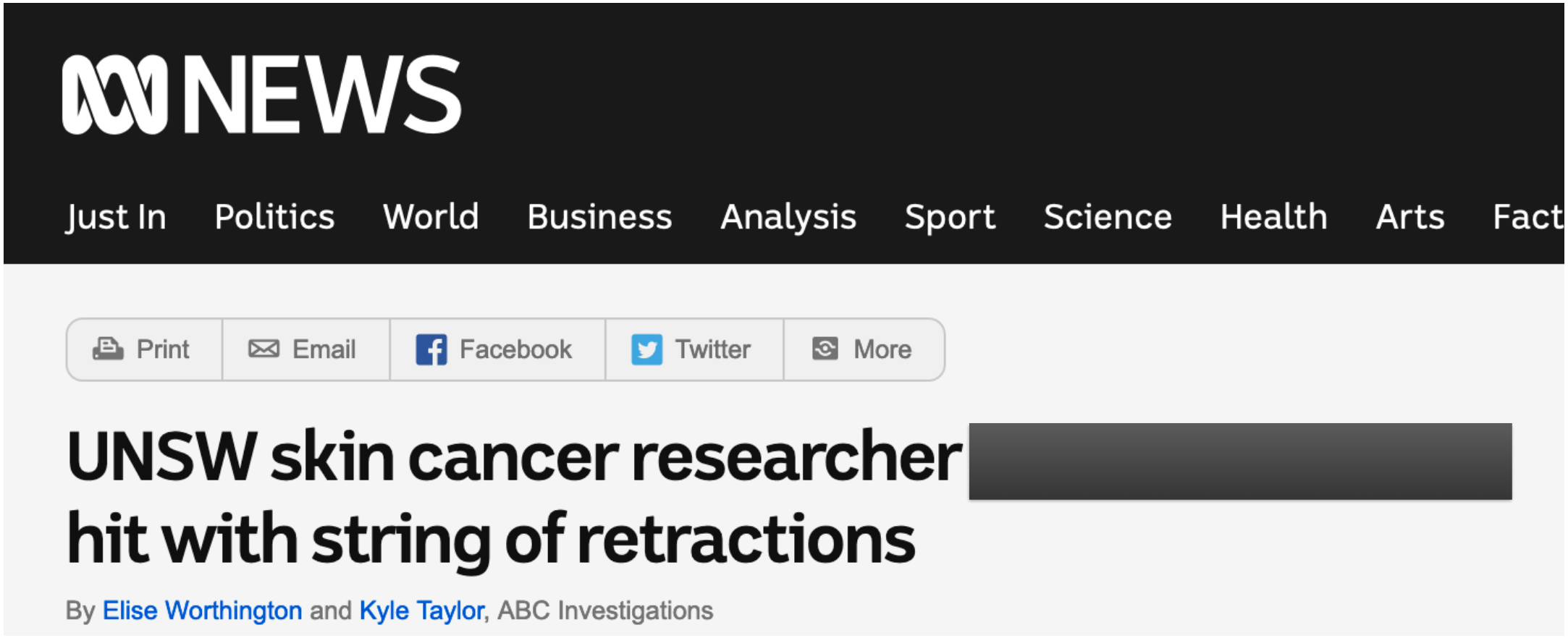
Open Science: what, why and how?

Professor Ina Bornkessel-Schlesewsky



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In the news …

October 17th 2019

https://www.abc.net.au/news/2019-10-17/unsw-skin-cancer-levon-khachigian-allegations-and-retractions/11585768

- “six research papers […] withdrawn or retracted from publication due to unresolved concerns over missing or manipulated data”
- “the same images had apparently been duplicated and then labelled as if they were representing two different things”
- "So the claim that the drug is having effect on cell size is clearly due to a magnification of the image and not an actual effect of the drug.”
- “ … the authors withdrew the research, admitting they couldn't locate the raw data needed to prove their work.”

In the news …

October 17th 2019

https://www.abc.net.au/news/2019-10-17/unsw-skin-cancer-levon-khachigian-allegations-and-retractions/11585768

The nine circles of scientific hell

Neuroskeptic (2012, Perspectives on Psychological Science)

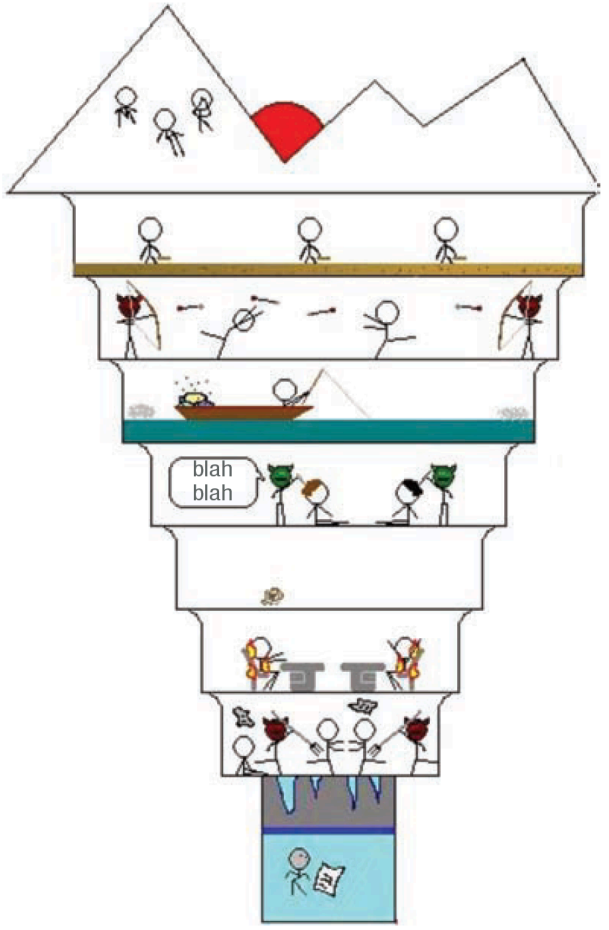

Fig. 1. The nine circles of scientific hell (with apologies to Dante and xkcd)

Center for Open Science – https://cos.io

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What is open science?

A movement aiming to make science more reliable, transparent and accessible

nature human behaviour

Letter | Published: 27 August 2018

Evaluating the replicability of social science experiments in *Nature* and *Science* between 2010 and 2015

Colin F. Camerer, Anna Dreber, Felix Holzmeister, Teck-Hua Ho, Jürgen Huber, Magnus Johannesson, Michael Kirchler, Gideon Nave, Brian A. Nosek ✉, Thomas Pfeiffer, Adam Altmejd, Nick Buttrick, Taizan Chan, Yiling Chen, Eskil Forsell, Anup Gampa, Emma Heikensten, Lily Hummer, Taisuke Imai, Siri Isaksson, Dylan Manfredi, Julia Rose, Eric-Jan Wagenmakers & Hang Wu

Nature Human Behaviour **2**, 637–644 (2018) | Download Citation ↓

from the abstract:

We replicate 21 systematically selected experimental studies in the social sciences published in Nature and Science between 2010 and 2015*. The replications follow analysis plans reviewed by the original authors and pre-registered prior to the replications. The replications are high powered, with sample sizes on average about five times higher than in the original studies. We find a significant effect in the same direction as the original study for 13 (62%) studies, and the effect size of the replications is on average about 50% of the original effect size.* ***Replicability varies between 12 (57%) and 14 (67%) studies for complementary replicability indicators****.*

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Why open science?
The replicability crisis

A movement aiming to make science more reliable, transparent and accessible

More social science studies just failed to replicate. Here's why this is good.

What scientists learn from failed replications: how to do better science.

By Brian Resnick | @B_resnick | brian@vox.com | Aug 27, 2018, 11:00am EDT

https://www.vox.com/science-and-health/2018/8/27/17761466/psychology-replication-crisis-nature-social-science

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Why open science?
The replicability crisis

A movement aiming to make science more transparent and accessible

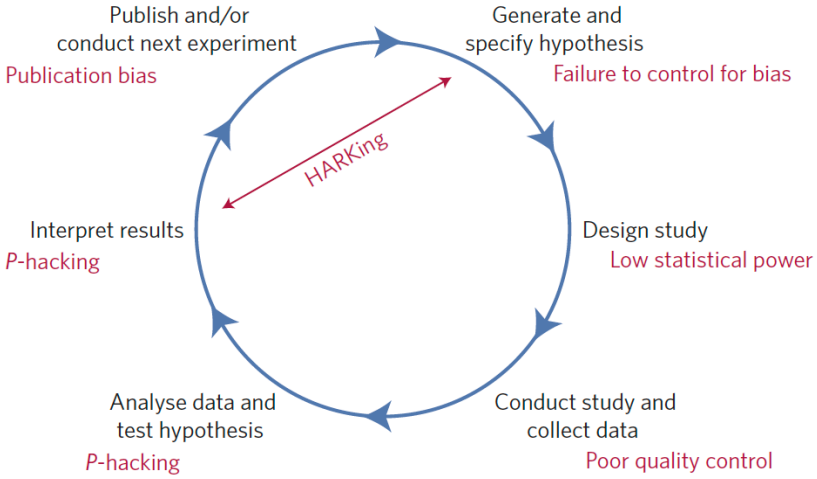

Figure 1 | Threats to reproducible science. An idealized version of the hypothetico-deductive model of the scientific method is shown. Various potential threats to this model exist (indicated in red), including lack of replication[5], hypothesizing after the results are known (HARKing)[7], poor study design, low statistical power[2], analytical flexibility[51], *P*-hacking[4], publication bias[3] and lack of data sharing[6]. Together these will serve to undermine the robustness of published research, and may also impact on the ability of science to self-correct.

Munafò et al. (2017, Nature Human Behaviour)

Table 1. Open science practices. Some methods introduced or suggested by the open science community to improve scientific practices.

Resources	Sharing of code, data, research materials, and methods [2,19].
Publishing formats	Registered reports [28], preregistrations [17], exploratory reports [32], preprints [27], open access publishing [33], as well as new evaluation and peer review processes [24].
Research questions	Pursuing replications and reanalyses [2,5,6,9,19].
Methodology	Changes in statistical approaches for power [21,22], how evidence is assessed [23] and communicated [34], as well as documenting data analysis in a way that facilitates reproducing results [35].

https://doi.org/10.1371/journal.pbio.3000246.t001

Allen & Mehler (2019, Plos Biology)

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Open science: how?

Some very real benefits

- Collaborate to correct errors

“Willoughby, the first author of the 2014 study who wrote the script, called the new study ‘a beautiful example of science working to advance the work we reported in 2014.’”

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MOTHERBOARD
TECH BY VICE

A Code Glitch May Have Caused Errors In More Than 100 Published Studies

The discovery is a reminder that science is collaborative and ideally self-correcting, but that nothing can be taken for granted.

By **Maddie Bender**

Oct 10 2019, 11:30pm Share Tweet

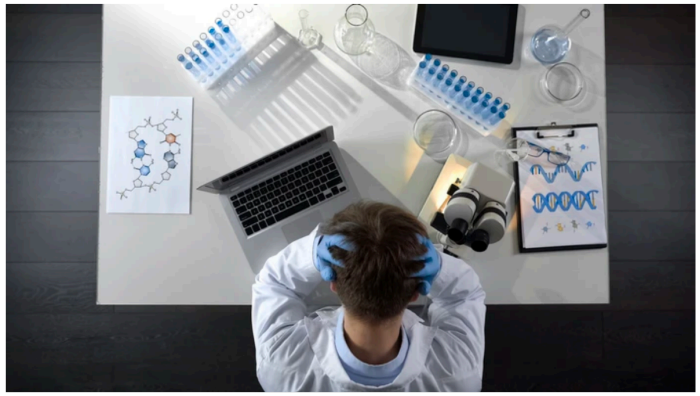

IMAGE: GETTY

Scientists in Hawai‘i have uncovered a glitch in a piece of code that could have yielded incorrect results in over 100 published studies that cited the original paper.

The glitch caused results of a common chemistry computation to vary depending on the operating system used, causing discrepancies among Mac, Windows, and Linux systems. The researchers published the revelation and a debugged version of the script, which amounts to roughly 1,000 lines of code, on Tuesday in the journal *Organic Letters*.

https://www.vice.com/en_ca/article/zmjwda/a-code-glitch-may-have-caused-errors-in-more-than-100-published-studies

Some very real benefits

- Your future self will thank you!

Hang on ... what about qualitative research?

Challenges include:

- emergent methodology depending on data
- contextual embedding of data
- sensitivity of data


ACCOUNTABILITY IN RESEARCH
2019, VOL. 26, NO. 3, 229–244
http://dx.doi.org/10.1080/08989621.2019.1580147

Taylor & Francis
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OPEN ACCESS

Preregistering qualitative research

Tamarinde L. Haven [a] and Dr. Leonie Van Grootel [b]

[a]Department of Philosophy, Vrije Universiteit Amsterdam, Amsterdam, The Netherlands; [b]Department of Methodology & Statistics, Tilburg University, Tilburg, The Netherlands


Article

Open Data in Qualitative Research

International Journal of Qualitative Methods
Volume 18: 1–6
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DOI: 10.1177/1609406918823863
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Amelia Chauvette[1], Kara Schick-Makaroff[1], and Anita E. Molzahn[2]


osf.io/ewyjb/

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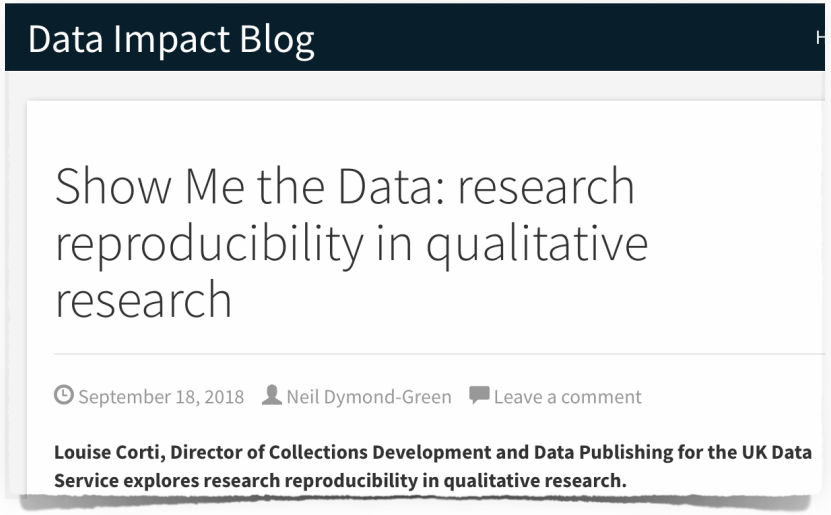
Data sharing in qualitative research: opportunities and concerns

AUTHORS
Cormac McGrath, Gustav Nilsonne

CREATED ON
August 29, 2018

LAST EDITED
November 14, 2018

SUPPLEMENTAL MATERIALS
osf.io/qhtyv/


Data Impact Blog

Show Me the Data: research reproducibility in qualitative research

September 18, 2018 Neil Dymond-Green Leave a comment

Louise Corti, Director of Collections Development and Data Publishing for the UK Data Service explores research reproducibility in qualitative research.

http://blog.ukdataservice.ac.uk/show-me-the-data/

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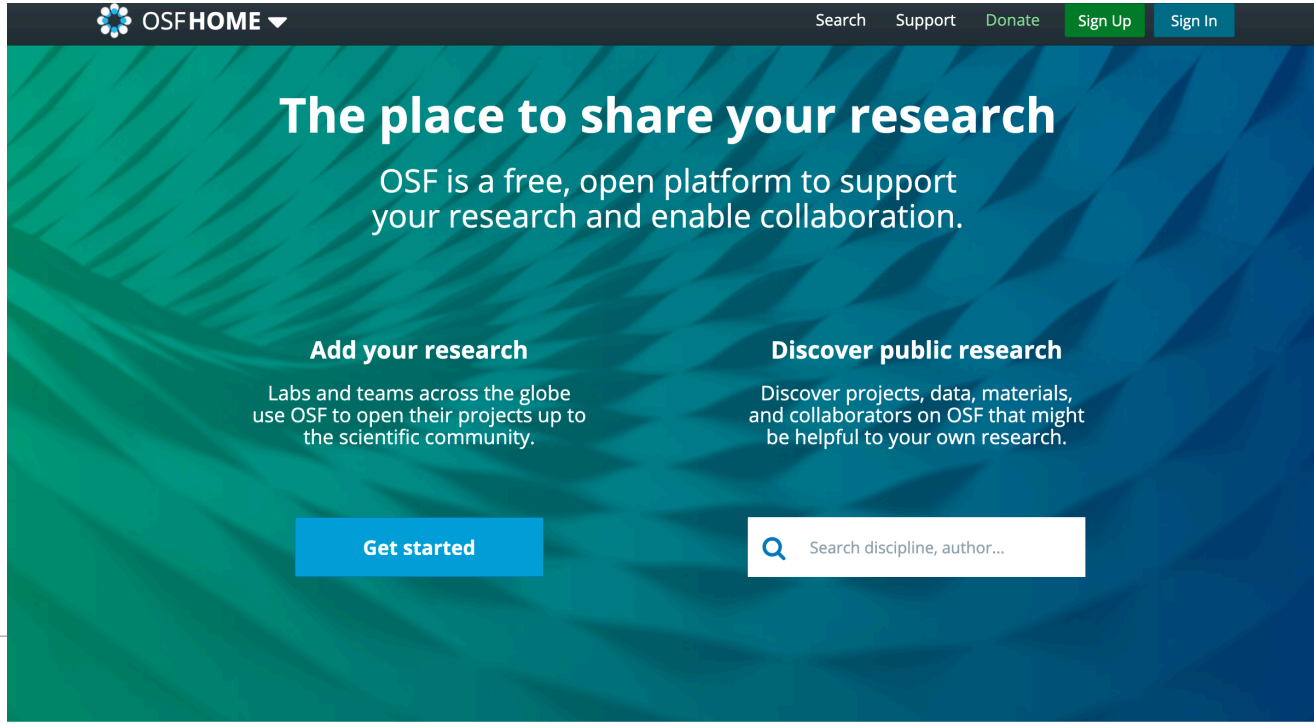
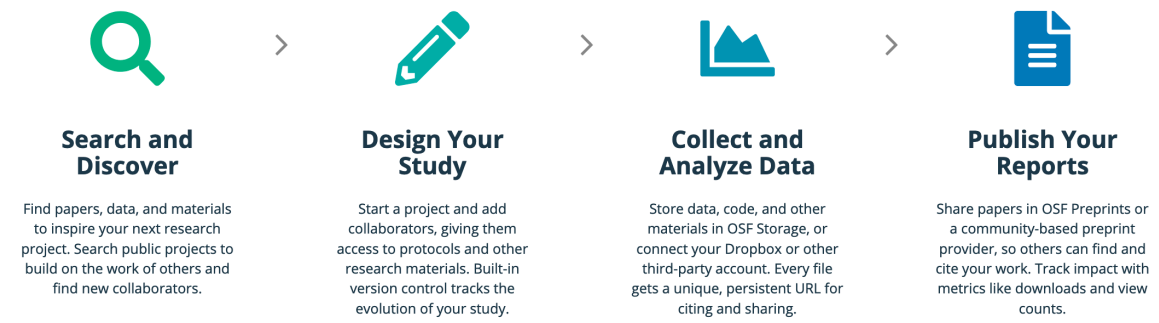
Open science: resources

Open Science Framework

osf.io





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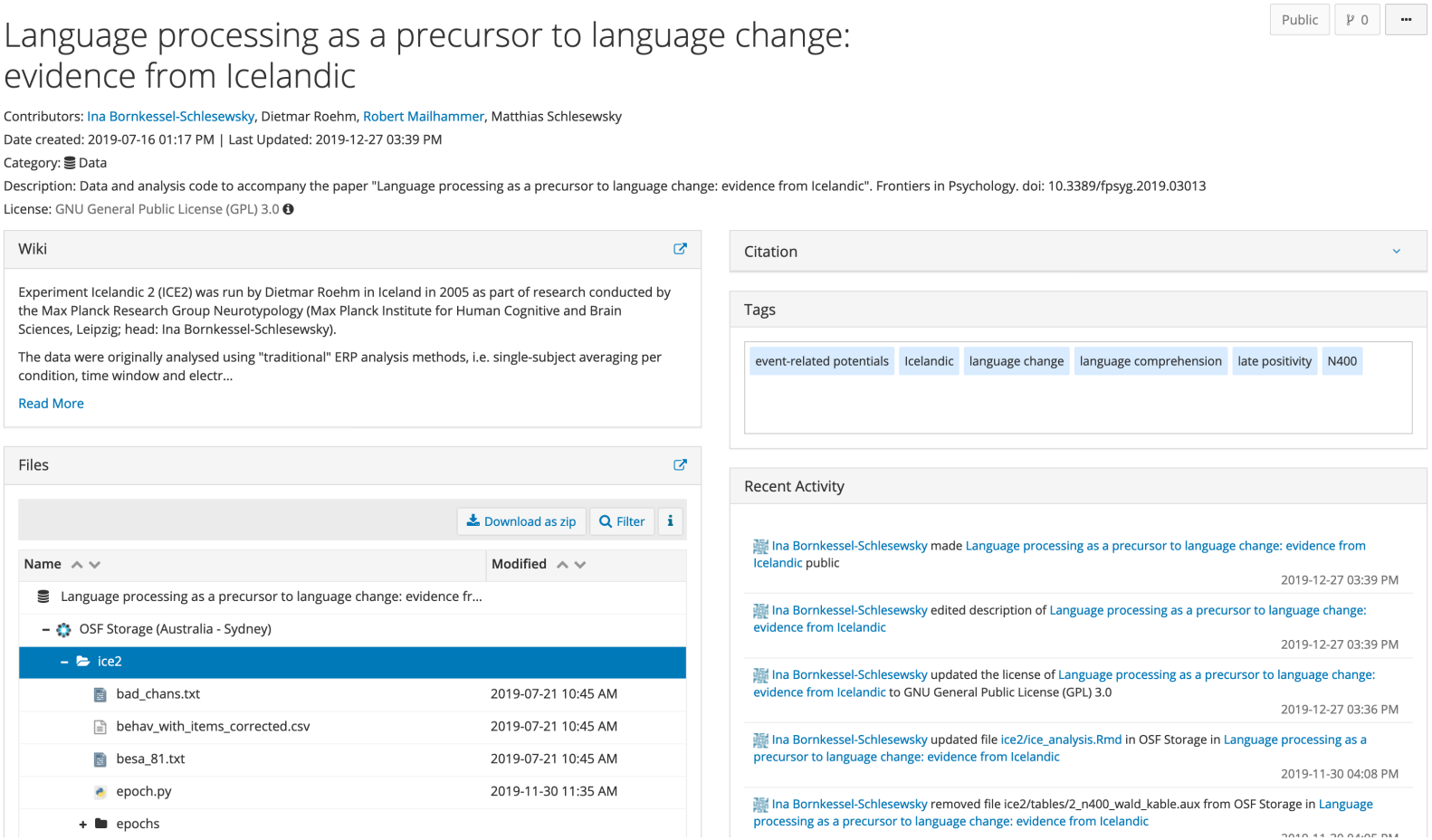

Language processing as a precursor to language change: evidence from Icelandic

Public | 0

Contributors: Ina Bornkessel-Schlesewsky, Dietmar Roehm, Robert Mailhammer, Matthias Schlesewsky

Date created: 2019-07-16 01:17 PM | Last Updated: 2019-12-27 03:39 PM

Category: Data

Description: Data and analysis code to accompany the paper "Language processing as a precursor to language change: evidence from Icelandic". Frontiers in Psychology. doi: 10.3389/fpsyg.2019.03013

License: GNU General Public License (GPL) 3.0

Wiki

Experiment Icelandic 2 (ICE2) was run by Dietmar Roehm in Iceland in 2005 as part of research conducted by the Max Planck Research Group Neurotypology (Max Planck Institute for Human Cognitive and Brain Sciences, Leipzig; head: Ina Bornkessel-Schlesewsky).

The data were originally analysed using "traditional" ERP analysis methods, i.e. single-subject averaging per condition, time window and electr...

Read More

Citation

Tags

event-related potentials | Icelandic | language change | language comprehension | late positivity | N400

Files

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Name	Modified
Language processing as a precursor to language change: evidence fr...	
OSF Storage (Australia - Sydney)	
ice2	
bad_chans.txt	2019-07-21 10:45 AM
behav_with_items_corrected.csv	2019-07-21 10:45 AM
besa_81.txt	2019-07-21 10:45 AM
epoch.py	2019-11-30 11:35 AM
epochs	

Recent Activity

Ina Bornkessel-Schlesewsky made Language processing as a precursor to language change: evidence from Icelandic public
2019-12-27 03:39 PM

Ina Bornkessel-Schlesewsky edited description of Language processing as a precursor to language change: evidence from Icelandic
2019-12-27 03:39 PM

Ina Bornkessel-Schlesewsky updated the license of Language processing as a precursor to language change: evidence from Icelandic to GNU General Public License (GPL) 3.0
2019-12-27 03:36 PM

Ina Bornkessel-Schlesewsky updated file ice2/ice_analysis.Rmd in OSF Storage in Language processing as a precursor to language change: evidence from Icelandic
2019-11-30 04:08 PM

Ina Bornkessel-Schlesewsky removed file ice2/tables/2_n400_wald_kable.aux from OSF Storage in Language processing as a precursor to language change: evidence from Icelandic

https://osf.io/zp6yv/

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Open science: resources
Open Science Framework

Raw data and analysis code to accompany

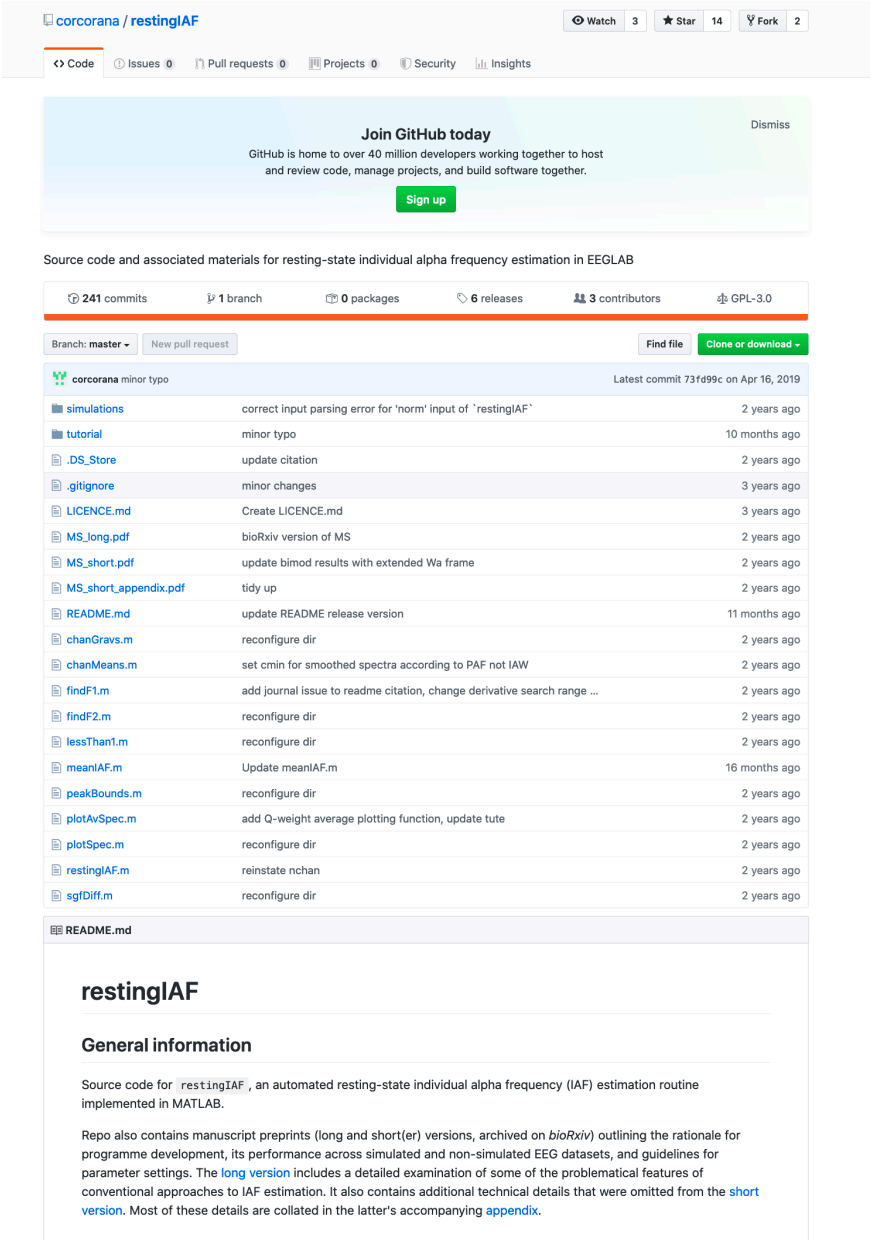
Bornkessel-Schlesewsky, I., Roehm, D., Mailhammer, R., & Schlesewsky, M. (2020). Language Processing as a Precursor to Language Change: Evidence From Icelandic. *Frontiers in Psychology, 10*, 3013. https://doi.org/10.3389/fpsyg.2019.03013

Open science: resources

GitHub (one example of a code repository)
github.com

example: repository providing code to accompany

Corcoran, A. W., Alday, P. M., Schlesewsky, M., & Bornkessel-Schlesewsky, I. (2018). Toward a reliable, automated method of individual alpha frequency (IAF) quantification. Psychophysiology, 55(7), e13064. https://doi.org/10.1111/psyp.13064



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Open science: resources

Many good recent overview articles

ROYAL SOCIETY OPEN SCIENCE

rsos.royalsocietypublishing.org

Research

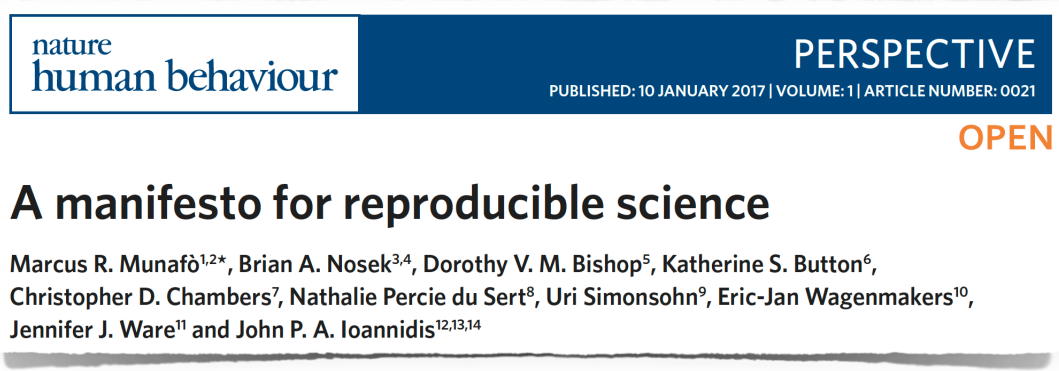
Cite this article: Smaldino PE, McElreath R. 2016 The natural selection of bad science.

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



nature human behaviour

PERSPECTIVE

PUBLISHED: 10 JANUARY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0021

OPEN

A manifesto for reproducible science

Marcus R. Munafò[1,2*], Brian A. Nosek[3,4], Dorothy V. M. Bishop[5], Katherine S. Button[6], Christopher D. Chambers[7], Nathalie Percie du Sert[8], Uri Simonsohn[9], Eric-Jan Wagenmakers[10], Jennifer J. Ware[11] and John P. A. Ioannidis[12,13,14]

PLOS BIOLOGY 2019

PERSPECTIVE

Open science challenges, benefits and tips in early career and beyond

Christopher Allen[1☯*], **David M. A. Mehler**[1,2☯*]

1 Cardiff University Brain Research Imaging Centre (CUBRIC), Wales, United Kingdom, **2** Department of Psychiatry, University of Muenster, Germany

☯ These authors contributed equally to this work.
* mehlerdma@gmail.com (DMAM); AllenCP@cardiff.ac.uk (CA)

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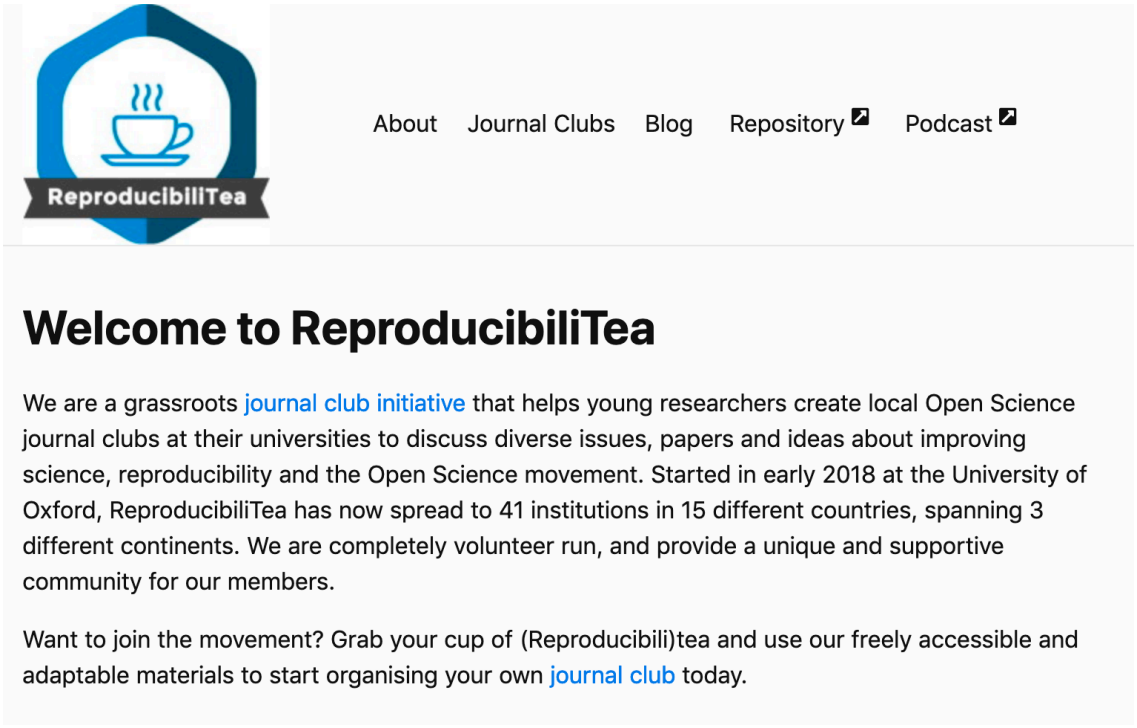

#openscience

https://reproducibilitea.org/

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Join the conversation!

many online resources to get you started